Environmental Impact Assessment

Gas to Energy Project

Esso Exploration and Production Guyana Limited

Volume II Appendices

ERM

November 2022

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APPENDIX A

Project Team and Curricula Vitae

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Project Team and Signatures

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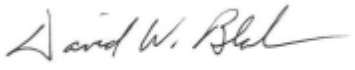
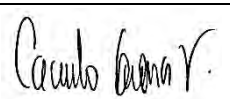
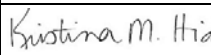
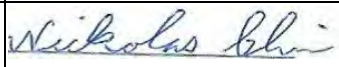
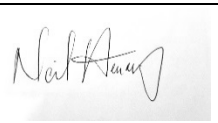
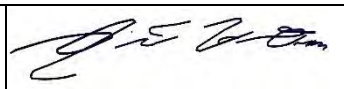
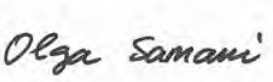
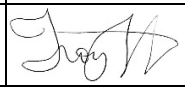
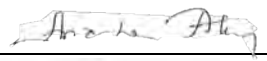
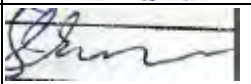
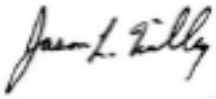
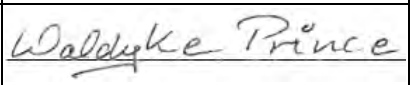
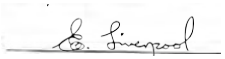
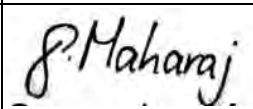
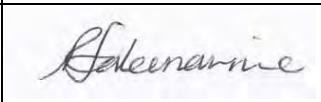
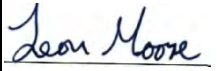
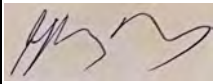
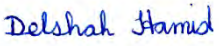
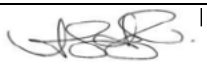
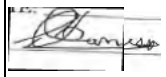
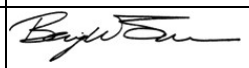
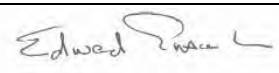
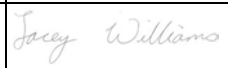
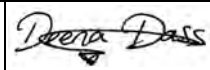
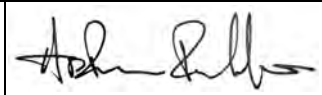
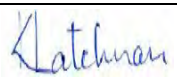
Member	Company and Position	Role	Signature
Project Management			
Dave Blaha	ERM: Partner-in-Charge	Overall lead for regulatory engagement, EIA process execution, and deliverable production; technical review of EIA	
Todd Hall	ERM: Program Lead	Overall program lead for the ExxonMobil Guyana program; technical review of EIA	
Camilo Gaona	ERM: Guyana Partner in Charge	Logistics management, subcontractor management, regulatory interface	
Julia Tims	ERM: Project Manager and Biological Resources Specialist	Overall day-to-day management of technical execution for EIA process; technical review of EIA Biological Resources chapter	
Selina Pradhan	ERM: Project Coordinator	Subcontractor, Field work and EIA task coordination	
Kris Hiatt	ERM: Technical Editor	Overall lead technical editor and document manager	
Nickolas Chin	ERM Guyana: Environmental Health, Safety, and Security Lead	Health and safety	
Neil Henry	ERM Guyana: Local ERM Team Coordinator	Logistics and other local support for field studies and stakeholder engagement	
Physical Resources Subject Matter Experts			
Rick Osa	ERM: Air Quality and Noise Monitoring Specialist	Contributor to EIA Physical Resources chapter	
Doug Dziubla	ERM: Air Quality Specialist	Contributor to EIA Physical Resources chapter	
Olga Samani	ERM: Air Quality Modeling Specialist	Technical lead for air quality dispersion modeling and air quality and climate impact assessment	
Troy Enright	ERM: Sound Specialist	Contributor to EIA Physical Resources chapter	

Member	Company and Position	Role	Signature
Shwet Prakash	ERM: Water Quality Specialist	Technical lead for water quality modeling and impact assessment	
Harry Zahakos	ERM: Water Quality Specialist	Contributor to EIA Physical Resources chapter	
Matt Erbe	ERM: Geology, Soils, and Groundwater Lead	Contributor to EIA Physical Resources chapter	
Herbert Pirela	ERM: Geology	Contributor to EIA Physical Resources chapter	
Anasha Ally	E&A: Team Coordinator, Permitting Specialist	Contributor to EIA Physical Resources chapter and Socioeconomic Resources chapter	
Lalita Gopaul	E&A: Permitting Support	Contributor to EIA Physical Resources chapter and Socioeconomic Resources chapter	
Jewel Liddell	E&A: Environmental Engineer	Contributor to EIA Physical Resources chapter	
Esther Ugraj	E&A: Environmentalist	Contributor to EIA Physical Resources chapter	
Sharadha Sonaram	E&A: Permitting Support	Contributor to EIA Physical Resources chapter	
Oudho Homenauth	E&A: Soil Scientist	Contributor to EIA Physical Resources chapter	
Amanda Persaud	CEMCO: Team Coordinator	Contributor to EIA Physical Resources chapter	
Michael Lowe	CEMCO: Water Quality Specialist	Contributor to EIA Physical Resources chapter	
Biological Resources Subject Matter Experts			
Jason Willey	ERM: Biological Resources Specialist	Technical lead for EIA Biological Resources chapter	

Member	Company and Position	Role	Signature
Amberly Moon	ERM: Biodiversity Specialist	Contributor to EIA Biological Resources chapter	
Morriah Fickes	ERM: Biodiversity Specialist	Contributor to EIA Biological Resources chapter	
Waldyke Prince	ERM: Biological Resources Specialist	Contributor to EIA Biological Resources chapter	
Elford Liverpool	University of Guyana CSBD: Team Coordinator	Contributor to EIA Biological Resources chapter	
Priya Maharaj	University of Guyana CSBD: Biological Resources Specialist	Contributor to EIA Biological Resources chapter	
Rovindra Lakenarine	University of Guyana CSBD: Biological Resources Specialist	Contributor to EIA Biological Resources chapter	
Mark Ram	University of Guyana CSBD: Biological Resources Specialist	Contributor to EIA Biological Resources chapter	
Leon Moore	Leon Moore Nature Experience: Team Coordinator, Biological Resources Specialist	Contributor to EIA Biological Resources chapter	
Jeffrey McCrary	Independent Consultant	Contributor to EIA Biological Resources chapter	
Delshah Hamid	E&A: Permitting Support	Contributor to EIA Biological Resources chapter	
Socioeconomic Resources Subject Matter Experts			
Karin Nunan	SLR: Socioeconomic, Stakeholder Engagement, and Ecosystems Services Specialist	Technical lead for EIA Socioeconomic Resources chapter	
Anna Sundby	ERM: Socioeconomic, Stakeholder Engagement,	Contributor to EIA Socioeconomic Resources chapter	

Member	Company and Position	Role	Signature
	and Ecosystems Services Specialist		
Candice Ramessar	ERM Guyana: Socioeconomic, Stakeholder Engagement, and Ecosystems Services Specialist	Contributor to EIA Socioeconomic Resources chapter	
Ashanta Osborne	CEMCO: Social Specialist	Contributor to EIA Socioeconomic Resources chapter	
Amanda Sahai-Alli	CEMCO: Social Specialist	Contributor to EIA Socioeconomic Resources chapter	
Kevin Malloy	ERM: Archaeologist	Contributor to EIA Socioeconomic Resources chapter	
Dominique Segura	ERM: Architectural Historian	Contributor to EIA Socioeconomic Resources chapter	
Matthew Robinson	ERM: Visual Specialist	Contributor to EIA Socioeconomic Resources chapter	
Ben Sussman	ERM: Transportation Specialist	Transportation and Traffic lead	
Edward Gonsalves	CEMCO: Civil Engineer/ Transportation Planner	Contributor to River Traffic Study	
Lacey Williams	CARITRANS: Transportation Specialist	Contributor to Onshore Traffic Study	
Deena Dass	CARITRANS: Transportation Specialist	Contributor to Onshore Traffic Study	
Adrian Rennie	CARITRANS: Transportation Specialist	Contributor to Onshore Traffic Study	
Kareem Brown	E&A: Social Specialist	Contributor to EIA Socioeconomic Resources chapter	
Kelly-Ann Latchman	E&A: Social Support	Contributor to EIA Socioeconomic Resources chapter	

Member	Company and Position	Role	Signature
Mark July	E&A: Social Specialist	Contributor to EIA Socioeconomic Resources chapter	
Roydon Croal	E&A: Social Specialist	Contributor to EIA Socioeconomic Resources chapter	
Other Subject Matter Experts			
Rowena Cerro	ERM: Cumulative Impacts Lead	Technical lead for EIA Cumulative Impacts chapter	
Noam Raffel	ERM: GIS Specialist	Technical lead for GIS	
Sam Guffey	ERM: Alternatives and Biological Resources	Contributor to alternatives analysis and contributor to EIA Biological Resources chapter	

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Curricula Vitae

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David Blaha

Partner-in-Charge

Dave Blaha has extensive experience in multi-media permitting of large (>$1billion) and often controversial infrastructure projects. He served as ERM's Partner-in-Charge for ExxonMobil's initial work in Guyana, including successfully permitting and securing the Government of Guyana approval for seismic surveys, EBSs, EMPs, and the Liza Phase 1 EIA. This included close coordination with the Guyana EPA and key stakeholders. His other work for ExxonMobil has ranged from serving as the technical coordinator for EM's Golden Pass LNG Project in Texas to the decommissioning of the Nam Phong Gas Processing Plant in Thailand. Other large complex projects that he has helped lead include the Keystone XL Pipeline EIS for the US State Department and the Northeast Gateway Deepwater Port LNG Terminal EIS for the US Coast Guard.

Experience: 37 years of experience with evaluating the environmental and social risks of development projects. Has worked with many lenders to conduct appropriate environmental and social due diligence, gap analyses, and construction/operation compliance assessments relative to the IFC Performance standards, IDB Safeguard Policies and/or Equator Principles.

Email: david.blaha@erm.com

LinkedIn: https://www.linkedin.com/in/david-blaha-2a24224/

Education

- Master of Environmental Management, Duke University, NC, 1981
- Bachelor of Arts, Biology, Gettysburg College, PA, 1978

Professional Affiliations and Registrations

- American Institute of Certified Planners, 1986
- International Association of Impact Assessment
- American Planning Association
- International Hydropower Association
- National Association of Env. Professionals

Languages

- English – native speaker
- Spanish - basic

Fields of Competence

- Environmental and social impact assessment applying the IFC Performance Standards, World Bank Safeguards, and Equator Principles
- Water resources, including water supply planning and water quality management. Analyses of sources, quantities, types, transport, and fate of pollutants.
- Wetland ecology, including wetland delineation, functional assessments, mitigation design, permitting, and protection planning.

Key Industry Sectors

- Finance
- Power
- Oil & Gas
- Mining
- Infrastructure and Land Use

Training

- Hydropower Sustainability Assessment Protocol, by the International Hydropower Association, July 2007.

Publications and Presentations

- *Role of the Independent Environmental Consultant within the Project Finance Cycle* - invited speaker, presented at the IAIA Annual Conference, Montreal, April 2017
- *Managing Environmental and Social Risks of Large Infrastructure Projects - invited speaker at World Bank sponsored PPP Workshop, Bangkok, September 2016.*

Key Projects

IFC InfraVentures Framework Contract - Project Director for framework contract providing environmental and social advisory services to IFC InfraVentures for multiple projects where the IFC is an equity investor or facilitating a public-private partnership.

Inter-American Development Bank (IDB) Support Services Contracts. Project Director for support services task order contract with the IDB for both public sector and private sector projects (2010), supporting energy cluster work (2011), and an overall multi-year support contract (2011 – ongoing). Experienced in applying the IDB's Environment and Safeguard Policies and Directives thru a variety of deliverables (e.g., ESS, ESDD, ESMR).

Millennium Challenge Corporation (MCC). Program Director for 5-year, $60M contract with MCC, and subsequent Environmental and Social Advisory Services contract to provide independent engineering and environmental evaluation and monitoring of infrastructure projects in nearly 30 "compact" countries around the world.

Oyu Tolgoi Copper Mine IESC, Mongolia Project Director serving as Independent Environmental and Social Consultant for the lenders (IFC, EBRD, EDC, Standard Chartered, BNP Paribas) for the world's largest undeveloped copper-gold project located in the Gobi Desert. Evaluating ESIA in terms of IFC PS, Equator Principles and EBRD Environmental Requirements. Responsible for helping lenders manage financial and reputational risks.

Pando – Monte Virio Hydropower Project, Panama. Project Director for construction and operation phase monitoring of an 83 MW hydropower project with a 19-km transmission line to ensure project complies with lender requirements, IFC performance standards, Panamanian regulations, and the project's E&S Management Plan and E&S Action Plan on behalf of the lenders, which include the IDB, IFC, CIFI, and DEG.

Alto Maipo Hydropower Project ESDD, Chile Project Director for ESDD of a controversial 531 MW hydropower project proposed by AES Gener located east of Santiago on behalf of the lenders (IFC, IDB, OPIC). Key issues relate to impacts on endangered small catfish, downstream recreational use, sediment transport, water rights, and the hydrologic effects of potential "blackout" events.

Buenaventura Industrial Port Expansion ESDD, Colombia. Project Director for due diligence of a proposed Pacific container port expansion in Buenaventura on behalf of the IFC. Key issues relate to potential impacts on water quality, adjoining low income residential areas, and temporary disruption of subsistence fishing.

Belgrade Wastewater System Improvement Project, Serbia. Project Director for preparing an Environmental and Social Screening Report of a proposed public-private partnership to expand and rehabilitate the City of Belgrade's wastewater collection, treatment, and disposal system for the IFC.

Onshore LNG ESIA Terms of Reference, Bangladesh. Project Director for preparing the Terms of Reference for an ESIA for a proposed onshore LNG terminal in Bangladesh for the IFC InfraVentures.

Bajo Frio Hydropower Project ESDD, Panama Project Director for conducting an ESDD review per IFC PS, EP, and World Commission on Dams Guidelines for a 58 MW hydropower project on the Chiriqui River in Panama on behalf of the lenders (FMO, DEG, DnB NOR Bank ASA).

Chacayes Hydroelectric Project ESDD, Chile Project Director for conducting an Environmental and Social Due Diligence (ESDD) in accordance with the EP on behalf of the lenders (Credit Agricole) for a 80 MW hydropower project in Chile. Also hired to conduct construction monitoring.

Antotonilco Wastewater Treatment Plant ESDD, Mexico. Project Director for conducting an Environmental and Social Due Diligence pursuant to the Equator Principles for the lender (Credit Agricole) for the largest wastewater treatment plant in the Americas and the largest water sustainability project in Mexico.

Todd H. Hall, PE

Guyana Program Lead, Partner-in-Charge

Todd has over 25 years of broad experience in environmental consulting, focusing on environmental, social and health impact assessment, management plan development, multi-media permitting, site planning and licensing, remediation, and risk assessment. He has prepared environmental, social, and health impact assessments and management plans for dozens of exploration and development projects in North America, South America, Asia/Pacific, Africa, and the Middle East. Todd has worked with ExxonMobil for his entire career, from his first project involving a remedial investigation of a legacy ExxonMobil property, and he has led ERM's programs for ExxonMobil at multiple downstream facilities, legacy sites, LNG regasification facilities, and upstream exploration and development projects worldwide. He has been a part of ERM's support to EEPGL in Guyana since 2017, and has been the Program Lead for ERM's support to EEPGL since early 2018.

Experience: Over 25 years in oil and gas, petrochemical, mining, and power

Email: todd.hall@erm.com

LinkedIn: https://www.linkedin.com/in/todd-hall-5069b14/

Education

- M.E. Civil (Environmental) Engineering, Texas A&M University, College Station, TX, 1995
- B.S. Civil Engineering, Texas A&M University, College Station, TX, 1994

Professional Affiliations and Registrations

- Registered Professional Engineer, Texas
- International Association for Impact Assessment
- Society of Petroleum Engineers

Languages

- English, native speaker

Fields of Competence

- Environmental, social, and health impact assessment
- Environmental, social, and health management plan development
- International Best Practice (EP, IFC PS, etc.)
- National Environmental Policy Act (NEPA)
- Environmental planning, siting, and licensing for U.S. and international energy projects
- Multi-media environmental permitting
- Environmental engineering design
- Site investigation and remediation
- Risk assessment (human and ecological)
- Regulatory compliance assessment

Key Industry Sectors

- Oil and Gas
- Petrochemical
- Power
- Mining

Key Projects

Environmental Impact Assessments
Directed Environmental Impact Assessments (EIAs), inclusive of socioeconomic and community health resources, and associated data collection and stakeholder engagement process for the proposed Liza Phase 2 Development Project and the Payara Development Project, both offshore Guyana. Data collection included completion of onshore and marine traffic studies, onshore and offshore ambient air quality monitoring, and surveys of marine fish, marine benthos, coastal birds, seabirds, marine turtles, and ecosystem services in the Project Area of Influence.

Environmental Management Plans
Directed Environmental Management Plans for several multi-well exploration campaigns offshore Guyana.

Environmental Impact Assessment
Served as senior technical reviewer for an Environmental Impact Assessment for the Liza Phase 1 Development Project offshore Guyana.

Environmental, Social, and Health Impact Assessment
Led preparation of a bankable Environmental, Social, and Health Impact Assessment for a proposed gold mine in Colombia, working from a separate Spanish-language National EIA.

Environmental Planning, Impact Assessment and Regulatory Strategy Implementation
Directed and led the project for a proposed greenfield petroleum refinery and integrated power plant in South Dakota. Completed an environmental critical issues analysis; prepared a permitting strategy; completed an ecological reconnaissance, wetland delineation, and cultural resources intensive survey; prepared for and participated in public open houses and public zoning board hearings; prepared draft re-zoning language; completed a socioeconomic baseline study and economic impact analysis; and prepared a human health risk assessment regarding forecasted air emissions from the facility.

Regulatory Approvals Process
Supported the process for proposed LNG export terminal in western British Columbia. Prepared EA summary documentation to aid in dissemination of EA findings and proposed mitigations to internal and external stakeholders and interested parties. Provided advice related to project design alternatives with respect to air quality regulatory ramifications. Assisted with GHG management strategy including support for lifecycle analysis and development of recommendations for use in influencing and managing emerging GHG regulations applicable to the BC LNG industry.

Environmental Licensing
Directed the assessment and licensing for the Golden Pass LNG Terminal and associated Golden Pass Pipeline system in East Texas and Northwest Louisiana. Developed permitting and development strategies, prepared Environmental Resource Reports to be submitted with separate Natural Gas Act Section 3(a) and Section 7(c) applications to FERC, and prepared related federal, state, and local environmental permit applications. Coordinated ancillary studies to support the application (e.g., traffic study, bird strike monitoring). Directed field activities in support of licensing, including extensive field wetland delineation and archaeological surveys.

Socio-economic Baseline Study
Completed a socio-economic baseline study for a series of Texas counties and Louisiana parishes along the U.S. Gulf Coast. Collected an extensive socio-economic data set and created a methodology to ‘rate’ a number of socio-economic aspects of each county/parish with respect to its development needs and the degree to which each was expected to support future oil and gas development growth in the region.

Environmental Management Plan Development
Developed an environmental management plan, a waste management plan, a regulatory compliance plan, and an environmental monitoring plan for the Golden Pass LNG regasification terminal and pipeline's transition from development/construction to operations. Developed a detailed Compliance Register identifying all environmental, health and safety regulations applicable to terminal and pipeline operations, the basis for applicability, and the specific actionable requirements stemming from regulations.

Environmental Impact Assessment
Managed an Environmental Impact Assessment for the proposed Ras Tanura Refinery Expansion Project in the Kingdom of Saudi Arabia, including completion of extensive CALPUFF air dispersion modeling.

Environmental Impact Assessment
Managed an Environmental Impact Assessment for the proposed Wasit Gas Plant Project in the Kingdom of Saudi Arabia, including completion of extensive CALPUFF air dispersion modeling.

Phase I HSEIA
Directed the HSEIA under ADNOC's Code of Practices for the Integrated Gas Development – Project Habshan Platforms located in the Umm Shaif Field offshore Abu Dhabi.

Air Dispersion Modeling
Managed air dispersion modeling in support of the Saudi Kayan Petrochemical Complex development project in Jubail Industrial City, Saudi Arabia.

Environmental Assessment
Prepared the environmental component of a Public Utility Commission application to construct a transmission line from east Texas into the Houston area. Completed intensive environmental field surveys and prepared an Environmental Assessment (EA) triggered from the project crossing Federal lands.

Environmental and Socioeconomic Feasibility Study
Conducted an environmental and socioeconomic feasibility study for the development of a liquefaction facility in the Caribbean Islands. Rated and ranked several candidate sites based on environmental and social impact criteria.

Environmental, Social and Health Impact Assessment (ESHIA)
Directed the ESHIA for the proposed Congo River Crossing Canyon Project offshore Angola.

Environmental and Social Impact Assessment
Directed the assessment for a 370km segment of a proposed crude oil pipeline in Colombia, including preparing a gap analysis between local licensing requirements and the requirements that would apply under an international financing approach. Collected primary data, identified and communicated planned project details with stakeholder groups including protected communities, and completed a topographic and geotechnical survey of the pipeline segment route.

Social and Health Impact Assessment
Conducted technical review for an assessment of unconventional production operations across a >100,000 acre shale gas formation in the Eagle Ford formation.

Hazard Studies
Completed three separate studies to assess the risk associated with operation of flares on gas production platforms offshore Equatorial Guinea.

Environmental and Social Due Diligence
Completion an assessment for the proposed 'farm-in' acquisition of unconventional natural gas production operations in Eastern Louisiana. Completed a Risk Analysis transaction including interviews with the firm's management and other personnel at the firm's headquarters, and site visits to representative facilities to present summary of findings, including an

assessment of the priority of findings based on a risk categorization structured to inform decision-making.

Philosophies and Plans
Directed the development of environmental control design philosophy, oil and hazardous materials spill response philosophy, environmental management plan, environmental monitoring plan, waste management plan, and regulatory compliance plan for a component of the Barzan gas development project offshore Qatar.

Waste Management Plan
Prepared the plan for oil and gas operations in the Western Desert of Egypt.

Environmental/Regulatory Framework
Directed the assessment for the area of a proposed exploration and production effort offshore Barbados.

Technical Review
Served as Senior Technical Reviewer for a desktop environmental, regulatory, and social review and ecological resource assessment for an exploration and production area of interest in Colombia.

Environmental Impact Assessment
Directed the assessment for a proposed offshore natural gas pipeline in Angola and for three separate Supplemental EIAs for offshore oil and gas developments offshore Angola.

Environmental Impact Assessments
Directed several assessments for proposed exploratory drilling projects offshore Angola. Completed social baseline data gathering, oil spill modeling, cuttings discharge modeling, and regulatory licensing support.

Environmental Impact Assessment
Directed an assessment for proposed production platform expansions offshore Angola.

Air Quality Modeling Study
Conducted the study for a proposed floating production, storage, and offloading facilities offshore Angola. Used the Offshore Coastal Dispersion Model to predict transport of air pollutant concentrations from offshore sources to onshore receptors.

ESHIA/ESAP
Directed and led an Environmental, Social and Health Impact Assessment (ESHIA) and associated Environmental and Social Action Plan (ESAP) prepared in accordance with international best practice (EBRD and ADB) standards for the Ukhaa Khudag (UHG) Project, including a coal mine, coal-fired power generation facilities, a groundwater abstraction field, and other supporting facilities in southern Mongolia. Conducted extensive social and environmental baseline data gathering, air dispersion modeling, and noise modeling, and supported stakeholder engagement and consultation activities. Prepared Railway Construction Ecological Best Practices and Resettlement Best Practices white papers, and completed environmental and social action plan monitoring and evaluation.

Environmental and Social Impact Assessment
Prepared a preliminary ESIA for a major copper/gold mine in Alaska. Provided strategic direction relative to the ESIA approach and conducted technical reviews of project deliverables.

Environmental and Regulatory Management Plan
Developed an internal plan detailing the division of environmental and regulatory responsibilities and interfaces between exploration, geo-operations, and drilling business units within a major oil and gas company.

Environmental and Social Due Diligence
Directed the baseline characterization and conducted a due diligence exercise for a prospective farm-in of unconventional gas production operations in east Texas and northwest Louisiana. Assessed potential

environmental and social risks associated with increased production in the area.

Environmental Assessment
Directed a production well re-entry assessment to support development of oil and gas resources on property managed by the National Park Service (Big Thicket National Preserve).

Environmental Impact Review and Licensing
Directed a project to support preparation of a Department of Energy (DOE) assessment and associated state-level environmental review documentation for a major solar energy development in the Northeast U.S. Completed a viewshed analysis to assess visual impacts from construction of the project.

Socioeconomic Baseline/Impact Assessment
Directed the assessment supporting a gold mining project in Kazakhstan.

Due Diligence Assessment
Led the assessment for a major petroleum refinery in the U.S. Virgin Islands. Conducted a review of investigation, remediation, and permitting requirements, and status of associated refinery activities.

Hazard Assessment Project
Completed assessment for two proposed natural gas storage caverns in the Southwestern U.S. Developed worst-case failure scenarios and analyzed the expected consequences of the failure.

Environmental Impact Analyses
Acquired drilling licenses and completed the analyses associated with a proposed production well drilling and testing project in northern Brazil.

Air Quality Modeling Study
Conducted the study for proposed floating production, storage, and offloading (FPSO) facilities for a natural gas formation offshore Angola. Used the Offshore Coastal Dispersion Model to predict transport of air pollutant concentrations from offshore sources to onshore receptors.

Sustainability Reporting
Directed the project for a major wind energy development in accordance with Global Reporting Initiative (GRI G3) guidelines. Collected necessary reporting information, prepared an internal reporting handbook, and developed documentation demonstrating methodology used for reporting.

Environmental Licensing
Directed a permitting and impact assessment project in New York for a proposed wind power project. Acquired licensing through the New York State Public Service Commission and prepared an EIS pursuant to the State Environmental Quality Review process. Completed wetland delineation, cultural resource surveys, noise surveys, and visual impact simulations.

Site Screening Studies
Directed over 160 studies for proposed wind power projects in the U.S., each including mapping to identify key resources and land uses at the site, characterization of biological and aquatic resources potentially affected by the development, identification of recorded cultural resources within the site area, evaluation of potential land use related issues (e.g., zoning, visual restrictions, height limitations, designated conservation lands, floodplains, etc.), identification of potential tribal interests, and identification of potential communication, radar, and aviation related issues. Created a permit matrix that identified the federal, state, and local regulatory requirements that would apply to the development, the contact information for the agency responsible for the permit/approval, the requirements of the permit/approval application process, and the anticipated timeline.

Camilo Gaona

Guyana Partner-in-Charge

Camilo is a Partner in ERM and is the Lead for the operation of ERM Guyana since 2018. Between 2016 and 2018 was the Team Lead for Environmental Impact Assessments in ERM Korea and was responsible for undertaking International ESIAs, Environmental monitoring and audit (EM&A) as well as Environmental and Social Due Diligence in alignment with International Standards, either for commercial banks or ECAs. He is focused on Environmental and Social Impact Assessment Projects in a number of sectors including Oil & Gas and Power sector. He has been working on projects in several locations and countries as South Korea, Myanmar, Philippines, South Africa, Botswana, Mongolia, Turkmenistan, Colombia, Nicaragua, Dominican Republic and recently Guyana, developing International ESIA according to IFS-Ps and OECD Guidelines and following local regulations for each one of the countries, giving him a wider experience in environmental and social permitting processes.. He has conducted several ESDD in different in different countries in Asia, Africa, Middle East and Latin America in alignment with Equator Principles (EP), OECD, among others.

Experience: 12 years' experience in oil & gas, and power sectors

Email: camilo.gaona@erm.com

LinkedIn: www.linkedin.com/in/camilo-gaona-6745866b

Education

- Environmental Engineer, La Salle university, Colombia, 2008
- IFC Performance Standards, Managing Environmental and Social Performance course, 2014

Professional Affiliations and Registrations

- Engineering Association of Colombia -COPNIA

Languages

- Spanish, native speaker
- English, fluent
- Korean, working knowledge

Fields of Competence

- Environmental and Social Impact Assessment, local and international standards (IFC-PS, OECD, EP)
- Environmental and Social Due Diligence (ESDD), ESAP and monitoring for lenders.
- Environmental and social permitting

Key Industry Sectors

- Oil and gas
- Power
- Infrastructure

Key Projects

Mr .Gaona is familiar with requirements of lenders such as the IFC- PS. He has conducted several ESDD in different in different countries in Asia, Africa, Middle East and Latin America in alignment with Equator Principles (EP), OECD , among others.

Environmental and Social Studies for Kanukuku Block Offshore Guyana . Repsol Guyana. Oil & Gas Sector. 2018- Ongoing, Project Manager
ERM was engaged by Repsol Guyana to conduct and EAMP and ESHIA for the Multiwell Drilling Campaign in Kanuku Block Offshore Guyana. Scope of work also includes the update of the Stakeholders Engagement Plan.

Environmental and Social Impact Studies for Guyana Program . ExxonMobil. Oil & Gas Sector. 2018- Ongoing, Program Master Planner
Planning for different Projects belong to ExxonMobil Guyana Program as Liza Phase 2 and Payara oil fields

Environmental, Social and Technical analysis for a route selection for Gas Pipeline of 150Km length in Dominican Republic. SK E&S. Oil & Gas Sector. 2018- Ongoing, Project Manager
ERM was engaged by SK E&S to and Environmental, Social and Technical analysis to select the most viable route for a gas pipeline of ~150Km length. Scope of work also includes Identification of special crossings as well as diagnosis of roads to be use at construction stage.

Environmental and Social Screening for a Coal Power Plant in Phillipines. SK E&C. Power Sector. 2017, Project Manager
ERM was engaged by SK E&C to conduct an Environmental and Social Screening and a specific mangrove surveys for Coal Power Plant Project in Philippines. 2017

Environmental and Social Assessment and Environmental Legal Review for CCGT Power Plant in Dominican Republic. SK E&S Power Sector. 2017- Ongoing, Project Manager
ERM was engaged by SK E&S to conduct an ESA and Environmental review for a Combined Cycle Gas Turbine Power Plant in Dominican Republic. Scope of work also was a topographic survey and water quality sampling.

International Environmental and Social Impact Assessment for a De-Waxing unit in Turkmenbashi, Turkmenistan in alignment with IFC-PS and OECD Guidelines. O&G. 2017 – On Going, Project Manager
ERM is in charge to conduct an International Environmental and Social Impact Assessment in alignment with IFS-PS and OECD Guidelines for a De-Waxing Unit in Turkmenbashi, Turkmenistan. Project sponsor is a korean company and main finance came from a Korean ECA.

Environmental and social Due Diligence for Coal Power Plant in Botswana, Africa, in alignment with IFC-PS and OECD Guidelines, Power. 2016 – Ongoing. Confidential client, Project Manager
ERM was selected to act as Lender's independent consultant to conduct the ESDD, ESAP and Monitoring for Coal Power Plant (CFPP) in Botswana for a Korean ECA in alignment with IFC-PS and OECD Guidelines.

Environmental and social Due Diligence for Coal Power Plant in South Africa, Africa, in alignment with IFC-PS and OECD Guidelines, Power. 2016 – Ongoing, Project Manager
ERM was selected to act as Lender's independent consultant to conduct the ESDD, ESAP and Monitoring for Coal Power Plant (CFPP) in South Africa for a Korean ECA in alignment with IFC-PS and OECD Guidelines.

Environmental Impact and Social Study for Production Stage in Shwe Offshore Field in Bay of Bengal in Myanmar. POSCO-DAEWOO Corporation. Oil&Gas Sector. 2016-ongoing, Project Manager
ERM is in charge to undertake an Environmental and Social Impact Study for Production Stage in Shew Offshore Field an Offshore block in the as part of the Shwe Development Project in Myanmar.

Environmental and Social Monitoring for a Cracker and PE/PP Plant with IFC Performance Standards, Turkmenistan, Oil & Gas. 2016-ongoing, Project Manager
ERM was commissioned to monitoring the obligations of the EPC consortium for environmental and social aspects as part of an international credit which demands meet the IFC Performance Standards. ERM is the independent consultant for lenders.

Environmental Management Plan for Mining Exploration Activities in Shangalon Project. Myanmar, Mining Sector. 2016, Project Manager
ERM is in charge to undertake the Environmental Management Plan for a Gold-Copper Mining Exploration Activities in Shangalon region in Myanmar.

ESIA for Gran Canal Project in Nicaragua according with international standards. Nicaragua. Infrastructure Sector, 2013- 2015, Project Manager in Country
Preparation of a baseline as part of the elaboration of the ESIA for a Canal project of 270Km length in Nicaragua. Responsible for communications with the government and stakeholders. The project had about 400 people in the field and participation of different offices of ERM.

Environmental Alternatives Study and Environmental Impact Study for a gas pipeline, Colombia, Oil&Gas. 2015-2016, Project Manager
ERM was commissioned to evaluate the alternatives for the construction of a gas pipeline, document to be submitted to the environmental authority. ERM also was commissioned to do the Environmental Impact Study of the gas pipeline.

Environmental Impact and Social Study for an Offshore block, Colombia, Anadarko. Oil&Gas. 2015-2016, Project Manager
ERM was commissioned to undertake an Environmental Impact Study for an Offshore block in the Caribbean of Colombia.

Environmental Management Plan for a Pumping Station of Caño Limon Coveñas Pipeline. Oil & Gas Sector. 2012-2014, Project Manager
Preparation of a decision support document required for Environmental Licensing of a Pumping Station for the main pipeline in Colombia according with Colombian regulation.

Environmental, Social and Sustainable Risk Assessment for a Container Terminal in Cartagena, Colombia. Infrastructure Sector, 2015, Project Manager
Environmental and Social Risk Assessment for Terminal in Cartagena as part of A Due Diligence process, including International Standards (IFC) as one of the matters to assess.

Develop of H&S Management System for an Exploration petroleum Company in Colombia. O&G sector. 2013, Project Manager
HSE Management System was done based in Colombian and international standards for an exploration petroleum company in Colombia.2013- 2014.

Technical Concept to Develop Unconventional Resources in Colombia. Colombia. Oil & Gas Sector. 2013, Project Manager
Working with more than 6 ERM offices spanning 3 regions, ERM developed the Technical Concept for Sustainable Exploration and Production of Unconventional Resources in Colombia.

HSE Compliance Audit, Colombia, Confidential Client, Oil & Gas Sector, 2013, Auditor
We performed the audit of seven petroleum and gas blocks in Magdalena department and Putumayo, preparation of the report according to the scope (internal policies and national regulatory).

Julia L. Tims

Project Manager, Biological Resource Specialist

Julia has has been providing technical leadership and project management for US and international impact assessment and biodiversity-focused projects within a broad range of sectors including oil and gas, renewable energy, mining, and infrastructure. She has experience in developing and leading biodiversity baseline and impact studies in accordance with best practice and international standards, including IFC Performance Standards and others. Julia specializes in application of the mitigation hierarchy and development of Biodiversity Action Plans, management and monitoring plans, restoration plans, and offset strategy development to address unavoidable residual impacts. Julia has worked with ExxonMobil on multiple projects over the last 20 years and she has been part of ERM's support to EEPGL in Guyana since 2017, most recently leading the biodiversity component of the Payara EIA.

Experience: 25 years' experience in terrestrial ecology, natural resource management, project permitting, and environmental and social impact assessment.

Email: Julia.Tims@erm.com Education

- M.Sc., Natural Resources Management/Ecology, Cornell University, 1999, With Distinction
- B.Sc., Entomology and Applied Ecology/Wildlife Conservation, University of Delaware, 1990

Languages

- English, native speaker

Fields of Competence

- International Environmental and Social Impact Assessment
- International standards, including Equator Principles, IFC Performance Standards
- Domestic (US National Environmental Policy Act) Environmental Assessments and Environmental Impact Statements
- Environmental and Social Management and Monitoring Plans (ESMMP)
- Environmental and social due diligence
- Application of mitigation hierarchy
- Biodiversity offsets
- Ecosystem services assessment
- Project permitting and documentation
- Endangered species conservation and management
- Biodiversity Action Plans
- Critical Habitat Assessment
- High Conservation Value (HCV) Assessment
- Stakeholder engagement related to biodiversity and biological/social interactions
- Interaction with environmental NGOs
- Alternatives analysis
- Cumulative impact assessment

Key Industry Sectors

- Energy
- Oil and Gas
- Mining
- Agriculture
- Transportation

Key Projects

Environmental and Social Impact Assessment, Nicaragua
Led the biodiversity component of the Environmental and Social Impact Assessment (ESIA) and preliminary offset strategy for the world's largest infrastructure project. The project consists of the canal and related infrastructure including two ports, a transmission line, roads, and reservoirs. Developed specialist team of over 100 Nicaraguan and international experts to conduct marine, terrestrial, and freshwater biodiversity studies across the country and led wet and dry season field surveys. Led the data analysis and terrestrial biodiversity impact assessment, prepared detailed biodiversity and protected areas management plans and offsetting proposals, and developed the environmental and biodiversity components of the Environmental and Social Management System (ESMS). Key issues included loss of primary rainforest, impacts to sea turtles, impacts to over 80 rare species, habitat fragmentation, impacts to protected areas and the Mesoamerican Biological Corridor, and impacts to critical habitat. All work on the project was conducted in alignment with IFC Performance Standards. The ESIA was approved by the Government of Nicaragua and was subject to intense national and international scrutiny due to the high profile nature of the project.

Environmental and Social Impact Assessment, Offshore Oil Exploration Project, Guyana
Led the biodiversity components of two EIAs for offshore oil exploration projects in Guyana. Conducted baseline assessment focusing on seabirds and coastal birds and assessed the potential impacts of the proposed projects, including unplanned events such as oil spills, on bird populations in the Caribbean region, including rare species.

Environmental and Social Impact Assessment, Indonesia
Lead biodiversity specialist for biodiversity baseline preparation and impact assessment for a nickel and cobalt mine and hydrometallurgical processing plant in Central Halmahera and East Halmahera Regencies, North Maluku Province, Indonesia. The island contains numerous endemic and red list flora and fauna and lies within the Northern Maluku Endemic Bird Area, which has the highest levels of bird endemism for its size anywhere in the world. Because of this high level of bird endemism, Halmehara and its neighboring isands rank number ten out of a total of 218 designated biological diversity hotspots in the world. Extensive baseline biodiversity studies were conducted over a ten year period and results were collated into a biodiversity baseline report. Julia conducted an ecosystem services review, IFC PS6 critical habitat assessment, and impact assessment and developed a robust Biodiversity Action Plan (BAP) and Biodiversity Management Strategy that focused on minimizing unavoidable impacts to critical habitats, endemic birds and other rare species, and important ecosystem services. Evaluated the feasibility of biodiversity offset options in accordance with Buisiness and Biodiversity Offet Program (BBOP) Principals.

Environmental and Social Due Diligence, Belize
Currently leading the biodiversity and water aspects of an Environmental and Social Due Diligence (ESDD) of a sugarcane cultivation and processing mill for CIFI. The project is located in Belmopan District, Belize where rapid agricultural expansion is occurring. The greenfield site contained primary and secondary forest prior to clearing for project development and lies adjacent to a national protected area that was designated for the protection of jaguar and several sensitive water and wetland resources. Key issues facing the project include habitat loss, impacts to rare species, water quality, impacts of water abstraction on salinity and

downstream water availability, maintenance of ecosystem services, cultural resources, resettlement, occupational health and safety, and induced and cumulative impacts from other sugarcane growers in the region that are growing sugarcane to supply the mill.

Environmental and Social Impact Assessment, Ghana
Led the biodiversity and ecosystem services portions of the ESIA for in western Ghana. The project was highly controversial amongst Ghanaians and national and international NGOs for biodiversity and social reasons: the project area was located within a portion of Bui National Park, which has high biodiversity value. The area also contains roughly 2,000 villagers that would require resettlement if the project were to proceed. The ESIA was conducted in accordance with World Bank/IFC policies and guidelines. ERM conducted extensive stakeholder consultation throughout the ESIA process, a major focus of which was the effect of the project on the National Park and management options to balance project and park needs.

Environmental, Social, and Health Impact Assessment, Guinea
Project manager and biodiversity and ecosystem services lead for the ESIA for refinery and related port, railway, and related infrastructure located in Boka Prefecture Guinea. Collaborated with an expert local biodiversity field team to execute a rapid assessment, conducted in three seasonal survey missions, of terrestrial and aquatic biodiversity at the site and surrounding region. Two key species of concern identified were the IUCN-listed critically endangered marsh crab Afrithelphusa monodosa and the West African chimpanzee Pan troglodytes verus. The project would have unavoidable direct and indirect impacts on the habitats for these species as well as sensitive coastal mangroves, local fishing grounds, and nursery habitat for commercially valuable marine species. Led the project team in application of the mitigation hierarchy and assessment of design and layout alternatives to reduce impacts on biodiversity and ecosystem services. Coordinated with the government of Guinea and local and international NGOs and other stakeholders regarding potential biodiversity offsets focused on chimpanzees. Supported Alcoa and Rio Tinto in consultations with Wildlife Chimpanzee Foundation regarding offsetting options and feasibility of offset implementation.

Environmental and Social Impact Assessment, Cameroon
Provided technical oversight on the biodiversity and ecosystem services aspects of an ESIA for a proposed 116 km, 225kV transmission line between Bekoko and Nkongsamba in western Cameroon. The proposed transmission line follows an existing line for much of its route; however, part of the line required clearing of relatively undisturbed rainforest habitat that is adjacent to the Mouyouka – Kombé Kompina Forest Reserve. Ecological issues addressed included habitat loss and fragmentation, endemic plant and wildlife species, loss of biodiversity, anthropogenic effects on wildlife populations, and erosion and associated increases in sediment loads to rivers and streams. The project involved extensive stakeholder consultation, including assessment of natural resource livelihoods and the interactions of social and ecological issues regarding the project.

Environmental and Social Impact Assessment, Angola
Led the biodiversity and ecosystem services portions of an located on the lower stretches of Kunene River, at the Angola-Namibia border. The project is located in a desert and mountainous region with high biodiversity and high species endemism. Provided technical oversight of five specialist studies (vegetation, avifauna, mammals, insects, and herptiles) that were conducted by local and international experts. Incorporated specialist input into the ESIA for the project and developed

management recommendations in partnership with the specialists and the project proponent in order to minimize adverse biodiversity impacts and to maximize potential benefits of the project (e.g., access to stable water source, etc.).

Environmental and Social Impact Assessment, Suriname
Led the biodiversity aspects of the ESIA related to a proposed expansion of Alcoa's aluminium refinery in northeastern Suriname. Led an international team of biodiversity experts to conduct a rapid assessment biodiversity survey of the undeveloped area surrounding the refinery. The survey assessed the biological condition and value of the site based on: 1) habitat heterogeneity; 2) a preliminary survey of the organisms that characterize each of the habitats; and 3) the intactness of the habitats, and their capacity to support important biological resources and ecological processes. The results of the survey were used to evaluate the impact of the proposed refinery expansion on the local ecology and to recommend ways to minimize adverse effects on sensitive habitats and species.

Geothermal Project, St. Vincent and the Grenadines
Led the biodiversity and stakeholder engagement components of the ESIA for a geothermal energy project on the island of St. Vincent. Cooperated with local experts to conduct terrestrial and aquatic biodiversity baseline studies and water resource assessments. Led the stakeholder engagement aspects of the ESIA, including government communication and coordination and execution of the public meetings and focus group discussions in relation to the ESIA. The ESIA was conducted on budget, under an expedited 4-month timeframe, and was unanimously approved by the Government of St. Vincent and the Grenadines.

Environmental and Social Impact Assessment, Trinidad and Tobago
Led the environmental portion of the ESIA for a proposed aluminum smelter in southwestern Trinidad. The key environmental issues with the project included potential impacts to groundwater, habitat fragmentation, and changes in land use from agricultural to industrial. The project involved significant stakeholder consultation, including consultation with Trinidad's Environmental Management Authority regarding the scope of the ESIA and related public consultations. The project was highly controversial and put on hold before the publication of the ESIA. Based on the history of the project, ERM developed a lessons learned document that outlined recommendations for strategic approaches to the project if it is reactivated.

Environmental and Social Impact Assessment, Suriname
Project manager and lead biodiversity specialist for the ESIA for proposed sugarcane to ethanol project located in Wageningen, northwestern Suriname. The 15,000 hectare site is bordered to the north, east, and south by nature reserves and undeveloped land, and to the west by rice fields. The project contains agricultural (sugarcane plantation) and industrial (ethanol and sugar processing and production facility) components. A combined raw sugar/ethanol plant and power exportation plant is planned to allow for flexibility to vary ethanol versus sugar production depending on market demands and to export power to the national grid. ERM developed the ESIA to conform with Suriname National Institute for Environmental and Development Standards (NIMOS) standards. Key issues addressed in the ESIA included impacts to biodiversity, forest loss, water quality, water use/demands from the project and other users, impacts to nationally registered historic sites, impacts to protected areas, maintenance of ecosystem services, land use management and ownership, and greenhouse gas (GHG) production. ERM developed a GHG emissions inventory and

assessed GHG impacts based on minimum GHG savings in terms of the project's GHG intensity against a fossil fuel comparator using the methodology and rules defined in the European Union Renewable Energy Directive (EU RED). ERM was able to predict GHG savings of 60 to 85 percent depending on the amount of electricity sold to the national grid.

Environmental and Social Impact Assessment, West Greenland

Project manager and biodiversity lead for the ESIA for Aluminium and Hydroelectric Project, which consisted of an aluminium smelter, marine port, two hydroelectric projects, and electric transmission lines. This project constituted the largest industrial development in Greenlandic history. Issues identified during ESIA scoping included smelter air and water emissions and waste management; effects of the hydroelectric development on caribou migration, birds and internationally recognized Important Bird Areas, Arctic char, and cultural resources; and social and health effects related to immigration of foreign workers, housing, infrastructure, and social and health services. Collaborated with local and international experts to conduct baseline environmental, human health, and social studies. The impact assessment is currently on hold pending government negotiations relative to project development.

Biodiversity Baseline Studies and Impact Assessment, Argentina and Chile

Led the analysis and reporting for a Rapid Biodiversity Assessment and Ecosystem Services Review to fill baseline data gaps for a gold mine and related infrastructure located on the border of Chile and Argentina. The project has been under construction for over a decade and is now operational. Used the Valued Environmental Components (VEC) approach to assess the project's historic construction-related impacts and predicted future operational impacts on biodiversity. VEC's included rare flora, several rare terrestrial fauna species, migratory ungulates, vegas (i.e., wetlands), aquatic and riparian habitats, species known to provide important ecosystem services to local communities, and an internationally recognized Biosphere Reserve that is located just outside the Project's area of influence. Julia used the information generated during the baseline and impact assessment to update the project's Biodiversity Management Plan to define measures that will minimize and manage ongoing impacts to VECs during project operation and closure. Also prepared a Critical Habitat Assessment relative to IFC Performance Standard 6 and advised client on PS6 conformance.

Cumulative Impact, Peru

As part of the ESIA for the Gas Project in Peru, Julia conducted a comprehensive cumulative impacts assessment on biological resources that could result from the planned oil and gas developments and expansion of the Gas Separation Plant, combined with other past and reasonably foreseeable future activities within the lower Urubamba watershed. The assessment identified the probability and magnitude of cumulative effects on biodiversity, habitat quality, rare species, ecosystem services, and indigenous communities that rely on biological resources for sustenance fishing and hunting.

Business and Biodiversity Offsets Program (BBOP)

Providing biodiversity expertise in an advisory group that is developing a standardized approach for identifying, developing, and implementing biodiversity offsets for projects with unavoidable adverse impacts on biodiversity. Advisory group members include corporate representatives, academic scientists, representatives of environmental NGOs, US state and federal regulators, and international government representatives. The group is currently developing a protocol and a set of tools for determining when an offset is appropriate and defining the scope and nature of appropriate offsets. Efforts are also focused

on implementation and long term management and protection strategies for biodiversity offsets and the possibility of aggregating offsets into national or global protected areas management system aimed at specific conservation priorities.

Environmental Impact Statement for an HCP and ITP for a Wind Power Project, OH
Project Manager and avian/threatened and endangered species lead on an EIS for the United States Fish and Wildlife Service (USFWS) to assess the potential effects of the proposed 250 MW Wind Power Project in west-central Ohio. The Project required an Incidental Take Permit (ITP) pursuant to the Endangered Species Act (ESA) to authorize the incidental take of Indiana bats, listed as federally endangered under the ESA, that would likely occur as a result of the Project. The EIS assessed the effects of issuance of the ITP on Indiana bats and other resources as required by the National Environmental Policy Act (NEPA) including migratory birds and compliance with the Migratory Bird Treaty Act and other applicable federal regulations and Executive Orders. The EIS included a robust cumulative impact assessment of numerous wind projects proposed for the region and their cumulative impact on Indiana bats and migratory birds. This high-profile and precedent-setting project was the first ITP issued for Indiana bat related to a wind project in the US. ERM assisted the USFWS in preparing a robust EIS that withstood extensive public, NGO, and legal scrutiny on an expedited schedule. The final EIS was published in April 2013, and the USFWS approved the HCP in July 2013. The EIS was challenged in US Federal court and ultimately upheld, with the ITP issued in 2015.

Supplemental Environmental Impact Statement for an HCP and ITP for a Wind Power Project, OH
Project Manager and avian/threatened and endangered species lead on a supplemental EIS (SEIS) for the USFWS to assess the potential effects of the proposed 250 MW Wind Power Project in west-central Ohio. This high-profile and precedent-setting project was the first ITP issued for Indiana bat related to a wind project in the US. ERM assisted the USFWS in preparing a robust EIS that withstood extensive public, NGO, and legal scrutiny on an expedited schedule. The final EIS was published in April 2013, and the USFWS approved the HCP in July 2013 and issued the ITP in 2015. The EIS was successfully challenged in US Federal court in 2017 on the basis of too few alternatives evaluated so ERM is now preparing an SEIS to address three additional operational alternatives.

Environmental Impact Statement for a Hydroelectric Project Relicensing, Portland, OR
Project manager for the EIS and technical leader for terrestrial ecological issues for relicensing the hydroelectric project. Managed the NEPA process for the project, including preparation of the Draft and Final EIS as third-party contractor to the Federal Energy Regulatory Commission and facilitated interactions with PGE and the FERC regarding relicensing issues. Led the interaction among cooperating agencies in the NEPA process including US Forest Service and BLM. Provided technical expertise within working groups and facilitated coordination among natural resource trustees on ecological issues. Key issues included the effects of the project on wildlife and habitat, threatened and endangered plant and animal species, habitat loss, habitat connectivity/ fragmentation and wildlife movement, and establishment and spread of exotic species. Collaborated on preparation of a Vegetation Management Plan, Invasive and Exotic Species Management Plan, and Threatened and Endangered Species Management Plan.

Environmental Impact Statement Power Project. Massena, NY
Technical leader for terrestrial vegetation and wildlife sections of the EIS related to the proposed relicensing of the hydroelectric power project. The EIS was prepared to meet federal NEPA and New York SEQRA standards and requirements. During the five year relicensing process, Julia provided

technical expertise within working groups and facilitated coordination among natural resource trustees on ecological issues. Key issues includes the effects of the project on wildlife and habitat, threatened and endangered plant and animal species, habitat loss, habitat connectivity/ fragmentation and wildlife movement, and establishment and spread of exotic species. Facilitated interactions with NYPA, NYSDEC, and USACE.

Wind Power Project, PA
Project manager for a proposed 100 megawatt (MW) wind energy facility, located north of Scranton, PA. Currently supporting the project's feasibility assessment/due diligence review, early stakeholder outreach, and leading biological, environmental, and cultural resources pre-construction surveys for the project.

Wind Power Project, WV
Project manager for a proposed 150 megawatt (MW) wind energy facility located approximately 30 miles north of Elkins and in the immediate vicinity of the town of Bayard, West Virginia. The project site encompasses almost 24,000 acres of previously or currently mined land and the current land use on the site is a mix of forest, agriculture, and actively disturbed and regenerating lands. The project was subject to NEPA because the Navy will be purchasing the power generated by the project. Managed all pre-construction biological, environmental, and cultural resources surveys and supported state and federal agency consultation and public outreach for the project.

Solar Siting Support, VA
Leading environmental due diligence assessments and surveys for potential solar project developments throughout Virginia. Currently developing permitting matrices and streamlining the developer's due diligence processes to meet corporate and local requirements. Due diligence focuses on identifying regulatory constraints and potential issues of concern for sites including wetlands, floodplains, endangered species, cultural resources, site access, proximity to grid, among others. Developing a standardized assessment and ranking system to assist in identifying no-go projects and ranking the potential projects according to level of regulatory constraints and environmental issues.

Environmental Assessment, NM
Lead biodiversity and endangered species specialist for an EA that evaluated the effects of creating low-level military aircraft training exercises in New Mexico for the Air National Guard with the Federal Aviation Administration as a cooperating agency. Assessed the effects of low-level flight missions on the endangered Mexican spotted owl and on recreational use in two National Forests and successfully led the consultation with USFWS regarding impacts to Mexican spotted owl and other federally listed species.

Environment Impact Statement, ME
Responsible for preparing the biological portions of an EIS evaluating the effects of modifying the Condor 1 and 2 MOAs for the ANG 102nd Fighter Wing based at Otis AFB with the FAA as a cooperating agency. The proposed action involved lowering the floor to 500 feet AGL to improve air-to-ground training. The biological work focused on determining the impacts to migratory birds and bald eagles and involved extensive federal and state agency consultation.

Environmental Assessment, AZ
Lead biodiversity and endangered species specialist for an EA evaluating the environmental effects of the proposed beddown of eighteen F-16 aircraft at 162 FW base at Tucson International Airport (TIA) for Air National Guard. Key issues involved noise impacts at TIA and effects of increased noise and use of inert and live munitions during training operations on the federally endangered Sonoran Pronghorn antelope at Barry M. Goldwater Range, an active military flight

training range. Work included preparation of a Biological Assessment and Section 7 consultation with USFWS, both of which were concluded successfully and on schedule.

Environmental Impact Statement for Hydroelectric Project Relicensing, Portland, OR
Project manager for the EIS and technical leader for terrestrial ecological issues for relicensing the hydroelectric project. Managed the NEPA process and the biological aspects of the project, including preparation of the Draft and Final EIS as third-party contractor to the Federal Energy Regulatory Commission and facilitated interactions with PGE and the FERC regarding relicensing issues. Led the interaction among cooperating agencies in the NEPA process including US Forest Service and BLM. Provided technical expertise within working groups and facilitated coordination among natural resource trustees on ecological issues. Key issues included the effects of the project on wildlife and habitat, threatened and endangered plant and animal species, habitat loss, habitat connectivity/ fragmentation and wildlife movement, and establishment and spread of exotic species. Collaborated on preparation of a Vegetation Management Plan, Invasive and Exotic Species Management Plan, and Threatened and Endangered Species Management Plan.
Runway Safety Area Improvements and Terminal Construction/Expansion, Niagara Falls, NY Project manager and technical lead for wetlands and endangered species components of two Environmental Assessments (EAs) for Runway Safety Area Improvements and a Terminal Expansion. The EAs were prepared for the Niagara Frontier Transportation Authority (NFTA) to meet both federal NEPA and New York SEQRA standards for impact assessments. Facilitated consultation with state and federal agencies regarding potential archaeologically and biologically significant areas within and adjacent to the site. Conducted wetland delineation and stream habitat assessment of Cayuga Creek, which runs through the airport property and will be impacted by the proposed runway extension. Evaluated several alternatives to minimize the effects of the runway expansion on wetlands and aquatic habitats. Coordinated with NYSDEC and USACE Buffalo District to address issues related to stream relocation and mitigation design.

Crown Landing Liquefied Natural Gas Environmental Studies and Permitting. Logan Township, NJ.
Technical lead for endangered species and terrestrial ecological issues associated with a proposed liquefied natural gas (LNG) import terminal located on the Delaware River in New Jersey. Conducted terrestrial investigations at the site including wetland delineation, vegetation community characterization, wildlife habitat assessment, and threatened and endangered species investigations. Prepared Federal Energy Regulatory Commission (FERC) resource reports and worked closely with client to address ecological issues associated with the project and provided guidance for potential avoidance and mitigation measures to offset potential impacts of the project. Primary ecological issues with the project included impacts to wetlands, bald eagles, and other listed species. Addressed ecological issues with the regulatory agencies and prepared state and federal permit applications for the project.

Natural Gas Pipeline Third Party EA, ME
Technical lead for biological issues related a pipeline expansion (looping) project, including construction of five new compressor stations in Maine and Massachusetts. Natural resource issues included wetlands, wildlife, vegetation, and threatened and endangered species. Conducted project scoping and interagency consultation as part of FERC's pre-filing process. Conducted Section 7 Endangered Species Act consultations for bald eagle, Atlantic salmon, and shortnose sturgeon and resolved agency issues, which eliminated the need for formal consultation and a Biological Assessment.

Biological Assessment, Texas LNG, Brownsville, TX

Prepared the Biological Assessment pursuant to the Endangered Species Act for the Federal Energy Regulatory Commission to assess the potential impacts of the proposed Texas LNG project on 16 federally listed species. The assessment covered marine and terrestrial species, with particular emphasis on wintering shorebirds that concentrate in coastal Texas during winter, northern Aplomado falcon, ocelot, and gulf coast jaguarundi. The project was precedent setting in that is was one of the first in Texas to consider compensatory mitigation (i.e., offset or conservation bank) for wetlands and listed species (red knot, piping plover, ocelot, and jaguarondi) in one integrated offset/conservation bank.

Selina Pradhan

Project Manager/Regulatory Specialist

Ms. Selina Pradhan is a Senior Consultant with over 10 years of experience in the energy infrastructure industry (transmission line, oil & gas, solar and hydro power). Her field of competency include: National Environmental Policy Act (NEPA) & Federal Energy Regulatory Commission (FERC), ESIA/EIA/EA, Regulatory Compliance, Construction Compliance, Routing & Siting and Environmental Field Surveys. She has also successfully completed a year and half secondment in Nepal for two large scale energy and infrastructure projects, primarily providing project management and regulatory support, including liaising and coordinating among international and local clients, proponents & financial lender, project team members and subconsultants; and also, reviewing various environmental reports and permits. She is also experienced with Clean Water Act (CWA) Section 316(b) regulations and field-based impingement mortality studies and reporting, along with water quality sampling and analysis, prairie restoration and environmental site assessments.

Experience: 10 years of experience in environmental impact assessment and policy & regulation

Email: selina.pradhan@erm.com

Education

- B.S., Environmental Science, Minnesota State University, Minnesota, 2010
- GIS Certification
- Minor in Geography

Languages

- English (native speaker)
- Nepali (native speaker)
- Hindi (proficient)

Fields of Competence

- Project management & Negotiation
- NEPA & FERC (EIA/ESIA/EA)
- Federal, State, Local Permitting
- Transmission Line Projects (including routing/siting/stakeholder engagement & management)
- Pipeline Construction Compliance
- Field Surveys and Sampling
- ArcGIS mapping and Technologies
- GPS Trimble Unit

Key Industry Sectors

- Energy and Oil & Gas
- Transmission Lines
- Renewable (Solar & Hydro)

Key Projects at ERM

NextEra Energy, Blackburn Solar Project (58 MW) Current team lead responsible for the certificate of public convenience and necessity (CPCN) for the project in North Carolina.

Celanese Acetate, LLC., July 2016 to Present: Project manager responsible for leading the CWA Section 316(b) Impingement study of fish and shellfish at the CWIS, coordinating and managing sampling effort in the field, and preparing Impingement Mortality Study Report (illustrating "*de minimus*") to the state agency (Virginia DEQ).

World Bank, Upper Arun Hydroelectric Project, September 2019 to present, 1061 MW hydro project in Nepal. Project coordinator responsible for preparing the EIA and ESIA reports per Nepal's regulation and IFC E&S requirements; addressing client's data requests and comments; and reviewing the overall EIA/ESIA report. Other responsibilities include, leading project execution locally; and acting as a liaison among international and local clients, proponents, subconsultants and project team members.

Electricity Transmission Project (MCC's Nepal Compact), April 2019 to Aug 2021, 195 miles of new 400 kV overhead transmission line in Nepal. Project coordinator responsible for preparing the EIA and ESIA reports per Nepal's regulation and IFC E&S requirements; addressing client's data requests and comments; and reviewing the overall EIA/ESIA report. Other responsibilities include, leading project execution locally; and acting as a liaison among international and local clients, proponents, subconsultants and project team members.

FFI Grand Inga Project, 2021, Transmission Line Technical Review Lead. Completed Environment and Social review of the transmission line portion (in DRC and nearby African countries) for the hydro power project.

Kerckhoff Hydroelectric Project. Pacific Gas and Electric Company (PG&E), 2021. Support for the development of California Environmental Quality Act (CEQA) documents in conjunction with the State Water Resources Control Board for the relicensing of the PG&E Kerckhoff Hydroelectric Project (180,200 kW).

Duke Energy, Permanent Water Supply Project, August 2017 to Dec 2019 (Duke Energy Office, Charlotte, NC), provided permanent water solutions to the North Carolina coal ash plant neighbors. Project management support responsible for the development of complied project plan, project schedules for major deliverables, weekly and monthly status reports to the Executive oversight committees and state agency (NCDEQ), along with development of various action plans for the project. Other responsibilities included: review parcel data and addresses (GIS skills), lab data and results, and support tracking process for agency and plant neighbors correspondences.

Farnsworth Group, Yates Lateral Project and Newnan Tap Project, April 2018 to Dec 2019, natural gas pipeline projects (20 miles each) in Georgia: Project manager responsible for managing environmental field surveys; preparing federal, state and local permit application; and environmental construction and inspection management.

TransCanada/NiSource Columbia Gas Transmission, WB XPress Project, 2014 to 2018 , interstate natural gas pipeline project in Virginia and West Virginia: Project team member responsible for writing FERC Environmental Resource Reports, lead for preparing USACE Joint Permit Application for Nationwide Permit for Norfolk District, stream activity and hydrostatic permit applications for West Virginia, and several floodplain permit applications. Prepared Environmental Management and Construction Plans, and lead on document preparation and submission.

Dominion Virginia Power, Skiffes Creek 500 kV Transmission Line Project, 2014 to 2018, 500 kV of new, Greenfield, high-voltage transmission line near Colonial Williamsburg and Jamestown Island in Virginia: Team lead responsible for preparing the Federal Aviation Administration's (FAA) Notice of Proposed Construction or Alteration permit application and coordinating with the FAA regarding the permit application.

Columbia Gas Transmission, Line WB2VA Integrity Project, 2014 to 2018, Modification to 17 Compressor Stations in West Virginia and Virginia: Project team member responsible for writing FERC Environmental Resource Reports, preparing USACE Joint Permit Application for Nationwide Permit for Norfolk and Pittsburgh Districts, preparing Environmental Management and Construction Plan, construction compliance bi-weekly FERC reports and lead on document preparation and submission.

Shaw Industries Group, Inc., June 2015 to August 2016, CWA Section 316(b) Impingement Sampling Plan in Columbia, South Carolina: Team lead responsible for conducting impingement study of fish and shellfish at the CWIS, and coordinating and managing sampling effort in the field.

Columbia Gas Transmission, Hanover Replacement Project, March 2015 to October 2015, 6.5 miles of 8-inch gas pipeline in Pennsylvania: Project team member responsible for assisting with the FERC Environmental Compliance Program, preparing construction compliance weekly FERC reports and ensuring compliance during construction and restoration activities.

Columbia Gas Transmission (NiSource, Inc.), Giles County Project, September 2015 to October, 2018, 12.8 miles of 8-inch gas pipeline in Virginia: Project team member responsible for post-construction wetlands and waterbody monitoring, vegetation monitoring and report writing.

Dominion Resources, Atlantic Coast Pipeline, 2014 to 2016, approximately 600 miles interstate natural gas pipeline project in North Carolina, Virginia, and West Virginia: Project team member responsible for assisting with wetland and waterbody field surveys, QA/QC field data and project team support.

NiSource Columbia Gas Transmission, Smithfield III Expansion Project, 2012 to 2013, Expansion of four natural gas compressor stations in Pennsylvania and West Virginia: Project team member responsible for assisting with agency consultation letters and document formatting and preparation.

American Electric Power, Tazewell Area 138 kilovolt (kV) Improvement Project, 2013 to 2014, 8.3 miles of new 138 kV transmission line and approximately 28 miles of re-build 138 kV transmission line, one new switchyard and the expansion of three existing substations in Virginia and West Virginia: Project team member responsible for writing environmental reports and preparing environmental constraint report for the State Corporation Commission (SCC) Application and Virginia Department of Environmental Quality (DEQ) Supplement.

Williams and Boardwalk Pipeline Partners, LP, Bluegrass Pipeline Project, 2013 to 2014, 380 miles of new 24-inch-diameter pipeline and 121 miles of 20-inch-diameter natural gas liquids pipeline in West Virginia, Ohio, and Kentucky: Project team member responsible for assisting with wetland and waterbody field surveys and reviewing wetland and waterbody data forms.

Dominion Virginia Power, Brunswick 500 kV Project, 2012 to 2013, 20 miles of 500 kV transmission line in Brunswick and Greensville County, Virginia: Project team member responsible for writing environmental routing report, generating landowner mailing database, graphic preparation, and report formatting.

Dominion Virginia Power, Cannon Branch to Cloverhill Project, 2012 to 2013, 2.2-mile 230 kV Transmission Line in Virginia: Project team member responsible for preparing FAA's Notice of Proposed Construction or Alteration permit application and coordinating graphic preparation.

Williams Gas Pipeline (Laurel Mountain Midstream), Post Construction Monitoring Project, 2011- to 2012, several natural gas pipeline construction projects in Pennsylvania: Project team member responsible for conducting post construction field surveys, inspection of erosion and sediment control devices, recording daily precipitation data, and coordinating environmental surveys.

Northwest Pipeline, GP, Piceance Lateral Project, 2012, 150 miles of pipeline across Colorado and Wyoming: Project team member responsible for conducting post-construction vegetation survey and inspecting erosion and sediment control devices.

Dominion North Carolina Power, Shawboro to Aydlett Tap 230 kV Transmission Line Project, 2011 to 2013, 11 miles of 230 kV transmission line, in Currituck County North Carolina: Project team member responsible for writing the environmental routing report, preparing FAA tower construction permit application, generating landowner mailing database, document preparation, and formatting of the environmental routing report.

Kris Hiatt

Document Manager/Technical Editor

Kris has more than 18 years of professional experience in writing, technical editing, document management and development, formatting, layout, and knowledge management. She has managed the editing and production of high-profile, complex, multi-volume environmental impact statements (EISs) and environmental and social impact assessments (ESIAs). She has developed review processes, templates, style guides, consistency guides, editing checklists, and production workflows, allowing her to successfully manage editing and document production projects of varying sizes, budgets, and timelines. Many of the EISs that Kris managed were produced in accordance with the National Environmental Policy Act (NEPA) and Section 508 of the U.S. Rehabilitation Act. Kris is also experienced at responding to public and agency comments, as well as creating and maintaining administrative records.

Experience: 18 years' experience

Email: kris.hiatt@erm.com

Education

- B.A. English, Indiana University, USA, 1990

Languages

- English, native speaker

Fields of Competence

- Document management
- Technical and copy editing
- Document production
- Maintaining administrative records
- Consistency and style guides
- Editing and review workflows
- Template development
- Section 508 compliance
- Formatting

Key Industry Sectors

- Mining & Metals
- Oil & Gas
- Power
- Technology, Media, & Telecommunications
- Government
- Manufacturing

Key Projects

Multiple Offshore Oil Field Development Projects
Document and production manager and lead editor on three environmental impact assessments for development of offshore oil fields in Guyana. Developed a template, style and consistency guide, tracking matrices, and editing procedures. Provided technical and copy edits, consistency reviews, and formatting on all sections of the reports. Edited text to be concise and consistent with the style guide and to present one voice despite multiple authors. Worked closely with the project management teams, editors, subject matter experts, and subconsultants to coordinate and develop the multi-volume reports. Also edited multiple Environmental Assessment and Management Plan reports for exploration drilling campaigns and various study reports.

Vineyard Wind 1 Environmental Impact Statement
Document and production manager and lead editor on an EIS for a wind energy facility offshore Massachusetts. Developed a template, style and consistency guide, tracking matrices, and editing procedures. Provided technical and copy edits, consistency reviews, and formatting on all sections of the report. Edited text to be concise and consistent with the style guide and to present one voice despite multiple authors. Developed procedures for and managed Section 508 compliance.

Sea Port Oil Terminal Deepwater Port Project
Technical editor on a multi-volume EIS analyzing the impacts of a deepwater port in the Gulf of Mexico for the transportation of crude oil for export to the global market. Under the direction of the Document Manager, provided edits and consistency reviews to present one voice despite multiple authors. Provided support to make this document Section 508 compliant, which included developing alternative text for figures, inserting metadata, and configuring PDFs to pass government accessibility checks.

Black Butte Copper Project Environmental Impact Statement
Technical editor on a multi-volume EIS analyzing the impacts of a copper mine in Montana in compliance with the Montana Environmental Policy Act and NEPA. Under the direction of the Document Manager, provided edits and consistency reviews to present one voice despite multiple authors.

San Juan Mine Deep Lease Extension Environmental Impact Statement
Technical editor and production manager on a multi-volume EIS analyzing the impacts of the proposed extension of an existing underground coal mine. Developed the EIS template and production procedures in compliance with Section 508 and the project style guide. Under the direction of the lead consultant, provided edits and consistency reviews to present one voice despite multiple authors.

Upper Trishuli Hydroelectric Power Project Non-Technical Updated Environmental and Social Assessment Summary Report
Document and production manager and lead editor for an updated non-technical ESIA for the Upper Trishuli 1 Hydropower Project in Nepal. Provided technical and copy edits, consistency reviews, and formatting on all sections of the approximately 500-page report.

FirstNet Programmatic Environmental Impact Statement
Document and production manager and lead editor on an eight-volume Programmatic EIS for a nationwide wireless broadband network dedicated to public safety. Developed a template, style and consistency guide, tracking matrices, and editing procedures. Provided technical and copy edits, consistency reviews, and formatting on all sections of the report. Edited text to be concise and consistent with the style guide and to present one voice despite multiple authors. Developed procedures for and managed Section 508 compliance. Worked closely with the project management team, client, editors,

and subject matter experts to coordinate and develop the 4,700-page draft report. Analyzed and responded to public and agency comments.

Canal de Nicaragua Environmental and Social Impact Assessment
Document and production manager and lead editor for the Canal de Nicaragua ESIA. This major infrastructure project, if built, will be one of the largest civil works projects ever undertaken. This complex report was delivered in both Spanish (hard copy and electronic copy) and English (electronic copy only). The ESIA was approximately 11,000 pages in 14 volumes. Developed and maintained report template, consistency guide, report schedule, tracking sheets, and editing checklists. Managed flow of report sections through authors, senior reviewers, editors, and translators. Edited text to be concise and consistent with the style guide and to present one voice despite multiple authors. Worked closely with an outside translation company and internal translation reviewers.

Keystone XL Pipeline Supplemental Environmental Impact Statement
Document and production manager and lead editor on both the draft and final Supplemental EIS. Developed and maintained consistency guides, report template, tracking sheets, and editing checklists. Assembled and managed editing and production team. Provided technical and copy edits, consistency reviews, and formatting on all sections of the report. Worked closely with the project management team, editors, and subject matter experts to coordinate and develop both the 7,000-page, 11-volume final report and the 4-volume draft report. After release of the final Supplemental EIS, helped theme and code more than 3.5 million public comments.

Nickolas Chin

Environmental Health, Safety, and Security Lead

Nickolas has 5 years of broad experience in environmental consulting, focusing on environmental, social and health impact assessment, management plan development, environmental compliance, site auditing and risk assessment. With a background in environmental science, his primary focus was on the extractive sector, but has since transitioned into health & safety and environmental services for the energy sector. Experienced in myriad aspects of the local mining and forestry operations, he rapidly developed in health & safety and now focused on the newly burgeoning oil & gas sector. He has prepared environmental, social, and health impact assessments and management plans for multiple local companies, created emergency response plans, health and safety plans and journey management plans to ensure safety is always held paramount. Nickolas is a born and raised Guyanese and has worked and been involved in the local environmental field all his life. He has been a part of ERM's support to EEPGL in Guyana since 2019, and has been the Program H&S Lead for ERM's support to EEPGL since mid 2020.

Experience: 5 Years' experience in the Environmental Field, specifically Extractive Sectors.

Email: nickolas.chin@erm.com

Education

- B.Sc. Environmental Science, University of Guyana, Guyana, 2016

Languages

- English, native speaker

Fields of Competence

- Environmental compliance & operational analysis
- Health & safety best practices
- Activities & logistics coordination

Key Industry Sectors

- Mining
- Forestry
- Health & Safety
- Oil & Gas

Key Projects

EAMP and EIA for a Multi-well Exploration Campaign for O&G Operator in Offshore Guyana (Ongoing)
HSE Lead for the project and works to review the current local situation and update the client whilst in the permitting and planning phase.

ERM COVID 19 Return To Workplace (RTW) (Ongoing)
Created the ERM Guyana Office COVID 19 RTW protocol. Subject Matter Expert on COVID 19 and regular monitoring of the local situation to safeguard company and client interests.

ERM Diversity, Equality & Inclusion (Ongoing)
ERM Global Advisory Group for DE&I global member with regular recommendations and input for improving and promoting the company's DE&I agenda.

Key Projects Prior to Joining ERM

Onshore Technical Services Coordination (2019)
Served as the Technical Services Coordinator for Tiger Rentals Guyana and serviced Esso Exploration and Production Guyana Limited (EEPGL) Marine Logistics Division.

Health, Safety & Environmental Supervision (2018)
Served as the Senior HSE Officer for Environmental Management Consultants (EMC), which is now the local partner to ERM in Guyana.

Occupational Health & Safety Management (2017)
Served as the Occupational Health & Safety Officer for Giftland Group of Companies.

Neil Earle Henry

Local Team Coordinator

Neil is an experienced environmental professional with more than 20 years of experience in the environmental monitoring field both private and public. He previously worked at the Guyana´s EPA and has a good understanding of environmental management issues in Guyana. He has a breadth of experience working across several companies in environmental projects in Guyana. His primary focus was on the mining, forestry and tourism sectors, with experience in infrastructural monitoring. He has assisted in the preparation and review of environmental and social impact assessments and management plans for development projects in Guyana and Suriname. For the last three years Neil has been working with ERM in the Oil and Gas Industry in Guyana exclusively on EEPGL´s projects assisting with the preparation of their ESIAs.

Experience: 20 years' experience in environmental field

Email: Neil.Henry@erm.com

Education

- Graduate Diploma: Climate Change Adaptation, University of the Sunshine Coast, (Australia), August 2008 to March 2009
- Postgraduate Diploma: Integrated Watershed Modeling and Management, International Institute For Geo-Information Science and Earth Observation (ITC), University of Twente (The Netherlands), September 2007 to June 2008.
- B. Sc Environmental Studies, University of Guyana, 2000
- Guyana Mining School

Languages

- English, fluent

Fields of Competence

- Surface and Ground water Monitoring
- Assessing environmental impacts
- Recommending environmental remediation measures
- Prepare and conduct surface and ground water monitoring programs
- Reclamation projects - Gold Mines Limited (Essequibo), Gross Rosbel Gold Mines (Suriname), and Omai Bauxite Mining Inc. (Linden)

Key Projects

Guyana Industrial Minerals Inc. Subsidiary of First Bauxite Corporation - Senior Environmental and Community Relations Advisor (December 2015 to 2017)
Responsibilities include managing all environmental matters relating to the Company's success in achieving financial closure, creating an Environmental Management System using Local and International Standards. Both office and field work.

Troy Resources - Environmental Manager (2014-2015)
Responsibilities include managing all environmental matters relating to the Company's success in its startup of operations, creating an Environmental Management System using Local and International Standards. Both office and field work.

Guyana Industrial Minerals Inc. Subsidiary of First Bauxite Corporation. Environmental and Community Relations Officer (January 2012 to 2014)
Responsibilities include managing all environmental matters relating to the Company's success in achieving financial closure, implementing the Equator Principle Financial Institutions by applying the International Financial Corporation/World Bank Standards. Both office and field work.

Environmental Management Consultants, 60 Area H Ogle, ECD Environmental Inspector (April 2010 to December 2012)
As a team member of the consultant group working on environmental projects; (a) environmental monitoring of the Amaila Falls Hydro Access Road, (b) environmental management plans, (c) environmental monitoring of the Ministry of Public Works and Communications Bridges Rehabilitation Program-Phase 11 Rehabilitation of Lot II – Lot A1 and Lot A2 Structures.

Director on the Guyana Geology and Mines Commission's Board (2006- 2007)
Guyana Environmental Protection Agency, Environmental Officer II (April 2006-2007)
Responsible for all environmental issues that fall under the Mining, Forestry and Tourism sectors. Ensuring that all developers adhere to the Environmental Protection Act No. 11 of 1996 and all Regulations made under the Act.

Omai Gold Mines Ltd, Environmental Officer September (January 2000 to July 2005)
Responsible for coordinating all activities relative to the effective management of environmental activities at Omai Gold Mines Limited. Technical duties include, implementing surface and ground water monitoring programme, implementing the ISO14001 Standards, providing environmental training for Omai's employees. Management duties include supervising subcontractors and consultants working at Omai, representing Omai's interests at meeting with the government regulators as well as professional and industrial association.

Linden Mining Enterprise Ltd, Summer Job (1997,1998,1999)
- Special Projects – Conduct Site Inspections- Progressive Reclamation through the use of native plants in Linden- Water Quality and Erosion Control in Mined-out Areas

Ministry of Agriculture, Livestock Division. (1993-1996)
To provide extension services to the Linden community.

Special Assignments
- Hydro-meteorological Analysis of Lake Naivasha, Kenya and Lake Buurse, The Netherlands
- A Strategic Approach to Solid Waste Disposal in McKenzie, Linden.
- Environmental Inspections of the McKenzie Bauxite Plant and the East Montgomery operations Area
- Stack Dust: Health effects on Lindeners.
- Water Quality in the Northeast Kara Kara Mined-out area.

- The use of indigenous plants as a method of erosion control in mined affected areas.

Reclamation Activities

- Supervise re-vegetation of mine-out areas (approximately 188 hectares).
- Liaise with personnel during sloping, grading, and back filling of mined- out areas.
- Participate in an aquatic monitoring programme at Omai Gold Mines Limited (Aug. 2003).
- Assist and monitor University of Guyana students conducting special projects at Omai Gold Mines Limited.

Environmental Impact Assessment

- Assisted with the accumulation of baseline data for Gross Rosbel's EIA
- Assisted with the accumulation of baseline data for Linmine's EIA
- Trained in ambient dust sampling using the MiniVol dust sampling equipment;
- Trained in ambient noise sampling using the Quest noise level meter

Environmental Audits

- (External Audits) Consultants-Lakefield Research- November, 2000- February, 2003
- SGS ISO 14001 audits
  - Registration Audit- January 2001
  - Maintenance Audit- February 2002
  - Maintenance Audit- March 2003
  - Re-certification Audit- March 2004
  - (Internal Audits)
  - Consultants-G. Amyot- October 2001
  - D. Therrien- January 2003
  - G. Amyot- January 2004

Rick Osa, QEP

Air Quality and Noise Monitoring Specialist

Rick has over 40 years of air quality consulting experience and currently leads ERM's Ambient Air Quality Monitoring Center of Excellence. He directs ERM's air monitoring efforts, ensuring the collection of reliable, high quality data. Rick's experience spans the upstream, midstream, and downstream oil and gas industry. This includes ten monitoring deployments in Guyana, Senegal, and Angola. Rick is currently chairperson of the Air & Waste Management Association's Ambient Monitoring Technical Committee and has served as a U.S. State Department Air Quality Fellow, assigned to the Seoul, South Korea embassy.

Experience: 40 years' experience in air quality and environmental management

Email: rick.osa@erm.com

LinkedIn: https://www.linkedin.com/in/richard-osa-a21335b

Education

- MS. Engineering Management
  Northwestern University, USA, 1992
- Graduate studies. Environmental Engineering,
  Illinois Institute of Technology, USA, 1976 -1978
- BS. Physics
  Illinois Institute of Technology, USA, 1976

Professional Affiliations, Registrations, Honors

- Qualified Environmental Professional—Institute for Professional Environmental Practice
- Air Quality Fellow, South Korean Embassy, US Department of State
- Air & Waste Management Association

Languages

- English, native speaker

Fields of Competence

- Air emission source permitting
- Ambient air quality monitoring
- Fugitive dust quantification, modeling, and control
- Settled dust investigation
- Atmospheric dispersion modeling
- Noise monitoring and modeling
- Environmental management systems
- Legislative/regulatory analysis

Key Industry Sectors

- Power
- Oil & Gas Midstream
- Food, Beverage & Agri-business
- Pulp & paper
- Metals
- Mining
- Chemicals

Key Projects

PSD Air Emission Source Construction Permit
Nucor Steel, Blytheville, AR
Managed quick turn-around PSD air permitting effort. Tasks included:

- Definition of permitting strategy;
- Development of project, facility, and near-by emission source inventories;
- Preliminary air quality analysis (dispersion modeling);
- BACT analysis of modified emission units;
- Refined air quality analysis;
- Agency liaison and negotiation.

A Technical Support Document served as the application framework. Total time from project authorization to receipt of the agency's "completeness" notice was less than 12 weeks for this complex facility modification permitting effort.

Air Construction and Operating Permitting
Mondelēz Chicago Bakery, Chicago, IL
Directed multiple facility modification construction permitting projects and related Title V permit revisions for this bakery which is located in a designated "Environmental Justice" community. Several of the permitting actions were processed under Illinois' expedited permit review program, to accommodate the client's schedule.

Air Permit Compliance Assurance
Evonik Goldschmidt Corporation, Mapleton IL
Designed and implemented an emissions and compliance tracking system for a major synthetic organic chemical manufacturing complex. The system imported existing inventory and production data to document and report compliance with complex Title V operating permit requirements.

John Deere Seeding Group
Air Emission Source Construction Permit, Moline, IL
In partnership with client management, developed permitting strategy for new painting line. Project scope necessitated "one source" (i.e., aggregation) and Environmental Justice considerations. Oversaw development air permit application package and its submittal to Illinois EPA.

Air Permit Revision, Clinton Industrial Sand Mine & Processing Plan
Superior Silica Sand, Clinton, WI
Developed an air permitting strategy and application to add drilling and blasting as authorized operations at an existing sand mine, add a new mine, and add a crusher at an existing mine. The permitting authority considered the new processes and operations to serve as a "support facility"—requiring an aggregation approach. To expedite development, a "commence construction waiver" was obtained.

Sulfur Dioxide Attainment Status Monitoring
Multiple Clients, WI, IL, NY
Designed, installed, and operated three independent monitoring networks, conforming to the requirements of the SO_2 "Data Requirements Rule". The projects' objective is to demonstrate the attainment status of their respective areas. Program quality assurance conforms to 40CFR Part 58 Appendix A specifications, in accordance with the DRR. Operation is planned for at least three years in order to assess compliance with the one-hour NAAQS.

Shipborne Air Monitoring Survey
Confidential Client, Guyana, South America
To document pre-exploration, background air quality, instrumented a research vessel to continuously monitor SO_2, NO_2, H_2S, PM_{10}, VOC, wind speed and direction, temperature, relative humidity, and geographical location. Redundant instruments ensured high data recovery over the survey's six weeks, despite unattended operation. Data were screened to filter out measurements biased by the influence of the ship's engines.

Compressor Station Air Monitoring for Impact Assessment
Williams Cos., Multiple Locations
Recent changes to FERC guidance on preparation of environmental impact assessments (RR9) permits the use of local ambient air quality monitoring data to characterize the impact of existing equipment when performing a cumulative impact analysis. Ambient air monitoring tends to be considerably less conservative than the traditional approach—dispersion modeling. This approach can lead to project approvals with fewer restrictions or, in some instance, demonstrate that an otherwise un-licensable facility upgrade can, indeed, be authorized. These multi-year ambient air monitoring projects formed both the basis for FERC's revised RR9 guidance, but also its implementation to several large-scale gas pipeline development projects. Twelve (12) monitoring sites were established and operated, continuously monitoring $PM_{2.5}$, PM_{10}, SO_2, NO_2, CO, wind speed, wind direction, sigma theta, differential temperature, and solar radiation. The data were telemetered to ERM's database server and posted to a secure web site—accessible to the client.

PSD Pre-Construction Air Quality Monitoring
Nucor Steel, Convent, LA
Designed, installed, and managed data collection at this multi-year, three-site PSD pre-construction monitoring network. Continuously measured parameters consisted of $PM_{2.5}$, SO_2, NO_2, CO, wind speed, wind direction, sigma theta, and ambient temperature. Data were digitally recorded onsite and telemetered to ERM office via cellular modem.

Fenceline Air Quality, Meteorological Monitoring
Zeeland Farm Services, Zeeland, MI
Initial contract consisted of designing a two site (upwind-downwind configuration) $PM_{2.5}$ and PM_{10} monitoring program that met the requirements of a consent agreement. ERM then developed a Quality Assurance Project Plan (QAPP) for the program and obtained regulatory agency approval. The last task of the initial contract was to develop a budget-level cost estimate for the program's implementation. ERM was awarded a second contract—to procure monitoring equipment, install it, and operate the program for two years. This included developing and maintaining a secure web site for real-time data access.

Ambient Particulate, Manganese, Mercury, and Meteorological Monitoring
Nucor Steel, Marion, OH
Designed, installed, commissioned, and managing data collection at this multi-year, two site monitoring network. Manual (filter-based) and continuous automated particulate matter samplers are employed to document ambient air concentrations. Filter samples are analyzed to quantify particulate mercury and manganese concentrations. Wind speed and direction are used to identify culpable source(s) in the event of high concentrations.

Refinery Fenceline Monitoring Support
Delek, Krotz Springs, LA
Managed assessment and upgrade of on-site meteorological monitoring system, to conform to requirements of petroleum refinery fenceline monitoring regulations. Monitoring system was enhanced to provide real-time data for operational use. Parameters consisted of wind speed, wind direction, barometric pressure, ambient temperature, relative humidity, and precipitation. Data are fed into refinery's DCS via fiber optic.

Contaminated Soil Remediation Site Dust Monitoring
Proctor & Gamble, Inwood, WV
Network of continuous dust monitors was established and operated to provide real-time operational data to contractors carrying out contaminated soil remediation plan. Measured particulate matter levels and current meteorological conditions were telemetered to ERM and posted to a secure web site. Remediation contractors relied on the monitoring data to plan the day's operations and deploy appropriate dust control measures.

Douglas C. Dziubla

Senior Consultant, Project Management

Doug specializes in the design and operation of ambient air quality and meteorological monitoring programs which can characterize background concentrations, quantify maximum facility impacts, or perform analysis against air quality standards. Doug has thorough knowledge of every aspect of the project lifecycle and provides our clients with efficiently operated and quality assured programs. His extensive history of maintaining complex analysis systems enables him to lead ERM's team of air monitoring specialists to support projects in remote locations across the globe. Doug's experience allows ERM to maintain ERM's extensive inventory of monitoring equipment to allow rapid field deployment and in-house maintenance. To complement this, he serves as Secretary of the AWMA Air Measurement Techniques and Instrumentation Technical Committee.

Experience: 8 years of experience working in oil & gas, pulp & paper, power, chemical, manufacturing, metals, and mining sectors

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Education

- B.S. Meteorology, Northern Illinois University, 2013

Professional Affiliations and Registrations

- Air & Waste Management Association
- American Meteorological Society

Languages

- English, native speaker

Key Industry Sectors

- Oil & Gas Midstream & Upstream
- Power
- Chemical
- Food, Beverage & Agri-business
- Manufacturing
- Metals
- Mining
- Pulp & Paper

Honors and Awards

- ERM Innovation Pioneer. Remote Instrument Control. 2015
- People's Choice Award. Driving Blind: Vehicular Crashes due to Weather-related Visibility Impairment. 2013

Publications

- Ashley, W.S., Strader, S., Dziubla, D.C., & Haberlie, A. 2015. *Driving Blind: Weather-Related Vision Hazards and Fatal Motor Vehicle Crashes.* Bull. Amer. Meteor. Soc. Bulletin of the American Meteorological Society, 96(5), 755-778.
- Osa, R.H., Dziubla, D. and Rengel, A. 2015. *Ambient $PM_{2.5}$ Monitoring: PSD Permitting Risk and Risk Mitigation*. Presented at the 108th annual meeting and exhibition of the Air and Waste Management Association, Raleigh, NC.
- Osa, R.H., Dziubla, D. and Rengel, A. 2015. *Dust in the Wind: How Does Sand Mining Affect Air Quality?* Presented at the Society of Mining Engineers SME-MN Annual Conference, Duluth, MN.
- Osa, R.H. and Dziubla, D. 2013. *Demise of the SMC—Air Monitoring Returns to PSD Prominence*. Lake Michigan Section of Air & Waste Management Association December Newsletter.

Key Projects

Air Monitoring Survey – Upstream Oil & Gas – Guyana
Designed, constructed, and operated a mobile air monitoring laboratory to continuously monitor SO_2, NO_2, H_2S, PM_{10}, $PM_{2.5}$, BTEX, and meteorological parameters to support EIA background analysis. Real-time data were telemetered to ERM offices in North America for data review, validation, & reporting – and were posted to a secure, client-accessible website.

Shipborne Air Monitoring Survey – Upstream Oil & Gas – Guyana
To document background air quality, instrumented a research vessel to continuously monitor SO_2, NO_2, H_2S, PM_{10}, VOC, wind speed and direction, temperature, relative humidity, and geographical location. Redundant instruments ensured high data recovery over the survey's six weeks, despite unattended operation. Data were screened to filter out measurements biased by the influence of the ship's engines.

Public Air Monitoring Program – Manufacturing – West Virginia
Designed and managed a public-facing ambient air quality and meteorological monitoring program to moderate community concerns about the impacts of a manufacturing facility. Program continuously monitored, and publicly reported, ambient concentrations of formaldehyde, SO_2, NO_2, $PM_{2.5}$, and meteorological conditions.

Sulfur Dioxide Attainment Status Assessment – Multiple Clients – Wisconsin, Illinois, & New York
Designed and managed the ambient air monitoring program in support of US EPA's Data Requirements Rule that required large sources of sulfur dioxide to demonstrate compliance with the National Ambient Air Quality Standards. Monitoring performed for Food, Beverage, & Agri-business, Power, and Pulp & Paper clients.

Compressor Station Impact Assessment – Midstream Oil & Gas – Louisiana, Alabama, South Carolina, Virginia, Maryland, & Pennsylvania
Designed, deployed, and maintained an ambient air quality and meteorological monitoring network measuring nitrogen dioxide, sulfur dioxide, carbon monoxide, PM_{10}, $PM_{2.5}$, wind speed & direction, differential temperature and solar radiation.

PSD Permitting Support – Steel Client – Alabama, Louisiana, Arkansas, & South Carolina
Designed, implemented, and managed ambient air monitoring programs to support background analysis anticipation PSD permitting action.

Ambient Air Quality Monitoring – Chemical Client – Alaska
Supported the design, installation, and operation of an ambient air quality monitoring program monitoring continuous concentrations of PM_{10}, $PM_{2.5}$, and ozone, in addition to meteorological parameters.

Ambient Air Quality Monitoring – Steel – Ohio
Developed and deployed a meteorological monitoring system in under one week. Maintained the operation of total suspended particulate and a meteorological monitoring program.

Particulate Monitoring – Mining – Wisconsin
Maintained the operation and calibration of particulate samplers at two sites near silica mining operations.

Perimeter Air Monitoring – Remediation Site – West Virginia
Developed and implemented an off-grid monitoring network of PM_{10} air samplers and a meteorological monitoring system. Data was transmitted via cellular telemetry to a website in real time for use as an on-site operational air quality dashboard. In addition, the system continuously monitored current conditions with alarms to alert the on-site operators of declining air quality.

NAAQS Assessment – Manufacturing Client – New York

Designed, deployed, and maintained an ambient air quality and meteorological monitoring system measuring nitrogen dioxide, wind speed, wind direction for a NAAQS assessment of the 1-hour NO_2 standard.

Olga Samani

Senior Scientist

Olga Samani is a Senior Scientist based in Boston, Massachusetts. She has extensive experience with air quality modeling, emissions inventory development, source characterization, and risk assessment. Olga has conducted a wide range of projects involving the application of dispersion models (e.g., AERMOD, CALPUFF, VISCREEN, PLUVIEW, OCD) for industrial clients ranging from simple stack applications to complex projects involving an array of stacks and fugitive emission sources in the US and many countries around the world. Performed daily "predictive modeling" to confirm that planned operations for the following day will not cause or contribute to a modeled NAAQS exceedance. Performed monthly "hindcast modeling" using actual station emissions parameters and actual hourly meteorological conditions for each day, for comparison to the NAAQS as well as actual monitored concentrations. She has also been involved a number of challenging modeling applications designed to demonstrate compliance with the newly promulgated NO_2, SO_2, and $PM_{2.5}$ ambient standards ranging from small indusial boilers to combined cycle, coal fired power plants, steel and paper mills in support of NAAQS, PSD, BART project, SIP attainment demonstrations, and Hazardous Air Pollutants heath and ecological risk assessments.

Experience: 18+ years of experience in consulting and air quality analysis services in the oil & gas, power industry, chemical, and manufacturing sectors

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Email: Olga.Samani@erm.com

Education

- MS. Atmospheric Sciences, University of Massachusetts-Lowell, USA, 2003
- Freedom Support Act Program Fellow. University of Alabama, USA, 1998-1999
- BS. Environmental Sciences and Ecology, National University of Kyiv-Mohyla Academy, Ukraine, 2000

Professional Affiliations and Registrations

- Air & Waste Management Association (A&WMA)

Languages

- English, proficient
- Russian, native speaker
- Ukrainian, native speaker

Fields of Competence

- Air quality dispersion modeling
  - AERMOD
  - CALPUFF
  - SCICHEM
  - OCD
  - VISCREEN, PLUVIEW
  - Air toxics
- Geographic Information System (GIS)
  - ArcMap
  - EQuIS Professional

Key Industry Sectors

- Power
- Oil & Gas (on and off-shore development)
- Manufacturing
- Chemical

Key Projects

Environmental Impact Assessment

Environmental Impact Statement for a Proposed Prince Rupert LNG Terminal, British Columbia, Canada
Led the effort of the air dispersion modeling team to develop the Environmental Impact Statement for an LNG terminal. Worked closely with the BC Ministry of Environment to address concerns related to the modeling procedures and meteorological data development. Developed high-resolution meteorological data and conducted CALPUFF modeling of the sources associated with the proposed LNG facility construction and operation to demonstrate compliance with ambient standards.

Air Quality Assessment of the Vancouver Fraser Port Authority Centerm Expansion Project, Vancouver, British Columbia, Canada
Led the effort of the air dispersion modeling team to develop the Air Quality Assessment for the terminal expansion. Worked closely with the BC Ministry of Environment to address concerns related to the modeling procedures and meteorological data development. Developed high-resolution meteorological data and conducted CALPUFF modeling of the sources associated with the proposed terminal expansion to demonstrate compliance with ambient standards.

Environmental Impact Assessment for the Proposed Toco Marine Port, Trinidad
Conducted air dispersion modeling of the construction and operational phase. Performed CALPUFF modeling of marine vessels, onshore sources, and construction equipment to demonstrate compliance with the Trinidad and Tobago ambient air standards and International Finance Corporation guidelines.

1-Hour SO_2 Data Requirement Rule in Complex Terrain

1-Hour SO_2 Demonstration for Eastman Chemical Manufacturing Facility, Tennessee
Primary investigator for site-specific monitoring and modeling study to resolve an SO_2 non-attainment area in Kingsport, TN. The study has involved installation of meteorological and monitoring equipment, negotiation of monitoring and modeling protocols with reviewing agencies, and EPA approval of a site-specific dispersion model. Performed meteorological data sensitivity analysis utilizing the collected meteorological data and the Weather Research Forecast (WRF) prognostic meteorological data. Conducted numerous CALPUFF and AERMOD model runs to find a compliance scenario for several continuously operating industrial sources using actual emissions.

1-Hour SO_2 Demonstration for GenOn Facilities, Pennsylvania and Ohio
Primary investigator for modeling study to resolve 1-hour SO_2 non-attainment area near the Conemaugh and Seward Generating Stations. Conducted AERMOD modeling using actual emissions from the major coal-fired power plants (Keyston, Homer City, Seward, and Conemaugh) to demostrate complaince with the 1-hour SO_2. Innovative approach was implemented and approved to model complex terrain receptors with the onsite met data and simple terrain was modeled with the airport met data. Applied EPA procedure of randomly reassigned emissions to establish a longer-term averaging.

Litigation Support

Provided litigation modeling expertise for the expert witness report and declarations in support of defendants for Sierra Club vs. Ameren Misouri. Provided litigation modeling expertise for the expert witness report and declarations in support of defendants for Sierra Club vs. Energy Future Holdings Corporation and Luminant Generationg

Company LLC regarding self-reported opacity excursions at the Big Brown Steam Electric Station in Texas during the period 2007-2010.

PSD Permit Applications

PSD Permit Application for Nucor **Steel Mill, Illinois**
Lead the effort to prepare a PSD permit modification application for a large steel mill. The project triggered PSD Review for all pollutants. Performed NAAQS and PSD increment modeling for all pollutants. Performed screening and review of potential impacts at Class I areas in the region. Performed VISCREEN visibility modeling. Performed Tier-I screening for potential ozone and secondary PM2.5 impacts using the MERPs approach. Worked closely with the ADEQ to address all concerns related to the modeling approach and inventory.

PSD Permit Application for Alaska LNG
Liquefaction Facility, Nikitski, Alaska
Lead the effort to prepare a PSD permit application for an onshore LNG facility. Processed meteorological data and conducted CALPUFF modeling of the onshore stationary and marine sources to demonstrate compliance with the PSD increments, AQRVs (visibility and acidic deposition), and NAAQS at nearby Class I and sensitive Class II areas.

PSD Permit Application for Alaska LNG Gas Treatment Plant Permit Application, North Slope, Alaska
Lead the effort to prepare a PSD permit application for the onshore GTP facility. Processed meteorological data and conducted CALPUFF modeling of the stationary sources to show compliance with the PSD increments, AQRVs (visibility and acidic deposition), and NAAQS.

PSD Permit Application for ConocoPhillips **Chukchi Sea, Exploratory Drilling Project, Devil's Paw Prospect, Alaska**
Lead the effort to prepare a PSD permit application for the offshore drilling project. Processed meteorological data for CALPUFF and OCD models. Conducted modeling of the project-related and mobile emissions associated with the exploratory drilling activities to demonstrate compliance with the NAAQS.

PSD Permit Application for ConocoPhillips **Beacon Port LNG Terminal, Gulf of Mexico**
Lead the effort to prepare a PSD permit application for the LNG project. Processed meteorological data for CALPUFF, OCD, and OZIPR (ozone) models. Conducted modeling of the LNG terminal sources and the riser platform in the Gulf of Mexico to demonstate compliance with the PSD increments, AQRVs, and NAAQS.

Troy Enright

Principal Consultant

Mr. Troy Enright assists clients with assessing siting and routing considerations, completing environmental surveys, determining regulatory applicability and obtaining environmental permits and authorizations for construction and operation of stationary and linear energy facilities. Troy has worked with state environmental policy acts and NEPA, managing teams preparing EAs, and serving as subject matter expert authoring Air, Noise and Soil sections for third-party EISs and EAs prepared for various federal and state agencies including the Federal Energy Regulatory Commission, Bureau of Land Management, and U.S. Coast Guard. Troy has also managed teams preparing route permit applications and certificate of need applications for submittal to public utility commissions for linear energy infrastructure projects.

Experience: 17 years' experience in oil and gas, power, and renewable energy sectors

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LinkedIn: https://www.linkedin.com/in/troy-enright-56b126a1/

Education

- B.S. Environmental Science, Soil and Water Resources Emphasis, University of Minnesota, Minnesota, 2003

Professional Affiliations and Registrations

- 24-Hour Hazardous Waste Operations and Emergency Response, EX Environmental, Wisconsin, 2013
- FERC Environmental Report Preparation and Environmental Compliance Seminars, 2011
- Northwest Environmental Training Center, Introduction to the California Environmental Quality Act, 2007
- University of Minnesota Design, Construction and Maintenance of Stormwater Treatment and Erosion Control Measures, 2004

Languages

- English, native speaker
- French, fluent

Fields of Competence

- Siting and routing analyses for linear energy project (pipelines, electric transmission lines)
- Third-party NEPA analyses (air quality and noise impact assessment)
- FERC permitting and compliance

Key Industry Sectors

- Oil & Gas
- Power
- Chemical

Key Projects

Venture Global LNG; Delta LNG and Delta Express Pipeline Project; 2018 to Present
Natural gas pipeline infrastructure project for LNG terminal and 285 mile pipeline to be located in central and southern Louisiana: Deputy Project Manager responsible for FERC Section 3(a) and 7(c) application development. Activities included coordinating team of subject matter experts to prepare resource reports and respond to environmental information requests for project in the FERC Pre-filing process.

Seismic Air Quality Analyses; Multiple Projects; 2020 to Present; air quality subject matter expert preparing marine air quality analyses for seismic projects off the coast of Argentina. Tasks included verifying project information, coordinating emission estimates, and summarizing marine emissions associated with seismic surveys.

SPOT Terminal Services, LLC; Sea Port Oil Terminal Deepwater Port Project; 2019 to Present
Deepwater oil terminal and pipeline proposed to be located in the Gulf of Mexico and Brazoria and Harris Counties, Texas: Subject matter expert for air quality, noise, and cumulative impact sections of draft and final EIS prepared on behalf of the United States Coast Guard and Maritime Administration. Activities included reviewing project materials provided by the applicant; preparing the noise (airborne and underwater) section, and assisting in preparation of the air quality and cumulative impact sections for the draft EIS; and preparing draft General Conformity Analysis.

Alaska Gasline Development Corporation; Alaska LNG Project; 2015 to 2020; natural gas pipeline infrastructure project including gas treatment facility, 807 mile pipeline, and LNG Terminal proposed to be located in northern, central, and southern Alaska: Subject matter expert and team lead for air quality and noise sections of draft EIS being prepared on behalf of FERC. Activities have included participating in and coordinating inter-agency meetings, presenting project information at agency meetings, reviewing project materials provided by the applicant, and leading a team preparing the air quality and noise sections for the draft EIS.

Eagle LNG; Jacksonville LNG Project; 2018 to 2019
LNG Terminal proposed to be located in Jacksonville, Florida: Subject matter expert for air quality, noise, and cumulative impact sections of draft and final EIS prepared on behalf of FERC. Activities have included reviewing project materials provided by the applicant; preparing the air quality, noise (airborne and underwater), and cumulative impact sections for the draft EIS; preparing responses to comments on the draft EIS; and providing edits for the final EIS.

Tennessee Gas Pipeline, LLC; Susquehanna West, Triad Expansion, and Orion Expansion Projects; 2015 to 2018
Three natural gas pipeline infrastructure projects including a total of approximately 28 miles of pipeline and associated aboveground facilities in northcentral and northeastern Pennsylvania: Project manager responsible for the preparation of three FERC third-party EAs. Activities have included preparing the notice of intent and data requests, reviewing scoping comments, and managing the teams of resource experts for each of the three projects.

Magnolia LNG, LLC and Kinder Morgan Louisiana Pipeline LLC, Magnolia LNG and Lake Charles Expansion Project - Louisiana, 2015 to 2016; LNG terminal including four liquefaction trains, ancillary facilities, and reconfiguration of the Kinder Morgan Louisiana Pipeline to provide natural gas service to the LNG facility; reviewed Resource Report 9 (Air and Noise) and authored Air and Noise section of a third-party Draft EIS (DEIS) prepared for the FERC. Assisted in preparation of the final EIS by responding to comments related to air and noise issues received on the draft EIS.

Spectra Energy, Atlantic Bridge Project, 2015 to 2016, approximately 6.3 miles of 42-inch-diameter natural gas pipeline and associated aboveground facilities in New York, Connecticut, and Massachusetts: Responsible for reviewing Resource Report 9 (Air and Noise), authoring air and noise section for a third-party EA prepared for the FERC, assisting in the preparation of data requests, and attending open houses.

Shwet Prakash

Partner
Water Quality Specialist

Shwet is a Partner who manages ERM's Water Resources, Climate Change and Modeling Group. He is an oceanographer and has been managing and delivering water resources and modeling services. Shwet has been involved in developing state of the art chemical fate and transport models for a variety of offshore, coastal and inland water quality applications. His experience includes directing projects that include hydrodynamic studies, groundwater contamination, fate and transport, accidental oil spill studies, sediment transport and scour studies, regulatory permitting climate change risk analysis and adaptation. Shwet has provided these services to most of the major oil & gas companies

Experience: 14 years' experience in oil & gas, power, chemical, mining and manufacturing industry.

Email: Shwet.Prakash@erm.com

Education

- M.S. (Civil Engineering), University at Buffalo, State University of New York, NY, February 2004
- B.S. (Civil Engineering), Indian Institute of Technology, Bombay, India, May 2001
- Professional Development courses in Environmental Hydrodynamics and Sediment Transport Modeling with POM and ECOMSED, Stevens Institute of Technology, Hoboken, NJ

Languages

- English, native speaker

Fields of Competence

- Computational fluid dynamics
- 1-D, 2-D and 3-D numerical modeling of coastal and shelf processes including hydrodynamics and waves
- Chemical transport and fate and water quality modeling
- Ecological risk assessment & spill modeling
- Sediment transport modeling
- Particle tracking and entrainment modeling
- Groundwater modeling
- Programming in FORTRAN, C, Visual Basic and HTML
- Field data processing and analysis
- Marina design and water quality
- Coastal zone protection

Key Industry Sectors

- Oil and Gas
- Electric Utility (fossil fuel, nuclear, wind and hydropower)
- Mining

Key Projects

Water Quality Impact Assessment from offshore FPSO, Guyana
Managed a comprehensive modeling exercise to quantify environmental impacts related to the commissioning of an FPSO offshore Guyana. Environmental risks associated to wastewater discharge, dredging, drill cuttings, mud discharge, pipeline hydrotesting and accidental spills were estimated using numerical models. Individual wastewater components were modeled and evaluated against relevant ambient water quality standards. Assessments were performed based on detailed metocean study of the region to identify critical circulatory patterns. Conducted workshops for local Guyanese government agencies including Guyana EPA.

Multiple Specialist Studies related to offshore O&G development in Gulf of Mexico
Managing and developing various large scale comprehensive water quality and thermal impacts studies in Gulf of Mexico. Modeling studies typically included oceanography and metocean assessments, assessment of chlorine discharges, thermal discharges, wastewater discharges, brine water discharges and accidental spills into the open waters of the Gulf.

Brine Discharge Study for Onshore LNG Facilities, Ras Laffan Industrial City, Qatar
Directed a comprehensive study to assess the impacts of brine discharge from various operators in Ras Laffan Industrial City (RLIC). Assessment included performing a complete three-dimensional hydrodynamic and water quality model for the waters offshore RLIC. Multiple scenarios were developed including normal and upset cases along with a combination of various ambient conditions such as Shamal winds, typical and extreme water temperatures, and multiple tidal cycles. Three different locations of potential discharge of brine release were evaluated to identify the location that would result in least environmental impact. Study results were presented to Qatar's MME.

Multiple Studies Related to Water Quality and Thermal Impacts from Onshore LNG facilities, Qatar
Managing and developing various large scale comprehensive water quality and thermal impacts studies in Ras Laffan Industrial City, Qatar. Modeling studies included assessment of chlorine discharges, thermal discharges and brine water discharges into the Arabian Gulf.

Multiple Specialist Studies related to FLNG development offshore Mozambique
Managed five specialist studies related to the environmental impacts from operational and accidental discharges from an FLNG. Study included development of a comprehensive flow, transport and fate model for thermal, produced water and wastewater discharge along with consideration of accidental oil spill and planned drilling operations.

Development of Constructed Wetlands Model for Water Reuse, Qatar
Directed development of numerical model for constructed wetlands that could aid in designing these wetlands for treatment of wastewater through the removal of nutrients, metals and organic compounds. A functioning wetlands system would allow for the reuse of treated process water for irrigation or recharging groundwater.

Water Quality Impact Assessment from Onshore LNG Terminal Expansion, Indonesia
Managed a comprehensive modeling exercise to quantify environmental impacts related to expansion of an onshore LNG facility in Indonesia. Environmental risks associated to wastewater discharge, dredging, drill cuttings and mud discharge and pipeline hydrotesting were estimated using a 3-D hydrodynamic and transport model. Individual wastewater components were modeled and evaluated against relevant ambient water quality standards.

Lower Passaic River Superfund Site Hydrodynamic and Contaminated Sediment Transport Modeling
This confidential study included analysis of current meter and water surface elevation data and modeling of the hydrodynamics and transport of sediments. The purpose of the study was to support our client, a PRP, in the interim allocation process and to help establish the magnitude of dispersal of material introduced into the prominent Newark Bay river-estuary system. This effort also included review of EPA- and Cooperating Parties Group-generated documents and datasets (particularly EPA's Framework Document and modeling reports), submission of comments, and attendance at Technical Committee meetings.

Dredging Impact Assessment, Saigon Premier Container Terminal, Vietnam
The purpose of this project was to estimate the potential impacts of proposed dredging operations for the Saigon Premier Container Terminal. Three types of impacts were examined: re-suspended sediments entering the water column; suspended and newly exposed bottom sediments exerting a demand on the water column's dissolved oxygen (DO); and, changes in currents caused by the new bottom configuration. Model results predicted magnitudes, durations, and locations of the suspended solids and dissolved oxygen reductions compared to criteria.

Deposition and erosion studies in Tawau Harbor, Vietnam
The hydrodynamic and sediment transport modules of GEMSS were used to evaluate the deposition and erosion characteristics of bottom sediments in Tawau Harbor, Vietnam. The hydrodynamic circulation in the harbor was obtained using tides and winds. Sediment bed characteristics were assumed as non-cohesive and deposition and erosion probabilities were estimated for each model grid cell in the harbor by comparing the bottom currents with the threshold velocities for the movement of sediment particles of different sizes.

Submarine Tailings Disposal Studies in Stephens Passage, Juneau, Alaska
The purpose of this study was to evaluate the impact of proposed submarine tailings outfall in Stephens Passage. The only practical way to include the effects of the complex bathymetry and ocean currents on tailings distribution on the ocean bottom was to use a numerical model to simulate the relevant processes. The models were used to evaluate the distribution of tailings on the ocean bottom based on design parameters for the tailings pipe, and on the model predicted ocean currents. The model results were used to set up sediment monitoring program in the Passage.

Oil Spill Response Planning and Impact Assessment for various clients and fields, offshore Malaysia
Currently developing models to estimate the environmental impacts from accidental spills during the operations of MOPUs and FSOs offshore Malaysia. Responsibilities include overall project management of these modeling projects, client liaison and regulatory support.

Oil Spill Impact Assessment for confidential field development, offshore Western Australia
Currently developing models to estimate the environmental impacts from accidental spills during the operations of FLNGs (Sunrise, Prelude and Scarborough), MOPUs and FSOs offshore Australia. Responsibilities include overall project management of these modeling projects that include three individual clusters.

Oil Spill Response Planning and Impact Assessment for various clients and fields, offshore Africa
Currently directing several model developments to estimate the environmental impacts from accidental and operational discharges including spills during the operations of offshore production units offshore Africa. Responsibilities include overall project management of these modeling projects, client liaison and regulatory support.

Oil Spill Modeling, MA
Involved in development of an oil spill fate model. The model was developed using GEMSS-COSIM (Chemical and Oil Spill Impact Module). The study required analysis of oil spill fate and its shoreline interaction under varying meteorological and hydrodynamic conditions.

Entrainment Modeling Regassification Facility, New Jersey
Proposed development of an LNG import terminal on the Delaware River in Gloucester County, NJ. During vessel unloading while at berth, LNG carriers take on about 30,000 m3 of water to maintain hydraulic stability when empty. Concerns exist regarding the entrainment effects and possible fishery losses due to this ballast water intake. Striped Bass, White Perch and Bay Anchovy are the species of concern since they consistently dominate the ichthyoplankton population in the Delaware River. ERM simulated intake effects using a high resolution hydrodynamic model to estimate entrainment rates for various life stages of these species of concern. These rates were used to estimate the loss of equivalent adults using a specialized module developed by ERM.

Publications

- Saeed, S.; Prakash, S.; Deb, N.; Campbell, R.; Kolluru, V.; Febbo, E.; Dupont, J. “Development of a Site-Specific Kinetic Model for Chlorine Decay and the Formation of Chlorination By-Products in Seawater”. J. Mar. Sci. Eng. 2015, 3, 772-792.
- Wilcock, Ronni, D. Newbold, V. S. Kolluru and S. Prakash, 2015. “Chasing Black Swans: Identification, Adaptation and Resilience”, Presented at the climate change impacts mini symposium organized during the A&WMA’s 108th Annual Conference & Exhibition Connecting the Dots: Environmental Quality to Climate, June 22-25, 2015. Raleigh Convention Center, Raleigh, North Carolina. USA
- Wilcock, Ronni, V. S. Kolluru and S. Prakash, 2015. “A Tool to Determine the Impacts of Climate Change”, Presented at the 35th Annual Conference of the International Association for Impact Assessment – Impact Assessment in the Digital Era”, April 20-23, Florence, Italy, 2015.
- Prakash, S., J. A. Vandenberg, E. M. Buchak. 2014. “Sediment Diagenesis Module for CE-QUAL-W2 Part 2: Numerical Formulation”. Environmental Modeling & Assessment. (in press).
- Vandenberg, J. A., S. Prakash, E. M. Buchak. 2014. “Sediment Diagenesis Module for CE-QUAL-W2. Part 1: Conceptual Formulation”. Environmental Modeling & Assessment. DOI 10.1007/s10666-014-9428-0. Print ISSN 1420-2026. Online ISSN1573-2967. Springer International Publishing. November.
- Prakash, S., Kolluru, V. and Young, C. “Evaluation of the Zone of Influence and Entrainment Impacts for an Intake Using a 3-Dimensional Hydrodynamic and Transport Model”. Journal of Marine Science and Engineering 2014. Vol. 2, 306-325.
- Febbo, E., Duggan, J., Kolluru, V. and Prakash, S. “Integration of a Geospatial Framework with a Suite of Numerical Models for Operational, Environmental and Regulatory Aspects of Cooling Water Usage”. Proceedings of the 2014 International Petroleum Technology Conference, held January 20–22, 2014, in Doha, Qatar.
- Saeed, S., Deb, N., Campbell, R., Prakash, S., Kolluru, V. and Febbo, E. “Laboratory Experiments to Validate 3D Numerical Modeling of Chlorine Decay in Industrial Cooling Water Discharge”. SETAC Europe 23rd Annual Meeting. May 12th to May 16th, 2013. Glasgow, UK.
- Febbo, E.J., Kolluru, V.S. and S. Prakash. “Numerical Modeling of Thermal Plume and Residual Chlorine Fate in Coastal Waters of the Arabian Gulf”. Society of Petroleum Engineering International Conference 2012. September 11-13. Perth, Australia.
- Kolluru, V.S., S. Prakash and E. Febbo. 2012. “Modeling the Fate and Transport of Residual Chlorine and Chlorine By-Products (CBP) in Coastal Waters of the Arabian Gulf”. The Sixth International Conference on Environmental Science and Technology 2012. June 25-29. Houston, Texas, USA.
- Prakash, Shwet, J.A. Vandenberg and E. Buchak. 2012. “CEMA Oil Sands Pit Lake

Model". CONRAD 2012 Water Conference. April 20-22. Edmonton, Alberta.

- Kolluru, V.S. and S. Prakash. 2012. "Source Water Protection: Protecting our drinking waters". India Water Week 2012. April 10-14. New Delhi, India.
- Prakash, S., J.A. Vandenberg and E. Buchak. 2011. "The Oil Sands Pit Lake Model - Sediment Diagenesis Module." MODSIM 2011. Modelling and Simulation Society of Australia and New Zealand, December 12-16, 2011. Perth, Australia.
- Vandenberg, J.A., S. Prakash, N. Lauzon and K. Salzsauler. 2011. "Use of water quality models for design and evaluation of pit lakes." Australian Center for Geomechanics. Mine Pit Lakes: Closure and Management. Page 63-81.
- Kolluru, V.S., M.J. Fichera, S. Prakash. 2006. "Multipurpose modeling tool for aquatic and sediment contaminant fate and effect assessments". SETAC North America 27th Annual Meeting. Montreal, Canada. November 2006.

Harry A Zahakos, PE

Senior Engineer

Harry has over 25 years of experience as an environmental engineer conducting, directing, and managing studies focused on the hydrodynamics and transport of sediments and contaminants in the aquatic environment. He has worked on numerous projects for both private and public sector clients with impact assessments, remedial investigations, and natural resource protection. His experience spans the range of site management including monitoring, data analysis, conceptual site model development, numerical modeling, forecasting and remedial design. Harry has extensive experience regarding contaminated sediment sites, including many under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA/Superfund). Harry has created several tools for clients to assist with historical and prognostic evaluations of sediment and contaminant transport. Harry has also served as expert reviewer of numerous modeling studies.

Experience: 25 years' experience in chemical, manufacturing, mining, oil and gas, power, and government sectors

Email: harry.zahakos@erm.com

Education

- Post-graduate studies, Earth and Environmental Engineering, Columbia University, NY
- M. E., Environmental Engineering, Manhattan College, NY
- B. S., Mechanical Engineering, Manhattan College, NY

Professional Affiliations and Registrations

- Professional Engineer in the State of New York
- Water Environment Federation
- Society of Environmental Toxicology and Chemistry
- American Society of Civil Engineers

Languages

- English, native speaker

Fields of Competence

- Hydrodynamics/hydrology/coastal processes
- Sediment transport and stability
- Contaminated sediment assessment and management
- Contaminant transport
- Water quality and eutrophication
- Persistent organic pollutants
- Integrated watershed management
- Impact assessment
- Remedial investigation and feasibility
- Wastewater treatment
- Numerical model application
- Model development including algorithm construction and source code implementation

Key Industry Sectors

- Chemical
- Manufacturing
- Mining
- Oil and Gas
- Power
- Government

Key Projects

Confidential River Superfund Site – Washington
Developed hydrodynamic conceptual model to assess the stability of river sediments and slag as a result of mining/refining operations. Performed an assessment of potential for slag resuspension and mobility. Conducted expert review of existing hydrodynamic modeling.

Hydropower Project – Papua New Guinea
Project aim was to assess the impact of construction and operation of the Wabo Hydroelectric Facility on the Purari River Delta, Papua New Guinea. Active project responsibilities included development of field program, data analysis, and development of modeling approach. Objectives included understanding of the effects of the dam on hydrodynamics, sedimentation and water quality in sensitive mangrove-lined river delta habitats.

Salt Marsh Enhancement – California
Developed hydrodynamic model to assess the hydrodynamics and sediment transport of Carpinteria tidal wetland along the Pacific Coast. Assessed the impact of potential dredging activities in enhancing marsh water circulation and habitat. Responsibilities included development of field programs, analysis of data, and model development and calibration.

Mine Impact Assessment – Sierra Leone
The purpose of this project was to assess the impact of barging operations associated with transport of iron ore from proposed mine re-deployment along the Port Loko River, Sierra Leone. Responsibilities included development of field program, analysis of data, and establishment of baseline conditions. Performed impact assessment of dredging operations through numerical modeling.

Gas Pipeline Project – New York
Managing engineer leading analysis to determine extent and depth of bed scour along proposed natural gas pipeline route across Long Island Sound under extreme storm conditions. The analysis involved the development of linked wind-wave, hydrodynamic, and sediment transport models. Model results were used to support pipeline design. Prepared final report to client.

Water Quality Impact Assessment from Offshore FLNG Development – Mozambique
Performed assessment of environmental impacts associated with operational and accidental discharges from an FLNG off the coast of Mozambique on behalf of ENI. Utilized 3-D hydrodynamic and transport models to quantify effects of thermal, produced water and wastewater discharge. Prepared EIA report for client

Water Quality Impact Assessment from Onshore LNG Terminal Expansion, BP, Indonesia
Performed assessment of environmental impacts related to expansion of an onshore LNG facility in Indonesia. Assessment utilized 3-D hydrodynamic and transport models to quantify effects of wastewater discharge, dredging, drill cuttings and mud discharge and hydrotest fluids. Prepared EIA report for client.

Modeling Suite for the Assessment and Remediation of Sediments
On behalf of the Electric Power Research Institute, the purpose of this project was to provide a decision-making tool for manufactured gas plant managers in the assessment of the fate of sediment-bound PAHs and the effects of remedial actions, called Model for the Assessment and Remediation of Sediments (MARS). Responsibilities included the conceptual design of software package, coupling of hydrodynamic, sediment transport, and toxicant fate models, design of user interface, and development of model test scenarios.

Constructed Wetlands Modeling – Qatar/Oman
On behalf of Exxon-Mobil Research Qatar, this project's goal was to provide a design tool for managers to assess the efficacy of constructed wetlands in the treatment of wastewaters for conventional and industrial pollutants.

Responsibilities included the conceptual design of software, development of individual kinetics for numerous contaminants, and general oversight of software development.

Estuarine Superfund Site – New Jersey
Representing a client on the Berry's Creek Study Area (BCSA) Technical Committee (TC). The BSCA encompasses several thousand acres of degraded urban wetlands and open water ecosystems tributary to Newark Bay. Mercury and PCBs are among the primary contaminants of concern. Supporting our client with direct representation on the TC and providing oversight for the Remedial Investigation/ Feasibility Study and Remedial Design. On behalf of our client, providing in-depth technical analysis of the study data to provide understanding of the implications for sediment remediation. The effort also included evaluation of hydrodynamic and sediment transport characterization and modeling as well as development of a mercury fate model. Prepared expert reports for client.

Tidal Creek Superfund Site – New York
Representing a client on the Newtown Creek Group (NCG) Technical Committee (TC). Newtown Creek in New York City is one of the largest contaminated sediment sites on the East Coast of North America. Numerous contaminants of concern include PCBs, PAHs, Dioxins/Furans and a variety of metals. Beyond direct representation on the TC, developing a Conceptual Site Model relating site operations and release history to Newtown Creek. Providing expert review of NCG contractor activities and deliverables. These efforts include evaluation of hydrodynamic, sediment transport, and chemical fate characterization and modeling.

Tidal Creek Superfund Site – New York
Developed hydrodynamic and sediment transport model to assess the transport of discharged solids in the vicinity of Superfund designated contaminated sediment site in the Gowanus Canal, New York. Model was used in support of quantifying influence of specific historical discharges outside of site to present sediment conditions within site. Prepared expert report for client.

Assessment of Sewage Treatment and Discharge to River – Indiana
Developed numerical model to predict fate and transport of Methyl 2-Fluoroacrylate and 2-Fluoroacrylate in sewage treatment and discharge to the Wabash River, Indiana. Chemical fate processes included volatilization, biodegradation, and sorption. Effluent concentrations were used to assess toxicity at the Sewage Treatment Plant outfall and within the greater River.

River PCBs Superfund Site – New York
Analysis of the Fate of PCBs in the Upper Hudson River (UHR) – responsible for the construction, application, and evaluation of PCB fate models of the UHR. Managed and maintained large databases and performed extensive data analysis for the assessment of PCB sources, model parameterization, calibration, and validation. Prepared sections of comprehensive documentation of hydrodynamic, sediment transport, PCB fate, and PCB bioaccumulation models. Conducted review and prepared responses to various USEPA data analysis and modeling reports.
Fate of Dredged PCB Contaminated Sediment in the UHR – developed numerical model to predict the fate and transport of resuspended sediment and PCBs as a result of dredging operations in the UHR. Applied model to identify areas requiring dredge control, designed various control strategies, and evaluated their ability to maintain far-field concentrations that comply with USEPA water quality standards. Prepared dredge design reports for USEPA review.

River PCBs Superfund Site – New York
Managing engineer responsible for direction and oversight of development and application of hydrodynamic, sediment transport, and PCB fate models of the Grasse River, New York. The primary goal of these simulations was to assess the efficacy

of remedial alternatives to reduce PCB levels in fish. Provided direct management of data analysis, model preparation, calibration, and projection scenarios.

Watershed and Lake Environmental Modeling – Texas
Technical lead working closely with client and consultants to develop integrated watershed and lake eutrophication model of Lake Travis, Texas as part of the Colorado River Environmental Modeling System. Provided guidance and direct technical support with data analysis, model setup, input preparation, calibration, projection scenario development, supporting field programs, and general project management.

River Superfund Site – Massachusetts
Responsible for direction and oversight of hydraulic modeling of flood plain in vicinity of manufacturing facility along the Housatonic River in Western Massachusetts. The objective of this study was to evaluate the impact on flood elevations and extent due to changes in floodplain topography associated with remediation actions. Prepared technical memorandum of findings to USEPA.

Chemical Fate and Transport Model Development
Primary engineer responsible for development of QEA-Fate, an in-house mathematical model to simulate the fate of toxic contaminants in aquatic systems. QEA-Fate is time-variable multi-classed integrated hydrodynamic, sediment transport, and chemical fate modeling framework based in USEPA Environmental Fluid Dynamics Code. Developed, implemented, and tested various kinetic routines allowing for the simulation of various mechanistic processes including sediment-water and air-water interactions.

Confidential River Superfund Site – Indiana
Analyzed sediment PCB and metals data in contaminated riverine system for source identification ('fingerprinting') of contamination from specific historical discharges.

Publications

- ERM. 2014. "Oceanographic Specialist Study - Produced Water and Thermal Discharge."
- ERM. 2014. "Constructed Wetlands Fate and Transport Model for Treatment of Industrial Wastewater."
- ERM. 2013. "Carpinteria Salt Marsh Hydrodynamic Model."
- ERM. 2013 "Modeling Environmental Impacts from Tangguh LNG Terminal Phase 2 Expansion."
- AECOM/ERM. 2013. "Purari Hydropower Project Feasibility and SEIA Studies – PNG SEIA Stage 2 Technical Report: Delta Processes Review and Analysis."
- Anchor-QEA. 2009. "Colorado River Environmental Models Phase 2: Lake Travis Final Report."
- QEA. 2008. "Phase 2 Intermediate Design Report, Attachment G - Dredge Resuspension Modeling."
- QEA. 2006. "Phase 1 Final Design Report, Attachment F - Dredge Resuspension Modeling."
- NYCDEP. 2003. "2002 New York Harbor Water Quality Report"
- Connolly, J.P., H.A. Zahakos, J. Benaman, C.K. Ziegler, J.R. Rhea and K. Russell. 2000. "A Model of PCB Fate in the Upper Hudson River", Environ. Sci. Technol. 34:4076-4087.
- QEA. 1999. "PCBs in the Upper Hudson River – Volume 2: A Model of PCB Fate, Transport and Bioaccumulation."
- QEA. 1999. "PCBs in the Upper Hudson River – Volume 3: Predictions of Natural Recovery and the Effectiveness of Active Remediation."
- Zahakos, H.A., Connolly, J.P., and Di Toro, D.M. 1994. "Lake Erie Eutrophication Model Post Audit 1980-1990."

Invited Presentations

- Taiwan-US Workshop on Soil, Groundwater and Sediment. 2014. "Modeling Fate and Transport of Contaminated Sediment". One of four American experts invited by Taiwan EPA to advise on the application of sediment remediation technology.

Matthew W. Erbe

Geology, Soils, and Groundwater Lead

Matt has over 20 years of broad experience in leading cross-functional teams in multiple locations to support projects in the United States, Latin America & Caribbean, and Europe. He has provided technical consulting for assessment of coastal and marine geology and sediments, evaluations of corrective measures for soil and groundwater impacts, and groundwater resource and supply analysis. He is recognized for his performance management capabilities to consistently meet and exceed client and stakeholder expectations and project deadlines, subcontractor management, budgets and specifications. Since 2013, his primary focus has been on the transportation, upstream oil & gas, chemical and waste management sectors. He has been a part of ERM's support to EEPGL in Guyana since 2016, and has been the Project Controls Lead for ERM's support to EEPGL since late 2017.

Experience: 20+ years' managing contaminated site investigations and remediation projects, environmental and social baseline studies, and impact assessments.

Email: matt.erbe@erm.com

LinkedIn: https://www.linkedin.com/in/matthew-erbe-79548a46/

Education

- MS, Hydrogeology, Syracuse University, 1997
- BS, Natural Sciences - Geology, Towson State University, 1995
- Fundamentals of Ground Water Geochemistry, Geochemical Modeling of Aqueous Systems, Advanced Ground Water Modeling Workshop
- 40-Hour OSHA Health and Safety Training for Hazardous Material Operations and Emergency Response, Current on Annual 8-Hour Update

Professional Affiliations and Registrations

- Professional Geologist, State of Tennessee

Languages

- English, native speaker

Fields of Competence

- Hydrogeology, soil science, geochemistry
- Ground water resource and quality evaluations
- Environmental impacts of onshore and offshore development of oil & gas resource exploration
- Coal combustion byproduct beneficial use and disposition
- Complex project management

Key Industry Sectors

- Oil & Gas
- Power
- Water Resources
- Chemical and Manufacturing

Key Projects – Complex Project Management

Impact Assessment – Oil & Gas Client
Program Controls Lead for $20MM+ program responsible for management and coordination of schedule, budget, change management and increasing local content support. Supporting Esso Exploration and Production Guyana Limited (EEPGL) with environmental and social impact assessment for exploratory drilling and oil field development offshore of Guyana.

Impact Assessment – Transportation Client
Project Manager for $26.5MM contract to complete an environmental and social impact assessment for the proposed 275 km interoceanic shipping canal in Nicaragua. Accountable for overseeing the physical, biological, cultural and social studies under an extremely challenging schedule utilizing more than 250 ERM engineers and scientists from Canada, China, Colombia, Mexico, Panama, Peru, and the United States. The work was conducted in partnership with international NGOs and Nicaraguan experts.

Corrective Measures - Decommissioning
Project Manager for decommissioning of a former industrial waste water treatment plant nearly 40 years after abandonment. Served as the owner's engineer for development of technical work specifications and construction management and for health and safety oversight. Decommissioning included conditioning and removal of TSCA-hazardous and non-hazardous sludge and supernatant from nine ASTs and 12 concrete basins, water treatment, sampling and discharge to surface water, and off-site disposal of conditioned sludge materials.

Impact Assessment – Government
Managed the environmental baseline study of a former a WWII era military base. Oversaw investigations of groundwater impacts relating to the historic fuel distribution system from a 1991 release of gasoline at an upgradient and off-site gasoline station. As a result, the Puerto Rico EQB has since identified additional responsible parties to the contamination. Current remediation includes AST removals, ground water monitoring and asbestos abatement of the hangar.

Key Projects – EPA Region III Project Work

68th Street Landfill Superfund Site – Remedial Investigation Rosedale, Maryland
Task Manager oversaw the RI for the 68th Street Landfill Superfund Site, Rosedale, Maryland. The 270-acre Site contained multiple former landfills and five USEPA-designated "source areas," as well as sensitive environmental features such as streams, wetlands, and floodplains. Investigation included analysis of groundwater to surface water discharge pathway, landfill gas migration assessment, conceptual model development, and remedial design support. (EPA RPM – C. Corbett)

Avtex Fibers Superfund Site – Hydrogeologic Assessment Front Royal, Virginia.
Project Manager and Principal Hydrogeologist for deep bedrock aquifer (DBA) investigations and closure of former waste disposal basins. Project required installation of multiple deep groundwater monitoring wells using conventional and multi-level systems, ambient ground water and river level monitoring, conduct of single and multi-well pumping tests in fractured shale, preparation of a dense aqueous phase liquid (DAPL) flow and transport model to evaluate the role of structural geologic elements in plume migration and aquifer hydraulics, and deep extraction well design. (EPA RPM – B. Gross)

MD Sand, Gravel and Stone Superfund Site – Remedial Investigation Elkton, Maryland.
Project geologist responsible for supplemental investigation at the 150-acre where industrial waste disposal activities contaminated soil and groundwater. Oversaw MIPS investigation of Upper Sand aquifer and FLUTe DNAPL characterization in Buried Waste Area, performed MNA assessment to reducing remedial costs with enhanced biodegradation. (EPA RPM – D. Rossi)

PEMCO Corp. EPA Region III Facility Lead Program – Remedial Investigation Baltimore City, Maryland.
Manager for Phase I/II ESA, Supplemental Studies, and RAP for Voluntary Cleanup Program of former pigment manufacturing facility in Baltimore City. The RAP was accepted by the MDE and EPA Region III FLP.

Key Projects – Atlantic Coastal Plain

BBSS Mine Site – Anne Arundel County Maryland
Principal Investigator for the evaluation of impacts to groundwater quality resulting from the use of fly ash to reclaim a sand and gravel mine. Used statistical analysis of metals concentration data collected from monitoring wells and residential water supply wells both adjacent to the mine site and the surrounding communities differentiating mining and reclamation activities which had contributed to the deterioration of the shallow potable aquifer system. Report requested by MDE.

Faulkner Ash Storage Facility – Charles County Maryland
Principal Investigator for evaluation of long-term surface water quality and the effectiveness of the wetland treatment systems to mitigate impacts to ground water from the ash fill. The studies provide stakeholders a basis for determining future requirements for monitoring and evaluating the effectiveness of preventive measures for sulfate reduction at existing and future CCP storage facilities and upgrading the treatment systems.

Millersville Landfill, Maryland. Anne Arundel County DPW.
Project Manager and Hydrogeologist for Assessment of Corrective Measures for impacts to groundwater, replacement of residential supply wells, hydrogeologic investigation of seeps to support landfill cells design, and human health risk assessments.

St. Andrew's Landfill, St. Mary's County, Maryland
Project Manager for evaluation of impacts to proposed housing development from methane and VOC soil gas plume migrating beyond landfill limits. Project involved collection and mapping of shallow soil gas, surface water, leachate and sediment samples downgradient of the landfill.

Elkton Landfill, Maryland – Cecil County DPW.
Principal Investigator for soil gas monitoring program at the Elkton Landfill in Cecil County, Maryland. Responsible for the installation of soil gas monitoring probes around the perimeter of the landfill to evaluate landfill gas migration.

Orbital ATK – Alternatives Analysis – Anne Arundel County, Maryland
Completed a remedial alternatives analysis of measures to eliminate the potential for off-site migration of ground water plume and reduce the residual contaminant mass. Effort completed to reduce client's long-term liabilities and financial obligations associated with Administrative Consent Order for site in Anne Arundel County.

Other Key Projects

Hydrogeologic Assessment – Land Development
Managed hydrogeologic investigation for ground water appropriations permit. The 23 lot parcel under development is adjacent to a fuel terminal which released gasoline to the saprolite and bedrock aquifers. Project included the use of an analytical element model to simulate future pumping conditions at the development and assess the migration and fate of BTEX and MTBE in ground water.

MD DNR Power Plant Research Program – Land Development – MDE Water and Science Administration
Managed the hydrogeologic evaluation of the site to characterize the pre-development hydrology of the gravel bog and establish baseline hydrologic conditions prior to development in the region.

Corrective Measures – Site Characterization
Oversaw delineation of extents of sludge at five former Acid Tar Sludge Pits at Pennsylvania refinery. Assessed general characteristics of the sludge and underlying soils (i.e., acidity and density) to support the remedial action. Challenges included working with hazardous tar with pH<2, release of hydrogen sulfide gases, and work over water.

Corrective Measures – Alternatives Analysis
Evaluated remedial technologies to reduce source concentrations of trichloroethylene in the ground water within a karst aquifer system at former CREO Manufacturing Plant in West Virginia. Leading technologies evaluated included electric resistance and radio frequency heating, bio augmentation, and dual-phase extraction with vapor extraction.

Corrective Measures – Site Characterization and Remedial Design
Managed the evaluation of environmental impacts at former rayon manufacturing facilities under the West Virginia Voluntary Remediation Program. Primary contaminants included metals, carbon disulfide and PAHs. Prepared remedial action design for replacement of the seep collection system to prevent surface discharge.

Manufactured Gas Plant – Phase II ESA
Geologist responsible for remedial investigation of ground water contaminated by coal tar at a former manufactured gas plant in Binghamton, New York. Project included geologic site characterization and NAPL delineation, well installation, ground water sampling, aquifer testing, client and regulatory agency communication, and health and safety monitoring.

Manufactured Gas Plant – Groundwater Model
Groundwater Flow Model, Project Manager for an investigation of the potential impacts to ground water related to a former MGP facility. Used analytical element models to simulate water table aquifer and capture zone for a City production well adjacent to the facility to refute hydraulic connection of the City wells and deeper aquifer.

Municipal Landfill Evaluation – Siting
Manager for proposed landfill information review and fatal flaw analysis. Support included review of County's WMP, zoning requirements, environmental resources, design criteria, and estimation of landfill capacity.

Publications

- D. Aeiker, M. Erbe and L. Rafalko, V. Gardner and R. Cleary. "Mapping Preferential Groundwater Flow Pathways for Contaminant Migration within a Karst Aquifer System", paper presented at the Fifth International Symposium and Exhibition on the Redevelopment of Manufactured Gas Plant Sites, Destin, FL, 2014.
- Erbe, M., and J. Ryan, "Use of In-situ Bioventing to Mitigate Diesel Range Petroleum Hydrocarbons in Saprolite", paper presented at the Battelle Ninth International In-Situ and On-Site Bioremediation Symposium, Baltimore, MD, 2007.
- Erbe, M., "Evaluation of Water Quality Conditions Associated with the Use of Coal Combustion Products for Highway Embankments", talk given at the 2005 EPA Region III By-Products Symposium, Philadelphia, PA, 2005.
- Erbe, M., R. Keating, C. Travers, L. Norman, W. Cutler, and T. Martin, "Assessing the Role of Structural Elements in Aquifer Hydraulics and Plume Management", talk and paper presented at U.S. EPA/NGWA Fractured Rock Conference Proceedings, Portland, Maine, 2004.
- Erbe, M.W. and D.I. Siegel, "Using Ternary Diagrams to Characterize the Natural Attenuation of Chlorinated Ethenes in Ground Water", published in Journal of Environmental Hydrology, Vol. 9. March 2001.

Herbert Pirela, PhD

Senior Project Manager

Herbert Pirela has over 23 years of experience in designing, conducting, and managing major environmental investigations and permitting projects. The major focus of his work has been on impact analyses for soils, reclamation, and geology, and includes environmental assessments under the National Environmental Act (NEPA) and other United States and international regulations. Herbert also has extensive experience with international standards and best practices, especially with the IFC Performance Standards and WBG EHS Guidelines, having lead and conducted multiple environmental and social impact assessments (ESIA) on behalf of International Development Finance Institutions.

Experience: 23 years' experience in the power, oil & gas, and mining sectors

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Education

- PhD. Soil Chemist,
  Iowa State University, USA, 1987

Professional Affiliations and Registrations

- American Society of Agronomy
- Society of Environmental Toxicology and Chemistry
- Soil Science Society of America
- Chevron ESHIA Qualified Facilitator

Languages

- English, native speaker
- Spanish, High proficiency (Spoken and written)

Fields of Competence

- Environmental impact assessment
- National Environmental Policy Act (NEPA) and state-equivalent NEPA compliance
- Project permitting and documentation
- Project planning and design to address aoils and geological issues
- Stakeholder engagement
- Cumulative impact assessment
- Soil restoration/revegetation specially in desert or arid environments
- Pipelines and other energy industry projects

Key Industry Sectors

- Power
- Mining
- Oil & Gas

Honors and Awards

- Graduate Research Excellence Award, Iowa State University, 1987.

Key Projects

Improving the Transport Logistics and Competiveness of the Dr. Jules Sedney Port of Paramaribo, Suriname
ERM was contracted to perform an Environmental, Social, and Health & Safety (ESHS) review of the Dr. Jules Sednesy Port in Paramaribo to assess the compliance status of existing Port operations, including the Environmental and Social Management System, against different criteria, standards, and regulatory requirements, such as, Surinamese laws and regulations, and applicable best management practices, international treaties and conventions such as ISO 14001:2015, the Basel Convention and Marine Pollution – MARPOL 73/78. Herbert served as project manager to conduct the ESHS review.

Environmental and Social Impact Assessment for the Saramacca Gold Mine, IAMGOLD, Suriname
For the proposed Environmental and Social Impact Assessment, for the Saramacca Mine project in Suriname, Herbert is the environmental technical lead for the project and assistant Project Manager. He worked with project manager and IAMGOLD to coordinate the implementation of the required field studies and writing of environmental report.

Gold Mine Tailings Storage Facility Expansion ESIA, Rosebel Gold Mines, IAMGOLD Corporation, Suriname
To maintain gold production levels, Rosebel Gold Mines is currently investigating the feasibility of expanding its mines tailings storage facility. The proposed expansion includes the expansion of the existing tailings facility to the east by constructing seven additional dams, which will raise total vertical containment by 43 meters when the Project is completed. Herbert is serving as project manager to conduct an environmental and impact assessment for the expansion of the gold mines existing tailings storage facilities in according to local and international guidelines.

Merian Gold Mine Project ESHIA, Newmont Mining Corporation, Suriname
Suriname Gold Company, LLC (Surgold) owns and operates the Merian Gold Project 30 Km to the north of the Nassau Mountains in eastern Suriname. Herbert is currently leading the soils impact assessment for the Environmental and Social Impact Assessment of a new gold mine in Suriname. The Project straddles the divide of two major watersheds and is located in the equatorial rain forest. The impact assessment includes the assessment of the impacts of the mine pits and other infrastructure and proposed mitigation measures.

Environmental Evaluation for the Para North and North Kankantrie Mines Boskalis International b.v., Suriname
Boskalis is finalizing a Total Concept Study for the further exploitation of the Para North and Kankantrie North bauxite deposits. These are mining concessions in Suriname owned by Suriname Aluminum Company LLC (Suralco). Suralco's existing supplies of bauxite are depleting and the additional sources of ore from these two deposits are necessary to help maintain an uninterrupted supply to the Paranam alumina refinery in Suriname. Herbert managed the preparation of the environmental assessment required by the concept study of the proposed mine. He worked at Boskalis offices in the Netherlands in cooperation with project engineers to develop approaches to how to best proceed with the development of the mine and its potential impacts.

Lelydorp I Bauxite Mine ESIA, Suriname Aluminum Company, Suriname
In 1965, the Suriname Aluminum Company (Suralco) began operating the Paranam alumina refinery, located south of Paramaribo in northern Suriname. Historically, most of the Bauxite ore for the Paranam refinery had come from mines that were expected to be depleted by the fourth quarter of 2012. The next source of bauxite to sustain the Paranam alumina refinery was not planned to be available until the third

quarter of 2014. Suralco identified the Lelydorp I Bauxite deposits as sufficient to bridge this “bauxite gap”. Suralco engaged ERM to conduct the ESIA for this fast tracked Project. Herbert served as the Deputy Project Manager and soils lead for the Project.

Nassau Plateau Bauxita Mine ESHIA, Suriname Aluminum Company, Suriname
Manager for the development of an ESHIA for new bauxite mine on the Nassua Plateau that evaluates the environmental and social impacts of the proposed new mine. Suralco, subsidiary of the international metals company Alcoa, is conducting environmental and social studies that evaluates the feasibility of developing a bauxite mine on the Nassau Plateau in eastern Suriname. The presence of bauxite at Nassau has been known since the early 1950s when the Surinamese government first conducted mineral exploration in the area. Suralco, and most recently BHP Billiton, have conducted additional testing to characterize the extent of the deposit. Suralco currently holds the bauxite exploration concession for the Nassau Plateau and has decided to re-evaluate the potential for a bauxite mine in this area.

Suralco Alumina Refinery Expansion ESIA, Suriname Aluminum Company, Suriname
Project Manager for the development of an ESIA evaluating the environmental and social effects of proposed alumina refinery modifications required to accommodate a new bauxite source, as well as expansion of the bauxite residue disposal areas. Includes stakeholder engagement and social baseline surveys.

Loma Miranda Nickel Mining Environmental Impact Assessment, Falconbridge, Xtrata, Dominican Republic
For the proposed expansion of the nickel mining operations at the Loma Miranda concession Dominican Republic, Herbert was the physical resources team leader that led a multi-national group of experts that evaluated the impacts of the proposed Project. The team proposed innovative mitigation measures to avoid or minimize the impacts of the Project on the hydrogeological resources of the Project area.

Final ESIA of the Aurora Gold Mine Project, Guyana Goldfield’s Aurora Mine, Guyana
ERM, in consortium with Ground Structures Engineering Corporation of Guyana (GSEC), was commissioned to undertake the ESIA. Herbert was the lead soils scientist that developed a sampling strategic to establish soil baseline quality characteristics of the Project area. In addition, assessed the potential impacts and recommended mitigation measures.

Kabata Aluminum Refinery ESIA, Rio Tinto/Alcoa, Guinea
Herbert is currently leading the soils and geology impact assessment for the Environmental and Social Impacts Assessment of a greenfield aluminum refinery on the coast of Guinea. The impact assessment included the evaluation of the potential impacts on local agriculture.

Coastal Pipeline West Virginia, Virginia, and North Carolina
For a 600-mile long interstate natural gas transmission pipeline that crosses West Virginia, Virginia, and North Carolina. The pipeline would serve multiple public utilities and their growing energy needs in Virginia and North Carolina. Herbert was the lead soil scientist in charge of the development comprehensive Rehabilitation and Restoration Plan for the project, including detailed plans to include pollinator plant and warm season grasses species in the restoration of the right-of-way in in piedmont and coastal plain areas in Virginia and North Carolina.

Pipeline, Alberta and Saskatchewan Canada, Montana, South Dakota and Nebraska
TransCanada Keystone Pipeline, LP (TransCanada) is proposing the construction of a new pipeline approximately 1,980-mile, 36-inch and related facilities to transport crude oil from the Western Canadian Sedimentary Basin to the Texas Gulf Coast. The original Project application, submitted in 2008, was subjected to NEPA review and an FEIS was issued in August 2011. That project was not found to serve the national interest, and TransCanada submitted an application for a revised route in May 2012. That route follows the original corridor in Montana and South Dakota with a significant realignment in Nebraska, avoiding the ecologically sensitive Sand Hills area. Herbert is the lead geologist/soil scientist for the revised route EIS. He evaluated the impacts of the project on the geological and soil resources along the route and proposed appropriate mitigation and best management practices to avoid or minimize the impacts on these resources. Herbert worked closely with the Nebraska Department of Environment Quality and TransCanada to develop innovative soil erosion control measures that minimize the impacts to Fragile Soils in Northern South Dakota and Nebraska near the ecologically sensitive Sand Hills area.

ESIA of Sugarcane-Ethanol Project, State Oil Company of Suriname, Suriname
Staatsolie, the State Oil Company of Suriname, is currently planning to develop a Sugarcane-to-Ethanol Plant in the Wageningen Area of District Nickerie in Suriname. The 12,600 hectare site is bordered to the north, east, and south by nature reserves and undeveloped land, and to the west by rice fields. ERM has been commissioned by Staatsolie to conduct a comprehensive ESIA of the proposed bioethanol project in Wageningen, Suriname. Herbert is the lead scientist assessing the impacts of proposed planned agricultural activities on the soils resources of the area.

Environmental and Social Impact Assessment for LNG Project, Barbados
Project Manager for the IDB and the Barbados National Petroleum Corporation (NPC) to prepare an Environmental Impact Assessment for LNG facility improvements in Barbados. In Phase I, NPC will increase the capacity of its Woodbourne facility to handle up to seven LNG iso-containers. In Phase II, a Public-Private Partnership would be formed to develop a permanent LNG Terminal and Storage facility at the Port of Bridgetown.

Environmental and Social Impact Assessment for Transmission Line
Project manager for an ESIA for the construction of a transmission power line from Acajutla to Ahuachapán, El Salvador, for Energia de Pacifico.

Support for the Geothermal Exploration and Transmission Improvements in the Framework of the Investment Plan (NL-1094)
Project manager and technical lead to support the Nicaragua Ministry of Energy and the Nicaragua National Electricity Company to comply with the IDB's performance standards and development of management plans.

Supplemental Studies for the Guanacaste Geothermal Project, Costa Rica
Project manager and technical physical lead for the development of a Supplemental ESIA, Cumulative Impacts Assessment, Biodiversity Action Plan, and Strategic Environmental Assessment for the project.

Supplemental Analysis of the Environmental Impact Assessment for the Lima Metro Line 2 and Line 4 Project
Project geotechnical lead for the preparation of a supplemental analysis for the EIA for this project for the InterAmerican Development Bank. Project issues included resettlement, seismic hazards, subsidence and water table impacts, and stakeholder engagement, among others.

Environmental and Social Impact Assessment (ESIA), for the Nicaragua Interoceanic Canal Project, Nicaragua
Project geologist/soil scientist team leader, leading a multi-national group of experts to survey and map the geology and soils of the Project area, including the evaluation of the impacts of the proposed Project. The team is proposing innovative mitigation measures to avoid or minimize the impacts of the Project.

Evaluation of Alternatives to Access to Water for Irrigation and Watering of Cattle Affected by Hydroelectric Project El Reventazon, Costa Rica
Project manager and technical lead that assessed various alternatives for the access to water to a small cattle ranch in Costa Rica affected by El Reventazon Project. The alternatives analysis included the technical evaluation, costs, and feasibility of the implementation.

Environmental and Social Project Supervision (ESPS) visit prior to technical completion
Project manager for the San Bartolo hydroelectric Project in Copal, Ecuador, supervising the technical completion of the Project. The Project included a review of Hidrosanbartolo's annual Environmental and Social Compliance Reports with regards to building and operation of the Project; a site visit to assess the compliance of the San Bartolo Hydroelectric Project with the Project Environmental and Social Action Plan (ESAP) and Environmental Management Plan (EMP); and recommendations to address any issues of no compliance in the ESAP and EMP.

Ecological Restoration and Remediation Project Pluspetrol Norte, Pluspetrol, Peru
Project manager for the Ecological restoration and remediation of the Yanayacu Site. The Yanayacu Site is located in the Block 8 hydrocarbons concessions in the Amazonian lowlands of the Loreto Department of northeastern Peru. The site lies approximately 16-km south of the Marañón River in the Pacaya-Samiria National Reserve, to the west of the city of Iquitos. The Yanayacu Site is an active oil extraction facility consisting of oil wells, tank batteries, pipelines, and associated infrastructure. The Site has been active since 1974, and is impacted as a result of historical oil spills and leaks from the operating facility. In addition, produced water was discharged to the land surface until 1996. The forested wetland areas that surround the tank batteries and other oil-extraction facilities are impacted by weathered residuals of crude oil as a result of these historical spills and releases.

Environmental and Social Due Diligence of La Yesca Hydroelectric Dam, Mexico
Team member that conducted environmental and social due diligence and monitoring of a proposed hydroelectric dam near on the Santiago River near the border with the states of Jalisco and Nayarit in the Midwestern of Mexico.

Environmental and Social Due Diligence of Baba Hydroelectric Dam, Ecuador
Team member that conducted environmental and social due diligence and monitoring of a proposed hydroelectric dam near Buena Fé and Valencia, Province of Los Rios, Ecuador. The project was socially sensitive due to the negative experience that communities had with a nearby historical project.

Cerrejon Coal Mine, Cerrejon, Colombia
Project Manager for an independent evaluation of a proposed expansion of the world's largest open pit bituminous coal mine in the world. Addressed effects on environment, neighboring villages, and downstream indigenous lands.

Colorado Piceance Basin Gas Extraction ESHIA, Colorado
Lead soil scientist/chemist for the development of ESHIA for a natural gas extraction/purification project in a 40,000 acres area. Developed a sampling strategic to establish soil baseline quality

characteristics. Assessed the potential impacts and recommended mitigation measures.

P-140 Fiber Optic Cable Removal, California, Arizona, and New Mexico
Team soil scientist for an EIS for the removal of a 220-mile portion of buried coaxial telecommunication cable with segments in three states.

Decommissioning
Decommissioning of a metallurgical facility that manufactured specialty steel and super alloy additives contaminated with uranium and thorium in Newfield, New Jersey. Herbert was lead soil scientist in the preparation of an EIS for the facility on behalf of the Nuclear Regulatory Commission. Herbert completed a detail analysis of the project-related impacts to soils and nearby farmlands.

Sequoyah Fuels Site, ERC, Gore, Oklahoma
The Sequoyah Fuels site near Gore, Oklahoma is a former uranium conversion facility located at the confluence of the Illinois and Arkansas Rivers. Lead soil scientist in the preparation of an EIS for the Sequoyah Fuels Site, which evaluated the alternative of storing permanently the radioactive wastes at the facility. The waste materials at the site are contaminated with uranium, thorium, and radium.

Navy's Atlantic Division (LANTDIV), Atlantic Fleet Weapons Training Facility, Vieques, Puerto Rico
Task manager for an EA for construction of a western boundary orientation line for the Live Impact Area. The assessment of the impact focused on potential impacts on soil resources, critical coastal areas and conservation zones, and threatened and endangered terrestrial and marine species. In addition, Herbert coordinated agency contacts and stakeholder meetings for the EA for the transfer of the 8,000-acre Naval Ammunition Support Detachment property to DOI, USFWS, and the Commonwealth of Puerto Rico. As lead soil scientist, he was a key contributor to the description of the proposed action and alternatives, as well as the section on terrestrial resources. He had the same role for the soil, geological, and topographic sections of the supplemental EIS for continued use of the Atlantic Fleet Weapons Training Facility.

Naval Facilities Engineering Command (NAVFACENGCOM), F/A-18 Super Hornet EIS, US East Coast
Base/task manager for this high profile, controversial EIS for the introduction of 162 Atlantic Fleet F/A-18 E/F aircraft to three East Coast military installations. He coordinated and attended numerous meetings with personnel at Marine Corps Air Station Cherry Point, North Carolina, to obtain data for the EIS. He provided detailed analyses of protected resource areas at the base, including soils, water resources, and wetlands. For the public involvement portion the project, Herbert designed display boards for use at public meetings and addressed public comments during the meetings.

On behalf of LANTDIV, he managed the preparation of an EA for establishing a new Naval Construction Force quarry and deactivating the existing one on Vieques. He directed the collection of existing environmental information, led a reconnaissance-level survey of existing and proposed quarry sites, and interviewed Naval Mobile Construction Battalion representatives regarding quarry operations. He also conducted a joint inspection of the proposed quarry site with representatives of the Navy and USFWS to discuss potential impacts on T/E species, particularly the yellow-shouldered blackbird. He assisted the Navy in its consultation with USFWS to satisfy the requirements of the Endangered Species Act.

Atlantic Division (LANTDIV) of NAVFACENGCOM NS Roosevelt Roads (NSRR), Puerto Rico
Herbert was a task manager for E & E's $598,000 task order to prepare the EA for closure and reuse of NSRR. He also researched and wrote the EA sections on the existing environment and soils for the permanent move of the Special Operations Command, South, from Panama to NSRR.

Naval Facilities Engineering Command (NAVFACENGCOM), F/A-18 Super Hornet EIS, US East Coast
Managed the preparation of the Habitat Assessment and Crop Mapping Report for the Supplemental Environmental Impact Statement (SEIS) for the Introduction of F/A -18 E/F to the east coast. The preparation of this report involved the collection of crop data at regional and site-specific levels by conducting field surveys, gathering agency data, and attending meetings. To expedite the mapping of crops grown in a particular farm field, Herbert developed a strategy that used a laptop equipped with a global positioning system (GPS) and a customized application interface to directly record observations in the field. The results of this work supported the assessment of impacts on migratory waterfowl associated with construction and operation of an Outlaying Landing Field. These results were also used in conjunction with data collected on waterfowl habits and habitats and the population size, distribution, and movement of waterfowl in eastern North Carolina.

LANTDIV, Naval Station Roosevelt Roads, Vieques, Puerto Rico
Herbert participated in the multidisciplinary assessment of the environmental impacts of outleasing about 1,330 acres of Navy-owned land. He was task leader for the evaluation of potential impacts of the mechanical clearing and cultivation of soil resources, including impacts on both surface water and groundwater. He also helped select appropriate crops with commercial potential for export.

Cherry Point Marine Corps Air Station, North Carolina, Hydric Soil Assessments, North Carolina and Connecticut
Conducted hydric soil assessments in support of wetland identification and delineation for various projects, including wetland identification for the Cherry Point Marine Corps Air Station in North Carolina and for the proposed expansion of a Frito-Lay distribution center in Milford, Connecticut.

Atlantic Coastal Pipeline West Virginia, Virginia, and North Carolina
For the Atlantic Coast Pipeline (ACP), a 600-mile long interstate natural gas transmission pipeline that crosses West Virginia, Virginia, and North Carolina. The pipeline would serve multiple public utilities and their growing energy needs in Virginia and North Carolina. Herbert is the lead soil scientist in charge of the development comprehensive Rehabilitation and Restoration Plan for the project. This includes detailed plans to include pollinator plant and warm season grasses species in the restoration of the right-of-way in piedmont and coastal plain areas in Virginia and North Carolina. Herbert is working closely with the USFS and ACP to develop innovative soil erosion control measures that minimize the impacts to Fragile Soils in the Monongahela and George Washington National Forests.

Kern River Expansion, California, Nevada, Utah, and Wyoming
For this fast-tracked, nearly 800-mile pipeline project, Herbert was lead soil scientist in the preparation of the complete FERC ER filing to Order 603 standards in less than five months. For the Phase 1 initial filing, he collected soil information for all four states traversed by the project, completed a detailed analysis of the project-related impacts on soil and topographic features, and prepared the soil resources report. In Phase 2, he conducted field surveys and developed comprehensive soil erosion and management control plans for the four States, including detailed plans for Dixie National Forest in Utah and Red Rock Canyon National Conservation Area and Spring Mountain National Recreation Area (Humbolt-Toiyabe National Forest) in Nevada. This required extensive consultation with DOI's Bureau of Land Management, USFWS, and the California Department of Fish and Game, with plans including restoration and mitigation guidelines and strategies

to minimize impacts through implementation of best management practices and site-specific restoration measures.

Alliance Pipeline, North Dakota, Minnesota, Iowa, and Illinois
To support the preparation of a third party EIS for this 900-mile pipeline, Herbert identified data gaps and issued data requests, verified ER information, and prepared the soil resource affected environment and environmental consequences sections for the advanced preliminary draft EIS. He evaluated soil along the proposed route and determined best management practices to minimize erosion. He also characterized wildlife and plant communities and identified potential impacts on sensitive species and plant communities. He coordinated with biologists of federal and state agencies regarding impacts on riparian and stream habitat, developed mitigation measures, and evaluated alternative routes to minimize or avoid impacts. Herbert also conducted a noxious weed evaluation and addressed concerns of farmers and state agencies concerning weed proliferation as a result of pipeline development.

Duke Energy Gas Transmission subsidiary, Copiah Storage Project, Copiah County, Mississippi.
Provided siting assistance and contributed to the preparation of the FERC ER for this high-productivity salt cavern natural gas storage/hub facility.

Harper-Joliet Pipeline Expansion, Iowa and Illinois
Soil and geology task leader in the preparation of the ER for pipeline expansion on behalf of the Natural Gas Pipeline Company of America. He collected background information on soil and geology, identified areas designated as prime farmlands, evaluated the potential for geologic hazards, and assessed pipeline construction and operation impacts on soil and geology.

West-East Crossover Pipeline, Tenneco, Inc., Louisiana and Mississippi
As the soil and geology task leader for the preparation of an ER, he was responsible for compiling all required environmental data concerning project-area soil and geology. He reviewed the wetland delineation and developed a comprehensive soil erosion and restoration control plan for the entire 10-county pipeline route. He also evaluated soil stratigraphy at river crossings to assist the cultural resource team in determining the need for archaeological testing at each site. The application of soil stratigraphy evaluations—a procedure that was accepted by both the Louisiana and Mississippi State Historic Preservation officers (SHPOs)—significantly reduced the number of river crossings that had to be tested with deep soil borings.

Additional Compressor and Meter Stations, Louisiana and Mississippi
Conducted wetland audits based on the federal manual for the delineation of wetlands for two natural gas pipeline compressor stations. In addition, Herbert managed the preparation of a technical report evaluating mercury contamination at gas pipeline meter stations. The report included evaluations of present levels of mercury contamination, fate, and transport; analytical techniques; and human and animal health considerations.

Williamsville Toll Barrier Relocation, New York.
Conducted soil and farmland evaluations as part of an EIS addressing several options to update or relocate a New York State Thruway toll barrier.

SunShine Pipeline, Alabama, Florida, Louisiana, Mississippi, and Gulf of Mexico
To determine if deep soil boring archaeological tests were required, Herbert analyzed and interpreted soil sediment at potential river crossings for ANR Pipeline Company’s proposed 760-mile natural gas pipeline system. The analysis—accepted by the Florida and Alabama SHPOs—enabled a significant reduction in the number of river crossings that had to be tested.

In addition, Herbert prepared the soil section of environmental documentation for the intrastate pipeline segment in Florida in order to file with the Florida Public Service Commission under the state's new Natural Gas Transmission Pipeline Siting Act, as well as the soil section of the ER for the interstate segment in Alabama and Mississippi, for filing with FERC.

Southeast Mainline Expansion, Alabama, Georgia, and North Carolina
In support of the preparation of an ER, he collected and evaluated all available soil information and prepared Resource Report 7 (Soil Resources), which included an evaluation of potential project impacts and guidelines for erosion control and revegetation.

Railroad Acquisitions/Mergers, Nationwide
Herbert evaluated ecological risk as part of a review of the EIS for acquisition of the Conrail railroad system by CSX and Norfolk Southern in the 23 states east of the Mississippi River. In support of the Union Pacific/Southern Pacific railroad merger, he evaluated ecological risk as part of the review of preliminary mitigation plans for the Wichita, Kansas, area, and the Truckee River Corridor near Reno, Nevada.

Route 219 Extension, Erie and Cattaraugus Counties, New York
In support of an EIS for the proposed 28-mile extension and upgrading of Route 219 from Springville to Salamanca, Herbert was task leader for the evaluation of impacts on farmland and soil. The work involved the identification of sensitive land uses and incorporation of the data as overlays in a geographic information system database. Herbert led extensive field surveys to identify agricultural resources in the project area and collected data to evaluate potential project-induced impacts. He inventoried prime farmland soil and statewide important soil traversed by the proposed routes and assessed impacts based on the Federal Farmland Protection Policy Act. In addition, he conducted field surveys and met with farm operators to inventory major active farm operations and agricultural districts in the project area. The information was applied in the final route alignment to minimize and—to the extent possible—avoid impacts on the farms.

Environmental Damage Claims, Kuwait
Since 1998, Herbert has been a key team member for the preparation of claims submitted to the United Nations Claims Commission (UNCC) by the State of Kuwait concerning damages to soil and the desert surface incurred as a result of the 1990-1991 Iraqi aggression. He spent five months in Kuwait, collecting information on native plant communities and desert soil physico-chemical parameters potentially affected by the oil fires, oil releases, use of seawater to douse the fires, and military activities. He also assessed the physical damages to the desert surface caused by the emplacement of minefields, the construction and removal of military fortifications, and military vehicular movement. He worked in cooperation with scientists from the Kuwait Institute of Scientific Research and environmental officials from involved ministries to evaluate impacts on desert vegetation and prepare a revegetation work plan. Then he determined the costs of implementing short- and long-term restoration programs for the desert surface.

For the subsequent, UNCC-required monitoring and assessment studies, he was the lead scientist in charge of developing the claim for damages to the terrestrial environment. The project included an oil release, oil fire, and fire-fighting survey; a construction/removal of military fortifications damage survey; a survey for open burn/open detonation (OD/OB) sites; and the evaluation of treatment technologies for tarcrete, OB/OD sites, and the desert pavement. Herbert also led the preparation of the claim addressing measures needed to clean and restore the Kuwait's terrestrial resources (soil, vegetation, and the desert surface), including remediation strategies and costs for damages

incurred as a result of oil releases, oil fires, and firefighting activities; the disposal of mines and ordnance at OB/OD sites; the construction and removal of military fortifications; and the construction of temporary wellhead storage pits in the operations areas of Kuwait Oil Company.

In 2002 and 2003, he managed the preparation of five review reports dealing with the impacts on terrestrial resources caused by oil lakes and tarcrete, military fortifications, and OB/OD sites; as well as the use of satellite imagery and remote sensing to assess the damages. He also responded to comments of the Kuwait Institute for Scientific Research on the reports. He developed the strategy for collection of damage-related data and 1,000 tarcrete samples across five major oil fields, determined sampling locations and prepared sampling maps, developed the requisite standard operating procedures, procured all sampling equipment and materials, and managed three sampling teams in plan implementation. To address UNCC comments concerning the remediation of OB/OD sites; he conducted a field survey of a selected OB/OD site to assess damages and potential remedial strategies. He also initiated the oil lakes monitoring and assessment program, including the collection of 3,900 soil samples from affected areas.

In 2004, Herbert had a major role in the preparation of a revised claim for terrestrial natural resource damages associated with the Gulf War. This involved combining data from field observations, satellite imagery, and geographical information systems to quantify injuries resulting from the 1990/1991 oil spills and to assess the likely benefits of creating a series of nine terrestrial preserve areas.

Eraifjan New Town, Kuwait
Herbert is managing an EIA in Kuwait ($500,000), which involves comprehensive environmental and scientific studies to evaluate impacts of a proposed new housing development. Phase 1 (environmental baseline report) includes review of relevant Kuwait environmental protection regulations and available historical data, plus multimedia environmental field surveys. Phase 2 involves evaluation of environmental conditions against conceptual and alternative design proposals for the new town. Phase 3 entails development of an EIA for the selected proposed design.

C5 Road Improvement Project, Honduras
Herbert is evaluating environmental and sociological (resettlement) plans for this major highway improvement project. This includes interviewing government agency representatives, reviewing technical reports, and proposing improved environmental methods and sociological impact mitigation measures. Herbert is also responsible for coordinating with MCC (an agency of the United States Government), integrating the findings of scientists and engineers, and preparing reports.

20-Year Environmental Support Program, Kazakhstan
Herbert provides regulatory and technical support to assist in assuring that the commercial development of the natural resources will not impair public welfare or cause unwarranted deterioration of the environment.

Offshore Oil/Gas Exploration EIR Review, Northeast Caspian Sea, Kazakhstan
Herbert participated in the evaluation of the EIA for proposed oil and gas exploration activities in the northeast Caspian Sea.

World Bank. Uzen Oilfield Rehabilitation Project, Kazakhstan
Herbert also was the revegetation specialist for a $3.3-million project for JSC Uzenmunaigas. The World Bank-funded program involved assessment of the extent of environmental degradation in the country’s largest operational oilfield; development of remedial strategies; and consultation to help USC

Uzenmunaigas (the oilfield operator) strengthen its environmental management capacity. Herbert addressed the ecology of the western Kazakhstan desert region; reviewed previous revegetation studies/techniques; and identified soil preparation, fertilizer, seeding, and transplanting procedures.

Seismic Exploration Project, Bolivia
Herbert managed the preparation of several EIAs and permit applications for seismic surveys. The surveys were needed to site and develop exploratory wells that were proposed to evaluate potential oil and gas productivity in the Chimore I, Chimore II, and Aguarague-Vuelta Grande exploration blocks. He led and implemented the field reconnaissance-level surveys, reviews of existing in-country information, evaluation of the impacts of clearing seismic survey trails in the project area, establishment of temporary helicopter ports along the seismic survey grid lines, seismic survey shothole drilling and explosives placement/detonation, and site reclamation/revegetation. The EIAs also addressed potential environmental impacts of the subsequent construction of well site access roads and the exploratory well drilling and testing operations, including the excavation of pits to hold drill cuttings. In addition, Herbert prepared the requisite seismic survey permit applications.

Risk Assessment
Herbert assessed the risks posed by multiple contaminants in air, soil, surface water, and sediment under the ARCS program for EPA Region 3.

Pangue Hydroelectric Project, Western Andes Maountains, Chile
Led the geomorphology and soil evaluations for an EIA. Herbert worked with scientists from the University of Chile to perform the surveys to characterize existing environmental conditions, evaluate impacts, and develop recommendations for impact mitigation and environmental management for project construction and operations.

EPA Regions 9 and 10. Carson River Mercury, West-Central Nevada
Herbert evaluated mercury impacts as part of an ecological assessment in support of an Alternative Remedial Contracting Strategy (ARCS) program for EPA Regions 9 and 10. The 70-mile-long river segment that is affected by mercury includes a large reservoir used as a sport and commercial fishery, as well as a desert wetland complex that contains the Stillwater Wildlife Refuge.

Additional ARCS 9/10 Program Sites, Idaho and California
Team soil scientist for an ecological risk assessment (ERA) for the Eastern Michaud Flats Superfund site in Idaho and managed the soil science review concerning the technical feasibility of revegetating the Atlas asbestos mine tailing site in California. The Atlas review included characterization of local (serpentine) soil and site ecology (a serpentine barrens consisting of unique chaparral communities with unusual, threatened, and rare species of shrubs and herbaceous plants). Herbert's recommendations for possible site restoration involved propagation of pioneering plant species, application of fertilizer and mulch, erosion management and grading, and irrigation.

ARCS 5 Sites Michigan, Indiana, Minnesota, and Wisconsin
Under the Region 5 ARCS program, Herbert managed the screening-level assessment of the risks posed to terrestrial ecosystems posed by heavy metals and organic compounds at the Bruce Products site in Michigan. He identified sensitive receptors, including riparian and coastal wetlands; interpreted analytical data concerning sediment and surface water; and characterized risks by comparing the estimated contaminant concentrations in surface water and sediment with contaminant-specific action levels. In addition, under the Region 5 ARCS program, he also participated in oversight and reviews of ERAs for the Tippecanoe Sanitary Landfill

in Indiana, H.O.D. Landfill in Minnesota, and Madison Metro contaminated wetland in Wisconsin.

Additional Hazardous Waste Sites, Massachusetts, Delaware, and California
He performed ecological evaluations to support the remedial investigation for a hazardous waste site at Fort Devens, Massachusetts, for the United States Army Environmental Center; the site characterization for the Governor Bacon Health Center in Delaware, for the USACE St. Louis District; and an environmental lead characterization of Lake Merced in California, for the San Francisco Municipal Railway/Public Utilities Commission. The work included interpretation of test results and evaluation of contaminant bioavailability, fate, and transport in various environmental media (air, water, soil, and sediment).

Spill Clean-up
Site manager for the clean-up of a spill of 400 tons of coal, 16,000 gallons of sodium hydroxide, and 100,000 gallons of light crude oil that had been caused by a major train wreck in Pennsylvania. The oil spillage had resulted in a fire, explosions, and severe surface and deep soil contamination; and posed a threat to local drinking water wells. The clean-up program entailed removal of one-third mile of rail roadbed to a depth of eight feet, rebuilding of the rail roadbed, and remediation of an affected creek and forest area.

Iowa State University
Participated in research to develop an accurate, precise method for the determination of sulfate in soil and investigated the chemistry of organic sulfur in soil and the potential mineralization rates and indexes of plant-available sulfur. He also assisted soil chemistry laboratory instructors in the planning, coordination, and delivery of laboratory courses; development of new analytical techniques; monitoring of equipment use; preparation of reagents; and ordering of materials and supplies.

Colorado State University
Performed field and greenhouse studies to evaluate the use of a natural zeolite as a potential enhancer of nitrogen availability to plants.

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Position Title and No.	Logistics and Coordination Support
Name of Expert:	Anasha Ally
Country of Citizenship/Resident:	Guyana

Education:

BSc Degree Industrial Management, University of the West Indies, St. Augustine, Trinidad (1994)

Employment Record relevant to the Assignment:

Period	Client and position	Country	Summary of Activities preformed relevant to the assignment
2019-2020	**E&A Consultants Inc.** In-Country Project Coordinator *E&A Consultants Inc. 227-7538*	*Guyana*	**Environmental and Regulatory Support for the Guyana Fiber Optic Enablement Project** • Administrative, logistical and Coordination to the project team
2013 – present	**E&A Consultants Inc.** Executive Director	*Guyana*	• Strategic plan for the company along with the other directors • Establishment and maintenance of relationships with associates which include local and international civil engineering and architectural consultants • Provision of hands-on support to project teams for the company's projects • Coordination and chairing of weekly progress meetings • Recruitment and development of a team of senior engineers to manage engineering projects • Ensurance of commitment to and compliance with all applicable laws and regulations • Creation of a culture of transparency and communication throughout the organization • Development of positive relationships with key stakeholders, including government agencies • Proactively address challenges in the internal and external environment to protect business interests

			• Along with the other directors oversight of financial decision making of the company
2012-2013	Guyana Water Inc. Project Coordinator	Guyana	**Georgetown Sanitation Improvement Project** **Activities performed:** Evaluated and partially trained new personnel**,** Delegated and assigned work to subordinates**,** Coordinated with GITEC based in Germany**,** Financial Affairs between E&A and GITEC**,** Supervised general accounting procedures and systems for the project**,** Instituted disciplinary procedures
1993 – 2013	**E&A Consultants Inc.** Administrator	Guyana	• Directed the company's day-to-day operations • Reported to the Managing Director • Chaired weekly progress meetings • Recruited new staff • Oversaw the financial transactions of the company on a daily basis • Supervised the Administrative team
2010-2012	Ministry of Home Affairs Project Coordinator		**Capital Works Project** **Activities performed:** Evaluated and partially trained new personnel, Monitored the progress of projects (35 in number),Delegated and assigned work to subordinates, Supervised general accounting procedures and systems for the project, Instituted disciplinary procedures
1999-2000	Guyana Lands and Surveys Commission Project Coordinator		**Conversion of Leasehold to freehold lands surveys** **Activities performed:** Evaluated and partially trained new personnel, Delegated and assigned work to subordinates, Supervised general accounting procedures and systems for the project, Instituted disciplinary procedures

1996-1997	Ministry of Public Works & Communication/Ministry of Home Affairs Project Coordinator		**Secondary Towns Infrastructure Development Project** Reported to the Project Manager, Coordinated all activities involving SNC Lavalin's expatriate staff and all local governmental bodies ,In association with the Ministry of Public Works and Communications and the Ministry of Home Affairs assisted SNC 's staff in obtaining visas, travel documents and work permit extensions, Evaluated and partially trained new personnel. Delegated and assigned work to subordinates. Supervised general accounting procedures and systems for the project, Instituted disciplinary procedures, Coordinated work flow for Word Processing and AutoCAD

Adequacy of the Assignment:

Detailed Tasks Assigned on Consultant's Team Experts:	**Reference to Prior Works/Assignments that Best illustrates Capacity to handle the Assigned Tasks.**
• Supervision of general accounting procedures and systems for the project, • Instituting disciplinary procedures, • Involve in the evaluation and partially training of new personnel, • Involve in the delegation and assignment of works to subordinates • Supervision of the Administrative team • Monitoring of the progress of works	• **Georgetown Sanitation Improvement Project** • **Capital Works Project for the Ministry of Home Affairs** • **Conversion of Leasehold to freehold lands surveys** • **Secondary Towns Infrastructure Development Project**

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Position Title and No.	Regulatory and Permitting Support
Name of Firm:	E&A Consultants Inc.
Name of Expert:	Lalita Gopaul
Country of Citizenship/Resident:	Guyana

Education:

- Currently pursuing a Master of Business Administration University of Suffolk, United Kingdom [Online]. Post Graduate Certificate Completed.
- Delivery of Competency Based Education and Training (Certificate) Council for Technical and Vocational Education and Training (2020)
- Bachelor of Science Degree Environmental Studies University of Guyana (2012-2016) GPA: 3.4
- High School Diploma- Queen's College (Grades 1 & 2 passes in 10 subject areas).

Employment Record relevant to the Assignment:

Period	**Employing organization and title/position. Contact information for references.**	**Country**	**Summary of activities performed relevant to the Assignment**
April 2021 to present	**E&A Consultants Inc.** Regulatory and Permitting Support Reference: Miss Anasha Ally Executive Director Email: eaconsul.net.gy Telephone: 226-8247	Guyana	**Gas to Energy Project** Identifying and liaising with applicable regulatory agencies and completing applications for permits/approvals necessary for the execution of the client's project.
November 2017-April 2021	**Global Technology Inc.** Business Development and Academic Coordinator Reference: Mr. Daniel Ally Programmer Email: danielally53@yahoo.com Mobile: 657-5515	Guyana	Building the company's portfolio with international partners, lead the HSSE and ISO process, prepared corporate content, communicated with professional membership organizations, tutored and managed the "Transformation to Online Training" project.

November 2016- Novemer 2018	**National Agricultural Research and Extension Institute (NAREI)** Research Officer Reference Dr. Oudho Homenauth Former CEO of NAREI oudhohomenauth@gmail.com Mobile: 592-600-0055	Guyana	Executed research projects on environmental bioenergy projects and presented completed research to extension services and sister agencies for implementation.

Membership in Professional Associations and Publication:

- Commonwealth Youth Award for Excellence (SDG#13-Climate Action) 2020 Alumni
- Member of the North American Association For Environmental Education (NAAEE)
- NAREI's 2017 and 2018 National Research Conference Publications
- Laboratory study of the nutrient release rate for vinasse on sandy soil and three coastal clay soils of Guyana- International journal of recycling organic waste in agriculture
- Bioenergy potential and its effects on climate change and the economy: A review of the Guyana Context Journal of Environment and Biotechnology Research
- Newspaper Waste to Energy Publication Part 1
- Stabroek News Guyana Feature
- The Commonwealth Media Feature
- Commonwealth Article Feature
- North American Association for Environmental Education Feature

Language Skills:

- Excellent in speaking, reading and writing English.

Adequacy of the Assignment:

Detailed Tasks Assigned on Consultant's Team Experts:	**Reference to Prior Works/Assignments that Best illustrates Capacity to handle the Assigned Tasks.**
• Identifying relevant regulatory agencies from which permits/approvals need to be sought for the project at hand • Liaising with regulatory agencies to gather details on the requirements	**1.** Gas To Energy Project **2.** Providing regulatory support to EACI's Client)- Current

for permits/approvals • Manage a Permitting Matrix and Schedules to track permits • Preparing content to populate the forms/applications • Preparing correspondences to be sent out to various regulatory agencies	
• Assessed the needs of the local market and source international partners to build the company's portfolio. Prepared agreements and other business correspondence. • Developed the HSSE procedures, lead the ISO process and conducted internal process improvement exercises. • Prepared case study articles for publication on company websites. • Liaised between the company professional organizations • Lead the project to move the physical training to Online for the delivery of Virtual Classes as a Covid-19 contingency measure. • Tutored (Part-time) –Taught students age 12-70 the Microsoft Office Suite of Software.	1. Company's Business Development Representative 2. Lead for corporate material preparation 3. Company's liason representative for professional bodies (Georgetown Chamber of Commerce, American Chamber of Commerce, the Center for Local Business Development, GOinvest, Ministry of Education, Valiant Business Media, Local Media etc.).
• Executed research projects on environmental projects and presented completed research to sister agencies. • Research papers included: An investigation of Bioenergy Utilization in Guyana including environmental and economic impacts.	Presented research findings to the Ministry of Agriculture Research Conferences Peer-reviewed documents for publication. Represented Guyana at the Commonwealth Youth Awards 2020

Development of a solar powered irrigation system for farming areas in Guyana (Technical Paper) Green Technologies and Sustainable Agricultural Practices for the Rupununi and Intermediate Savannahs (Agri Today Magazine Issue)	Represented Guyana at the North American Association for Environmental Educators Research Conference 2020.

FORM TECH-6
(Continued)
CURRICULUM VITAE (CV)

Position Title and No.	**K-7, Environmental and Social Manager**
Name of Expert:	**Jewel Liddell**
Country of Citizenship/Residence	**Guyana**

Education:

- University of Wales – 2003 – Masters of Science Degree in Environmental Studies
- University of Guyana – 2000 – Post Graduate Diploma of Education in Science
- University of Guyana – 1994 – Bachelors of Science Degree in Biology

Employment record relevant to the assignment:

Period	Employing organization position.	Country	Summary of activities performed relevant to the assignment
2021	Regulatory and Permitting Support Reference: Miss Anasha Ally Executive Director Email: eaconsul@guyana.net.gy Telephone: (592) 226-8247	Guyana	**FOC Project- Environmental Services- (Mangrove)** Providing regulatory and permitting support, conducting pre-construction vegetation survey for the Project, assisting with the preparation of the pre-construction vegetation survey report, assisting with the supervision of the extracting and replanting of mangroves, and assisting with monitoring the growth of the mangroves.
2017	Mr. R. Joseph Sanitation Manager Guyana Water Inc. Tele: (592) 225-0477 *Environmentalist*	Guyana	**Re-engineering of the University of Guyana Sewerage System** • Prepare environmental investigation reports • Design projects leading to environmental protection, such as water reclamation facilities • Obtain, update, and maintain plans, permits, and standard operating procedures • Provide technical support for environmental remediation projects and for legal actions • Analyze scientific data and do quality-control checks • Monitor the progress of environmental improvement programs • Inspect industrial and municipal facilities and programs to ensure

			compliance with environmental regulations • • Advise corporations and government agencies about procedures for cleaning up contaminated sites
2014	Guyana Water Inc. Tele: (592) 225-0477 *Environmentalist*	Guyana	**Waste Water Monitoring and Condition Assessment of Sanitation Infrastructure within Stevedore Community** • conducted environmental impact assessment • prepared assessment report • prepared environmental management plan
2013	Minister of Public Works Tele: (592) 225-5540 *Social and Environmental Inspector*	Guyana	**Expansion of the Sheriff Street-Mandela Avenue Road:** • Responsible for floral and faunal characterization in area of influence of the project, • Assessed impacts of the proposed development on flora, fauna, soil and water, • Developed mitigation measures for impacts identified, development of monitoring plan for project
2010	Guyana Goldfield Inc. Tele: (592) 231-0710 *Team leader and Mammologist*	Guyana	**Rapid biological Assessment for Sulphur Rose Mining Concession** Coordinating research activities with local and international researchers, Conduct biodiversity survey to determine mammalian baseline, identified impacts, determined significant impacts and proposed mitigation measures for impacts identified. Compiled report on floral and faunal baseline at Sulphur Rose
2010	Sithe Global (USA) and JGP Consultancy (Brazil) and Synergy Inc. (Guyana) Tele: (592) 225-6791 *Coordinator and Team Leader*	Guyana	**Faunal Specialist-Biological Assessment for Sections three to Seven of the Amaila Falls Hydro project Assess Road.** Coordinated activities for conduct of floral survey, participated in reconnaissance visit to survey sites,

			Identified and established transects for floral inventory, participated in mammalian survey.
2010	Sandsprings Resources Tele: (592) 222-6493 *Team Leader and Mammologist*	Guyana	**Rapid Biological Assessment for the Sandspring Resources Mining Inc. Access Road** • Conduct baseline biodiversity survey, • identify impacts, • determine significant impacts • Proposed mitigation measures for proposed development.
2009	Guyana Water Inc. Tele: (592) 225-0477 *Field Supervisor*	Guyana	**Health Indicator Surveyor** Supervised administration of questionnaires, coded questionnaires before entry into SPSS
2009	Government of Guyana *Researcher*	Guyana	**Guyana National Communication Report on Climate Change** Conducted interviews with relevant organizations and agencies, administered questionnaires to relevant organizations, agencies and individuals, compiled data canvasses from interviews and questionnaires.
2008	Ministry of Public Works and Communication Tele: (592) 225-5540 *Research Consultant*	Guyana	**Biological Impact Assessment for the Rehabilitation of Culverts along the road from Rosignol to Timehri** • Conduct biodiversity survey in areas influenced by the project, • identified impacts of the project on biological resources, • Determine significant impacts and proposed mitigation measures for proposed development.
			Biological Impact Assessment for the Rehabilitation of Black Bush Polder Road Conducted interviews with persons in the area of the influence of the project, conducted biological

			baseline survey and assessment, determined impacts associated with proposed project, proposed mitigation measures for impacts identified.
2006	*Biologist*	Guyana	E**nvironmental Impact Assessment for Carb island Oil Refinery** Conducted biodiversity survey, identified impacts and determined their significance, identified mitigation measures for impacts identified, prepared report.
2005	Jailing Logging Inc. *Researcher*	Guyana	**Environmental and Social Impact Assessment for Jailing Logging Concession Part** Conducted biodiversity baseline surveys, conducted impacts assessment and prepared report on impacts of proposed development on biological environment.

Membership in Professional Associations and Publications:

Language Skills:

- English

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:	**Reference to Prior Work/Assignments that Best Illustrates Capability to handle the Assigned Tasks**
(List all deliverables/tasks as in Tech-5 in which the Expert will be involved)	
• Review of Environmental assessment and management Plan • Enforcement of health and safety measures and environmental management plan • Progress reports • Final design report • Contract document	Expansion of the Sheriff Street- Mandela Avenue Road – Researcher and Environmentalist
	Expansion of the Sheriff Street- Mandela Avenue Road- Researcher and Environmentalist
	EMP for the upgrade and repairs of sea defense structures in Regions 2, 3, 4 and 6- Environmental /Biodiversity Specialist
	EMP for the upgrade and repairs of sea defense structures in Regions 2, 3, 4 and 6- Environmental /Biodiversity Specialist
	EMP for the upgrade and repairs of sea defense structures in Regions 2, 3, 4 and 6- Environmental /Biodiversity Specialist

	EMP for the upgrade and repairs of sea defense structures in Regions 2, 3, 4 and 6 - Environmental /Biodiversity Specialist
	Social/Biological Impact Assessment for the rehabilitation of Black Bush Polder Road - Environmental /Research Consultant
	Social/Biological Impact Assessment for the rehabilitation of Black Bush Polder Road - Environmental /Research Consultant
	Social/Biological Impact Assessment for the rehabilitation of Black Bush Polder Road - Environmental /Research Consultant

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Position Title and No.	Environmentalist
Name of Expert:	Esther Ugraj
Country of Citizenship/Resident:	Guyana

Education:

BSc of Science in Environmental Studies

Employment Record relevant to the Assignment:

Period	Client and position	Country	Summary of Activities preformed relevant to the assignment
2021	**E&A Consultants Inc.** Environmentalist Reference: Miss Anasha Ally Executive Director Email: eaconsul@guyana.net.gy Telephone: (592) 226-8247	Guyana	**Guyana Office Complex Project – (Environmental Monitoring)** Assisting with providing monitoring services when conducting site visits and ensuring the compliance in relation to the Environmental Management Plan for the execution of the client's project. Assisting with providing the Water Quality Monitoring by conducting Water Quality tests to ensure the client's project complies with the Environmental Permits.
2018-2019	**GIPEX** Registration Representative	*Guyana*	Provided thorough information about admission policies, financial requirements and check-in procedures

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Position Title and No.	Environmentalist
Name of Firm:	E&A Consultants Inc.
Name of Expert:	Sharadha Sonaram
Country of Citizenship/Resident:	Guyana

Education:

- Bachelor of Science Degree Environmental Studies University of Guyana (2015 – 2019) GPA: 2.7
- High School Diploma- West Demerara Secondary School (Grades 1 & 2 passes in 12 subject areas).

Employment Record relevant to the Assignment:

Period	**Employing organization and title/position. Contact information for references.**	**Country**	**Summary of activities performed relevant to the Assignment**
February 2021 – Present	**E&A Consultants Inc.** Regulatory and Environmental Support Reference: Miss Anasha Ally Executive Director Email:eaconsul@guyana.net.gy Telephone: (592) 226-8247	Guyana	**Gas to Energy Project** Identifying and liaising with applicable regulatory agencies and completing applications for permits/approvals necessary for the execution of the client's project.
February 2021 - Present	**E&A Consultants Inc.** Environmentalist Reference: Miss Anasha Ally Executive Director Email:eaconsul@guyana.net.gy Telephone: (592) 226-8247	Guyana	**Guyana Office Complex Project – (Environmental Monitoring)** Providing monitoring services when conducting site visits and ensuring the compliance as it relates to the Environmental Management Plan for the execution of the client's project.
February 2021 - Present	**E&A Consultants Inc.**	Guyana	**Design and Supervision of The Early Childhood Centre at the University of Guyana**

	Health, Safety and Environmental Officer Reference: Miss Anasha Ally Executive Director Email:eaconsul@guyana.net.gy Telephone: (592) 226-8247		Providing monitoring services when conducting site visits and ensuring the compliance as it relates to the Environmental Management Plan for the execution of the client's project.

Membership in Professional Associations and Publication:

- None

Language Skills:

- Excellent in speaking, reading and writing English.

Adequacy of the Assignment:

Detailed Tasks Assigned on Consultant's Team Experts:	**Reference to Prior Works/Assignments that Best illustrates Capacity to handle the Assigned Tasks.**
• Assisting with identifying relevant regulatory agencies from which permits/approvals need to be sought for the project at hand • Assisting with liaising with regulatory agencies to gather details on the requirements for permits/approvals • Assisting with managing the Permitting Matrix and Schedules to track permits • Assisting with preparing content to populate the forms/applications • Assisting with preparing correspondences to be sent out to various regulatory agencies	**1. Gas To Energy Project** **2.** Providing regulatory support to EACI's Client)- Current
• Providing assistance with environmental monitory and conduct site visits	**1. Guyana Office Complex Project** **2.** Providing environmental consultancy services to EACI's Client - Current

• Evaluating the compliance of the environmental management project's performance. • Composing reports. • Organizing the necessary environmental tests to conduct monitoring activities.	
• Assisting with the preparation of an Environmental Management Plan; • Conducting site visit inspections to monitor and evaluate the environmental management's project performance; • Composing monthly reports of the findings of the environmental management supervision activities; • Providing mitigation actions for non-conformances and ensured these actions were carried out.	1. **The Design and Supervision of the Early Childhood of Excellences, University of Guyana.** 2. Providing environmental consultancy services to EACI's Client - Current

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Position Title and No.	Soil Scientist
Name of Expert:	Oudho P. Homenauth
Country of Citizenship/Resident:	Guyana

Education:

- 9 GCE 'O' Levels and 3 'A' Levels, Queen's College, 1968-1975
- B.Sc. (Chemistry), University of Guyana, 1980
- M.Sc. (Agronomy – Soil Fertility),Mississippi State University, 1985
- Ph.D. (Agronomy – Soil Chemistry), Cornell University, 1992
- Minor – Statistics (biometrics), Chemistry

Employment Record relevant to the Assignment:

Period	Employing organization and title/position. Contact information for references.	Country	Summary of activities performed relevant to the Assignment
1980 – 1994	**Assistant Lecturer**, Faculty of Agriculture, University of Guyana,	Guyana	• Conducted research in soil science and statistics and teaching
1994 – 1998	**Senior Lecturer & Dean**, Faculty of Agriculture, University of Guyana	Guyana	• Conducted research in soil science and statistics and teaching
1999 to January2000	**Consultant**, Research Programmes, National Agricultural Research Institute	Guyana	• Review the research porgramme and recommendations for new projects.
February 2000 to April 2011	**Director**, National Agricultural Research Institute	Guyana	• Management of the institute and development of appropriate research activities
May 2011-March 2021	**Chief Executive Officer**, National Agricultural Research & Extension Institute	Guyana	• Management and formulation of projects for research and extension and plan quarantine services

			• Determination of fertilizer requirements for sweet peppers, corn, soy beans, tomatoes etc
December 2007	**Consultant**, Drainage & Irrigation Agriculture Water Management Institutions	Guyana	• Analysis of the drainage and irrigation institutions in Guyana
2012	An Analysis of Opportunities for Enhancing Cassava Production, FAO Rome	Guyana	• Developing appropriate value chains for cassava in Guyana
2004-2006	National Coordinator of the Guyana Component of the CARICOM/CARIFORUM Regional Food Security Project	Guyana	• Coordinating the Regional Food security activities that were applicable in Guyana involving drip irrigation and establishment of seed facility at Black Bush Polder Region 6.
2015	Organic, Hydroponic, and Hybrid-System Growing for Caribbean Schools and Model for Local Caribbean Entrepreneurship, OAS	Guyana	• Establishment of shade house facilities and hydroponic farms in Guyana • Designing and implementing appropriate systems relevant to Guyana
Ongoing	**Freelance**	Guyana	• Prepared manuals for use on soil, physical and chemical methods for use in Guyana • Trained technicians on various techniques
Ongoing	**Freelance**	Guyana	• Interpretation of soil test results and making lime • Fertilizer recommendations for farmers for the past 20 years.
Ongoing	**Freelance**	Guyana	• Production of a booklet on soiul fertility and fertilizer recommendations.

Membership in Professional Associations and Publication:

1. Homenauth, O. 1985 – Response of Sunflower to timing and rate of banded NH_4NO_3. Southern Branch of the American Society of Agronomy. 12 : 5-6.

2. Homenauth, O. 1986 – Efficiency and response to Sunflower to rate and timing of banded nitrogen. Comm. Soil Sc. Plant Anal. 17 : 921 – 935.

3. Homenauth, O. 1986 – Petiole and leaf nitrate studies in Sunflower. Soil Sci. Plant Anal. 17 : 981 – 985

4. Homenauth, O. 1994 – Adsorption of aniline on layer silicate clays and an organic soil. Soil Sci. Soc. Am. J. 58 : 347 – 354.

5. Homenauth, O. 1997 – Support for Forestry Education at the University of Guyana. Faculty of Agriculture, U.G. (20 pages).

6. Homenauth, O. 1997 – Transformation and modernization of tertiary level agricultural education in Guyana IIICA. (20 pages).

7. Homenauth, O. 1997 – A comprehensive review of the rice industry in Guyana. Guyana Rice Development Board (300 pages)

8. Homenauth, O. 1999 - Manual of soil Chemical Methods (NARI) – Mon Repos

9. Homenauth, O. 1999 - Manual of soil Physical Methods (NARI) – Mon Repos

10. 2001 – Development of an Organic Agriculture Programme for Guyana. NARI, Mon Repos.

11. Homenauth, O. 2002 – Status and Performance of agricultural diversification in Guyana. Workshop on status and performance of diversification initiatives of Caribbean Status, UWI.

12. Mathur, V. C., O. Homenauth & E. Patram – Cost of Cultivation and Production of Pineapple in Guyana. NARI, Mon Repos

13. Homenauth, O. L. T. Chester and R. N. Cumberbatch 2003 : General Characteristics of the Intermediate Savannahs, SAVANTEC, Roraima, Brazil

14. Cumberbatch, R. N., O. Homenauth and L. T. Chester, 2005: Technological Development and Plan for the Management of the Intermediate Savannah Eco System of Guyana. SAVANTEC. Roraima, Brazil.

15. Mathur, V.C. & O. Homenauth 2003: Agricultural diversification among CARICOM countries: A comparative analysis. NARI, Mon Repos.

16. Mathur, V. C. O. Homenauth & E. Patram, 2004: Economic analysis of prices of non-traditional commodities in Guyana. NARI, Mon Repos.

17. Mathur, V. C. O. Homenauth & Z. Khan, 2004: Production of non- traditional committees in Guyana. Status and Prospects. NARI, Mon Repos.

18. Homenauth, O. 2004 – Organic Agriculture Policy in Guyana. NARI, Mon Repos

19. Homenauth, O. 2004 – Organic Agriculture Training Manual. NARI, Mon Repos.

20. Homenauth, O. 2004 – Status of Organic Agriculture Development in Guyana. NARI, Mon Repos.

21. Homenauth, O. 2004 – Agricultural Development in the Intermediate Savannahs of Guyana. NARI, Mon Repos.
22. Kharb, R.S.P., and O. Homenauth, 2005: Seed Certification Standards. NARI, Mon Repos.

23. Kharb, R.S.P., and O. Homenauth, 2005: Identification of suitable areas for seed production of vegetable crops in Guyana, Mon Repos.

24. Homenauth, O., (2006) Drainage and Irrigation in Guyana – Country Paper. Caribbean Regional Workshop on the Management of Agricultural Irrigation Technology, Kingston, Jamaica.

25. Homenauth, O., (2006) Agricultural Diversification Paper, NAREI

26. Homenauth, O., (2007) Mitigation against natural disasters – Guyana Scenario. Caribbean Regional Workshop on the Management of Agricultural Irrigation Technology, Kingston, Jamaica.

27. Homenauth, O., (2007), Farmer's Manual, Ministry of Agriculture

28. Homenauth, O., (2010), Agro Processing Manual, NAREI

29. Homenauth, O., (2010) Vegetable Manual, NAREI

30. Homenauth, O., 2012, Climate Smart Agriculture Training Manual, NAREI

31. Homenauth, O & Cumberbatch, R. N & Austin, R. : "Farmer's Manual: Livestock Production", NAREI, November 2013

32. Homenauth, O & Cumberbatch, R. N. "Understanding Pastures: A Guide for Guyana", November 2013

33. Homenauth, O (2013): "Fertilizer Manual (Concepts, Application, Storage and Handling)", November 2013

34. Homenauth , O. (2013) "Training Manual "Protected Agriculture System", NAREI

35. Homenauth, O. (2013) ' Intensification of Vegetable Production and Diversification in Guyana, NAREI

36. D. P. Singh, O. Homenauth N. Cumberbatch, V. Persaud F. Benjamin (2014) 'Performance of Corn (Zea mays) Genotypes at Coastal and Savannah Regions and Cost of Cultivation in Guyana': Greener Journal of Agricultural Sciences" ISSN: 2276 – 7770 ICV (2012):6.15.

37. MOU between National Agricultural Research & Extension Institute (NAREI) and the Centro De Invesigacion Cientifica De Yucatan, A.C. (Mexico) for Academic Exchange and Collaboration, 2014

38. Abrahim, B. N., Clementson, C. &Homenauth, O. (2015) 'An investigation of the potential impacts on air quality during operations of the Bioethanol Demonstration Plant in Albion, Berbice': Global Scholastic Research Journal of Multidisciplinary ISSN: 2349-9397: 1.13.

39. Cumberbatch, R. N., Homenauth, O., (et al) (2015) 'A Protocol for the Planting, Managing and Cost of Establishing a Fruit Orchard in the Intermediate Savannahs of Guyana': Global Scholastic Research Journal of Multidisciplinary ISSN: 2349-9397. Issue 12.

40. Motielal M, Homenauth O, DeGroot P. (2016). Utilization of Cassava in Poultry Feed in Guyana. Greener Journal of Agricultural Sciences, 6(3): 121-126

41. Clementson, C., Abrahim, B.N., Homenauth, O. and V. Persaud (2016). An evaluation of "Vinasse" (Bio-ethanol Effluent) and vermicompost as soil amendments for cash crop production. Greener Journal of Agricultural Sciences 6(9): 256-261.

42. Abrahim, B.N., Clementson, C. and O. Homenauth (2016). Assessment of the potential water quality effects resulting from the release of vinasse from the Bioethanol Plant into the surrounding waterways. Greener Journal of Agricultural Sciences 6(3):102-109.

43. Clementson, C.L., Wilson, D. and P. Ragobeer (2016). The Bio-methane potential of the water hyacinth (Eichhorniacrassipes). Greener Journal of Agricultural Sciences 6(5):180-185.

44. Sukhna, Ramnarace & Homenauth, O. (2016): "Training of Vines in Black Pepper (Piper Nigrum L.)", January 2016, GSRJ: ISSN: 2349-9397

45. Sukhna, Ramnarace & Homenauth, O. (2016): "Rooting of Orthotrops and Runnes In Black Pepper (Piper Nigrum L.)", January 2016, GSRJ: ISSN: 2349-9397.

46. Moseley, K, Adams, R, Homenauth, O. "Climate Change Adaption Strategies for Urban Coastal Communities: Lessons from Guyana's Mangrove Restoration

Programme." Sustainable Urban Development: The Gap Between Rhetoric and Reality. A Critical Review of Presentations from the Caribbean Urban Forum 2016, Suriname, Caribbean Network of Urban and Land Management, 2017, pp.

2018 (Jan-Sept)

47. Effect of Rice Husk Biochar as an Amendment on a Marginal Soil in Guyana by Tracy Persaud, Oudho Homenauth, David Fredericks, Seon Hamer (World Environment p-ISSN: 2163-1573 e-ISSN: 2163-1581 2018; 8(1): 20-25 doi:10.5923/j.env.20180801.03) http://article.sapub.org/10.5923.j.env.20180801.03.html

48. The Effect of Vermicompost and Other Fertilizers on the Growth and Productivity of Pepper Plants in Guyana By Vasnie Ganeshnauth, Sirpaul Jaikishun, Abdullah A Ansari and Oudho Homenauth DOI: 10.5772/intechopen.73262" was published. https://www.intechopen.com/books/automation-in-agriculture-securing-food-supplies-for-future-generations/the-effect-of-vermicompost-and-other-fertilizers-on-the-growth-and-productivity-of-pepper-plants-in-

49. Interaction of Mangrove, Coastal Hydrodynamics, and Morphodynamics Along the Coastal Fringes of the Guianas" O. Homenauth; K. Moseley, et al (Threats to Mangrove Forests pp 429-473) https://doi.org/10.1007/978-3-319-73016-5_20

Language Skills:

- Excellent in speaking, reading and writing English.

CURRICULUM VITAE (CV)

1. **Proposed Position**: Project Director
2. **Name of Firm**: CEMCO Inc.
3. **Name of Staff**: Amanda Persaud
4. **Date of Birth**: May 04, 1981 **Nationality**: Guyanese

Education:

INSTITUTION	DEGREE	YEAR
Project Management Institute	Project Management Professional (PMP)	2019
Arthur Lok Jack Global School of Business	Master's in Business Administration (International) Innovation and Entrepreneurship Specialization – With Distinction	2012-2014
Florida International University	Bachelor of Business Administration	1999-2003
The Bishops' High School	CXC	1999

Employment record relevant to the assignment:

Period	Employing organization and your title/position. Contact information for references	Country	Summary of activities performed relevant to the Assignment
2011 – Present	**Employer:** CEMCO **Position**: Acting Managing Director	Guyana	• Project Co-ordination • Overseeing day-to-day operations. • Developing organizational policies. • Managing administrative budgets. • Hiring and training administrative staff. • Negotiating contracts and agreements with clients • Maintaining corporate relationships. • Monitoring operating expenses. • Updating executives on business performance • Project Accounting • Preparation of Financial Proposals for Tender Processes.

			• Provide leadership to finance and operations aspects of the project, including general administrative processes, financial management, subcontract management, accounting, and logistics

Membership in Professional Associations and Publications: Project Management Institute

Language Skills (indicate only languages in which you can work):

Language	Reading	Speaking	Writing
English	Excellent	Excellent	Excellent

Adequacy for the Assignment:

Detailed Tasks Assigned	
• Project Co-ordination • Project Accounting • HR Management • Financial Tracking • Claims/Conflict Resolution • Lead negotiations for both Consultancy and Works Contracts • Mobilse Consultant's Team & Coordinate their inputs over the project • Arrange and Convene Project startup/Inception Meeting • Overlook preparation of Inception Report	**Name of assignment or project:** Yellowtail Development Environmental Impact Assessment **Year**: 2021- **Location:** **Client:** ERM Guyana Inc **Main project features:** Provide Environmental and Regulatory Services in Guyana for the purpose of supporting the EEPGL Program.
	Name of assignment or project: Gas to Energy Development Project **Year**: 2021- **Location:** **Client:** ERM Guyana Inc **Main project features:** Provide Environmental and Regulatory Services in Guyana for the purpose of supporting the EEPGL Program.
	Name of assignment or project: Extension of Cheddi Jagan International Airport **Year**: 2017 to 2021

• Ensure that quality services are provided by the consultant's staff. • Attend important project meetings • Advise PE/Client on critical Contract Matters • Assist in expediting solutions to major technical problems and resolve disputes.	**Location:** Timehri, Region No. 4 **Client:** Ministry of Public Infrastructure **Main project features:** The construction of a New Terminal Building, Rehabilitation of Existing Terminal Building and the extension of the existing main runway to allow for Code E Aircraft operations
	Name of assignment or project : Supervision of Construction of Public Road Bridge Over Rehabilitated Cuhna Canal **Year:** 2018 **Location:** Land of Canaan, East bank Demerara **Client:** Ministry of Agriculture, Agriculture Sector Development Unit **Main project features:** Construction of a 121 feet skewed heavy duty precast prestressed concrete bridge with 50 feet long approaches.
	Name of Project: East Bank Demerara Four Lane Extension **Year**: 2012-2016 **Location**: Guyana **Position held**: **Project features**: Upgrading 5.4km of the main road and improvement of associated infrastructure to accommodate four lanes of traffic (upgrading from existing two lane). • Widening and rehabilitation of existing carriageway • Construction of additional two lanes • Construction and expansion of bridges and culverts along road alignment • Relocation of public utilities
	Name of Assignment: Design of Pump Stations for NDIA at Lima, Joppa, Eversham and Gangaram. **Year**: April 2013 to 2014 **Location**: Region 4 **Client**: Government of Guyana **Main Project features**: Design Calculations Positions held: Design Engineer Activities performed: • Geotechnical analysis and design of foundations. • Structural design of RC retaining walls and superstructure.

Expert's contact information: e-mail: apersaud@cemcoguyana.com

Certification:
I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and I am available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client, and/or sanctions by the Bank.

Amanda Persaud		26/01/2022
Name of Expert	Signature	Date

Amanda Persaud		26/01/2022
Name of authorized Representative of the Consultant (the same who signs the Proposal)	Signature	Date

1. Proposed Position: Environmental Officer
2. Name of Firm: CEMCO Inc.
3. Name of Staff: Michael Lowe
4. Nationality: Guyanese
5. Education:

INSTITUTION	Diploma / Certificate	YEAR
Technical University of Denmark - Coursera	Global Environmental Management	2021
New Guyana School	Basics of Occupational Health and Safety	2019
University of Guyana	Bachelors of Science Degree in Environmental Studies	2018

6. Membership of Professional Associations:
7. Other Training:
8. Countries of Work Experience: Guyana
9. Languages:

Language	Reading	Speaking	Writing
English	Excellent	Excellent	Excellent

10. Employment Record:

PERIOD	EMPLOYER	POSITIONS HELD
July 2018 - Present	CEMCO Inc.	Environmental Officer

11. Detailed Tasks Assigned	12. Work Undertaken that Best Illustrates Capacity to Handle the Tasks Assigned
• Coordinate, assist and undertake ESMPs and ESIA. • Review Contractor's EMP, Health & Safety, Traffic Management, Emergency Response & Water Management Plans • Routinely inspect construction activities and staging area for compliance with EMP • Enforce provisions of the EMP, Traffic Management & other plans • Assess the effectiveness of mitigation measures • Propose mitigation measure for new environmental problems • Assist the review traffic management arrangements • Prepare Environmental Reports and Issue Non-compliance notices • Ensure areas of non-compliance are promptly addressed • Along with Social Specialist, collect all relevant social data	**Assignment No. 1** Name of assignment or project: Cunha Canal Rehabilitation Project Year: 2018 – 2019 Location: Land of Canaan, East Bank Demerara Client: Agriculture Sector Development Unit- Ministry of Agriculture Main project features: The objective of the Cunha Canal Rehabilitation Project for Guyana is to increase the capacity of the Cunha Canal to drain the East Demerara Water Conservancy and local agricultural areas in the recipient's territory. The flood of 2005 highlighted the significance of the risks posed by the weakened containment and drainage capacities of the EDWC and coastal drainage system. The project entails construction of two Sluices and a Bridge over the existing roadway to facilitate re-alignment of the canal. Positions held: Environmental Officer Activities performed: - Routine inspection of construction activities and staging area for compliance with Environmental Management Plan - Tri weakly Health and Safety Inspection - Weekly Inspection reports - Provision of Mitigation measures for non-compliances and other environmental problems - Liaison with MOA, EPA and other agencies involved in the project - Community liaison in the project area. **Assignment No. 2** Name of assignment or project: Cheddi Jagan International Airport Expansion Project Year: 2018 - 2019 Location: Timehri, Client: Ministry of Public Infrastructure Main project features: The Cheddi Jagan International Airport

required for ESIAs • Provide guidance to Inspector of Works in basic daily monitoring	Expansion Project entails construction of the New Arrivals Terminal Building (NATB); Existing Terminal Building (ETB); Remote Apron; North East (NE) Runway Extension; South West (SW) Runway Extension; Diesel Generator Room (DGR); and Fire Pump Station. Positions held: Environmental Officer Activities performed: • Routine inspection of construction activities and staging area for compliance with EMP. • Health and Safety Inspection • Weekly Inspection reports • Provision of Mitigation measures for non-compliances and other environmental problems. • Liaison with MPI, EPA and other agencies involved in the project • Community liaison in the project area.
	Assignment No. 3
	Name of assignment or project: Community Based Livelihood Enhancement Fisheries Development Project - Lot 1 Year: 2019 – 2020 Location: Victoria, East Coast Demerara Client: Basic Needs Trust Fund - Ministry of Finance Main project features: Development of a 1600 Kg to a maximum of 3700 Kg per day Processing Facility that would cater for artisanal fishing operators and trawler owners. Positions held: Environmental Officer Activities performed: - Preparation of the Environmental and Social Management Plan. - Attend team meetings - Provision of Mitigation measures for environmental problems during design phase.

	Assignment No. 4 Name of assignment or project: Construction of Processing and Packaging Facility – Lot 2 Year: 2019 – 2021 Location: NAREI, Mon Repos, East Coast Demerara Client: Basic Needs Trust Fund - Ministry of Finance Main project features: Project entail the construction of a modern agro-processing and packaging facility to support value added production in the agricultural sector. Positions held: Environmental Officer Activities performed: - Preparation of the Environmental and Social Management Plan. - Attend team meetings - Provision of Mitigation measures for environmental problems during design phase. - Routine inspection of construction activities and staging area for compliance with EMP. - Health and Safety Inspection. - Monthly Inspection reports.
	Assignment No. 5 Name of assignment or project: Water and Sanitation Systems Enhancement Projects Year: 2019 – 2021 Location(s): Wowetta, Rupertee, Aranaputa, Kwaimatta, Fly Hill, and Shulinab; Region 9 Client: Basic Needs Trust Fund - Ministry of Finance

	Main project features: Water supply to the isolated deemed villages in Region 9 was insufficient and unsafe in some cases. Residents obtained water from hand dug wells, approximately 15-30 minutes (or more in some cases) to the water source. With the recognition of the challenge for clean and safe water, installation of a distribution network with stand pipes at strategic locations, became a necessity for development of the villages. Positions held: Environmental Officer Activities performed: - Routine inspection of construction activities and staging area for compliance with Environmental Management Plan. - Weekly Health and Safety Inspection. - Monthly inspection reports. - Preparation for the Environmental Management Plan. - Attend team meetings.

Jason Willey

Deputy Project Manager, Senior Technical Lead

Jason has 20 years of experience in environmental consulting. He focuses on environmental and social impact assessment, due diligence, and permitting. He has extensive experience in northern South America and the Guianas. Jason has been the Program Manager for ERM's support to EEPGL since late 2014. He spent 2007-2008 working in Australia and having led the aquatic resources component of ESIAs and due diligence assessments on every continent except Antarctica, often in remote or frontier regions. He has worked on numerous upstream and midstream oil and gas projects throughout his career, including LNG regasification facilities, pipelines, and upstream exploration and development projects worldwide. Prior to his involvement with EEPGL's activities in Guyana. Jason worked for several years for oil and gas and mining clients in neighboring Suriname.

Experience: 20 years' experience in transportation, mining, oil & gas, power and government sectors

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LinkedIn: https://www.linkedin.com/in/jason-willey-14948530/

Education

- M.S. Environmental Science and Policy, Johns Hopkins University, 2007
- B.S., Biology, University of Richmond, Richmond, VA, 1997

Languages

- English, native speaker

Fields of Competence

- Environmental and Social Impact Assessment, to NEPA (USA) and international standards
- Aquatic and estuarine ecology, including quantitative and qualitative fish community survey methods (US EPA rapid bio assessment protocol)
- Essential Fish Habitat evaluation, aquatic macroinvertebrate ecology, water quality sampling, and in-stream macrohabitat assessment
- Fish and benthic macroinvertebrate taxonomy
- Aerial photograph, landscape feature, and habitat interpretation
- Wetland delineation and functional assessment
- Stakeholder engagement particularly related to traditional fishing practices
- Recreational studies

Key Industry Sectors

- Transportation
- Mining
- Oil & Gas
- Power
- Government

Key Projects

Energy Client
Senior aquatic ecologist supporting the completion of a Supplementary Environmental and Social Impact Assessment (ESIA) and associated Management Plans to bring a 900 MW hydropower project planned for the Upper Karnali River in Nepal into compliance with IFC Performance Standards. Working on behalf of the Project Sponsor in coordination with the IFC. Key issues include determining riparian flows required to sustain IUCN listed fishes.

Financial Client
Developed a standard Terms of Reference for hydropower baselines for IFC's Infraventures program. Compiled global best practices for baseline study design, aquatic biodiversity and habitat surveys, and ecosystem services assessment. Presented good practices for fish surveys as part of the Sustainable Hydropower Series of workshops co-sponsored by the IFC and USAID in Nepal.

Government Client
Currently conducting an environmental and social due diligence on the Government of Liberia's rehabilitation of the Mount Coffee Hydroelectric Project, an 80 MW hydropower project Monterserrado County Liberia. Conducting the due diligence on behalf of MCC, which is a major donor to the project. Project involves re-constructing a dam, powerhouse, and reservoir that were destroyed during Liberia's civil war. Major issues include ecoflow and fisheries, resettlement, and community access. Providing strategic advice to MCC and the Liberian Electric Corporation to maximize compliance with the World Bank Environmental Safeguards.

Energy Client
Led a supplemental study of aquatic biological impacts of NSHE's 500 MW run-of-river hydroelectric project proposed on the Batang Toru River in North Sumatra, Indonesia to support lender financing of the project. ERM was engaged to undertake supplemental biodiversity studies, social studies (land acquisition audit, development of a stakeholder engagement plan and gathering of socio-economic baseline data), and an environmental flow study to address identified gaps between the Project's Indonesian Regulatory Approval (AMDAL) and the expectations of the 2012 IFC Performance Standards.

Transportation Client
Led the fisheries and aquatic resource component of the biodiversity field studies for the ESIA for the Nicaragua Grand Canal project, which included a hydropower project on the Agua Zarca River in central Nicaragua. Supervised the daily activities of two groups of fisheries scientists, malacologists, and macro-invertebrate specialists as they surveyed aquatic biodiversity across the Pacific and Atlantic slopes of Nicaragua and Lake Nicaragua. Authored the aquatic biological portion of the ESIA for the project.

Financial Client
Conducted an environmental due diligence on the ESIA for the proposed 48 MW San Bartolo hydropower project proposed on the Rio Negro in Copal Santiago, Ecuador. ERM identified critical gaps in the ESIA analysis and identified seven specific corrective actions that would enhance the ESIA and bring it into compliance with international standards. ERM's EDD report separated these actions into categories according to their priority for implementation, likely effect on construction or operation of the project, and cost to implement.

Power Client
Prepared aquatic resources section of the Preliminary Application Document submitted to FERC for a small (<10 MW) municipal hydropower project on the Grasse River in Massena, MY. Scoped initial aquatic ecological and fisheries studies required for the environmental impact analysis. Supervised riparian habitat mapping surveys and a wetland delineation along approximately 8 miles of the Grasse River. Developed conceptual designs for fish passage facilities designed to pass lake sturgeon (Acipenser fulvescens) and American eel (Anguilla rostrata). Assessed the potential impacts to local traditional fisheries practiced by the Mohawk tribe.

Federal Energy Regulatory Commission (US)
Assessed the effects of the proposed relicensing of Portland General Electric's 173 MW Clackamas River Hydroelectric Project on the Clackamas River in Oregon. Evaluated effects of the hydroelectric facility on fish and aquatic species, including several species of threatened or endangered salmonids. Described PGE's proposed action and incorporated agencies' comments into a comprehensive agency alternative. Authored the Threatened and Endangered Species section of the EIS for the project, which compared the effects of the proposed action and agency alternative on listed salmonids, native fish species, and benthic macroinvertebrates.

Federal Energy Regulatory Commission (US)
Co-authored the fisheries and aquatics resources section of the EIS for relicensing NYPA's 912 MW St. Lawrence-FDR Power Project on the St. Lawrence River in northern New York (US). Assessed of relicensing the hydroelectric project on fish and aquatic species, including several species of threatened or endangered fish, macroinvertebrates, and plankton. Considered effects on rare warm-water habitats created by the project and their role in enhancing fish reproduction in the river. Considered fish passage design and protective measures to avoid loss of fish passing downstream via the spillway and/or the turbines. FERC issued NYPA a 50 year license to operate the project in October 2003.

Mining Client
Preparing an EIA for an aluminum-smelting project in southwest Greenland to include a smelter, marine port, two hydroelectric developments, and electric transmission lines. Issues of concern related to construction of the marine port include potential impacts to near shore marine habitats, marine fisheries, marine mammals, and contamination of the marine environment. Issues of concern related to construction of the hydropower developments include potential ecological impacts of freshwater discharges to near shore marine habitats. Issues of concern related to the transmission lines include potential restriction of access to inshore fishing areas and interference with seabird flight patterns.

Energy Project
Prepared the fisheries and aquatics resources impact assessment as part of the ESHIA for the proposed 60 MW Nam Sane 3 Hydroelectric Project in Ban Phouviang, Xieng Khouang Province, Lao PDR. Conducted field assessments of aquatic habitat, fisheries and aquaculture practices, and general aquatic ecology. Overcame potential safety hazards from unexploded ordinance that prevented in-water surveys by interviewing local and indigenous people concerning fish distributions, migrations, and habitat use, as well as extrapolating from existing fisheries data from elsewhere in the Mekong River Basin. Collated information from various local, governmental, and NGO sources into the environmental baseline, and assessed impacts according to the Department of Energy's guidelines.

Energy Client
Provided general environmental impact assessment and planning services for several petroleum exploration and production facilities around Australia. Prepared EPBC Act (Australia) referrals and environmental management plans for offshore exploration projects. Coordinated oil spill contingency planning and sediment transport modeling to support EIA process for another offshore project in a potentially sensitive marine environment. Managed numerous concurrent modeling tasks to support the EIA process for the project and an ongoing a joint experiment by Woodside and the Australian Institute of Marine Science to determine the effects of accelerated episodic sedimentation on shallow Indo-Pacific reef building corals.

Oil & Gas Client
Managed an EIA for a marine seismic survey in the Great South Basin off the coast of New Zealand's South Island. Key issues include potential impacts on endangered marine mammals, marine fisheries, and seabirds, as well as ecosystem-level effects on sensitive habitats including the Sub-Antarctic island archipelago. Project required collating results of

recent and ongoing scientific research on the effects of vessel noise, seismic noise sources, and near-to mid-field interactions with vessels on rare, threatened, and endangered marine mammals. Impact assessment process included consultation with several key government stakeholders, and resulted in finding of no significant impacts and favorable feedback from NZ regulators.

Hydroelectric Project
Performed the aquatic resources and fisheries impact assessment for the Bui Hydroelectric Project in western Ghana. Key aquatic issues included conversion of riverine habitat to lacustrine habitat, loss of riparian productivity, and migration barriers.

Mining Client, Suriname
Lead aquatic ecologist on a feasibility assessment for a bauxite mine at a greenfield site in central Suriname. Historical investigations documented several species of armored catfish at the site, including at least one species that was potentially endemic to the local watershed immediately surrounding the proposed development site. Subsequently captured two suspected endemic armored catfish species at the site. Other potential ecological receptors of concern included amphibians, terrestrial mammals and birds, and riverine fisheries downstream of the development site. ERM has preliminarily concluded that considerable mitigation was likely to be necessary in order to render the environmental impacts of the proposed project acceptable under international and Suriname standards. Currently planning a detailed aquatic baseline survey at the site to establish the range of the suspected endemic fish at the site.

Power Client
Provided on-call environmental support to project engineers during the design phase of a natural gas pipeline project on Barrow Island off Western Australia. Provided design engineers with strategies intended to streamline the environmental permitting process. Project is a critical downstream component of the Gorgon natural gas development, a $50 billion development project near Karratha.

Hydro Power Project
Authored the aquatic resources and fisheries section of the EIA for the planned 100 MW Kalivac Hydro Power Plant on the Vjose River in Southern Albania. Determined that the project had the potential to fragment populations of resident and migratory fish species, including the several IUCN-listed minnows, two salmonids, and two species of sturgeon. Concluded that the project had the potential to enhance fisheries upstream of the dam due to increased productivity in the impounded reach. Recommended monitoring for indications of barotrauma and/or congregations of migratory fish downstream of the dam, and mitigation of these impacts if required.

International Joint Commission (US and Canada)
Managed a project to evaluate the potential effects of peaking ponding by hydropower interests on the ecology of the St. Mary's River. Consulted with the federal, state, and provincial agency personnel with regulatory responsibility on the river to evaluate the agency's concerns relative to peaking and ponding. Prepared an assessment for the IJC of peaking and ponding's effects on biological resources of concern, including migratory fish, the threatened lake sturgeon (Acipenser brevirostrum), and nuisance species, including the catadromous sea lamprey (Petromyzon marinus).

Virginia Department of Game and Inland Fisheries
Sampled fish communities in several major drainages throughout Virginia (US). Collected historical data and developed a database of historical fish collections throughout the state organized by watershed. Compiled data and prepared reports on watershed health based on recent and historical qualitative and quantitative fish data. Standardized stream data collection procedures in preparation for the eventual development of a statewide fish Index of Biotic Integrity in Virginia.

Recreational Boating Management Plan
Managed an update to the Recreational Boating Management Plan for Deep Creek Lake, an 18-MW

hydropower facility in western Maryland. Projected future use and developed recommendations for managing future recreational use and growth. Characterized use of the lake, involving a stratified random survey of commercial marinas, recreational users, and lakefront residents, and surveys of commercial rental operators, lakefront residents, and recreational boaters. Tracked commercial use in the lake's buffer strip. Determined that commercial use had experienced moderate growth over recent years, and that development could detract from the quality of the recreational resource. Made several recommendations to the DNR and the PRB for managing increased use of the lake.

Confidential Client
Lead biologist on the marine ecology and fisheries component of an Environmental and Social Impact Assessment (ESIA) for a resort planned on New Providence Island, The Bahamas. Verified preliminary marine habitat maps and data provided by the client in the field, and assessed the potential for the proposed project to impact marine resources. Resources of concern included listed marine reptiles, corals, seagrasses, and commercially and recreationally important fish and invertebrates. Conducted high-level consultations with select government agencies to ensure support for the ESIA.

Fisheries and Aquatic Resource
Co-authored the fisheries and aquatics resources section of the EIS for relicensing NYPA's 912 MW St. Lawrence-FDR Power Project on the St. Lawrence River between northern New York (US) and Ontario (Canada). Assessed the potential effects of relicensing the hydroelectric project on fish and aquatic species, including several species of threatened or endangered fish, macroinvertebrates, and plankton. Considered potential effects on rare warm-water habitats created by the project and their role in enhancing fish reproduction in the river. Considered fish passage design and protective measures to avoid loss of fish passing downstream via the spillway and/or the turbines. Reviewed input from Canadian communities affected by the project, including Native American tribes. FERC issued NYPA a 50 year license to operate the project in October 2003.

Amberly R. Moon

Biodiversity Specialist

Amberly has over 12 years of professional experience that includes project management, assessing biological impacts, conducting baseline studies and habitat assessments, surveys for threatened and endangered species, and environmental permitting. As an environmental consultant, her primary focus has been on the oil and gas and mining sectors, with additional experience in the power and transmission sector. She has assisted in preparation and review of environmental, social, and health impact assessments in North and South America. Amberly has supported projects for EEPGL since late 2018. She has managed EA&MPs for proposed exploratory drilling campaigns in offshore Guyana, and assisted in preparing EMPs, EIAs, and supplemental EIAs.

Experience: 12 years' experience including mining, oil and gas, power, and government.

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Education

- M.S. Biology, Virginia Commonwealth University, Richmond, VA, 2011
- B.S. Biology, (Chemistry Minor), Virginia Commonwealth University, Richmond, VA, 2008
- CPR & First Aid certified
- ERM Field Safety Officer Certified
- MSHA Certified
- U.S. Government Driver Safety Awareness Training
- Managing Our People Training
- Project Manager Fundamentals Training
- Project Manager Excellence Training

Languages

- English, native speaker

Fields of Competence

- Project management
- Biological impact assessment
- Baseline biological surveys
- Raptor species specialist
- Invasive species management
- Vegetation analysis
- Habitat restoration
- Technical writing and review
- Environmental review
- ArcGIS
- Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA)
- Endangered Species Act (ESA)

Key Industry Sectors

- Mining and Metals
- Oil and Gas
- Power & Transmission
- Government

Publications

- Moon, A.R, J.D. Kleopfer, L.P. Bullock, and J.Ware. "Winter Ecology of the Eastern box turtle (*Terrapene carolina carolina*) including temperature tolerance and microhabitat selection."

Key Projects

EIA for Off-shore Drilling and Production, Guyana 2019
Authored the introduction, administrative framework, and cumulative impacts for an offshore oil and gas EIA. Developed a traffic impact analysis data sheet and potential traffic routes for vehicles related to the project. Assisted in managing client comments and implementing changes including embedded controls, mitigation measures, and monitoring measures for the physical, biological, and social resource sections. Created presentations for the Guyana EPA and posters for the public describing the project.

EA&MP for Off-shore Exploration Drilling, Guyana 2020
Managed the production of an Environmental Assessment and Management Plan for an offshore exploration drilling project including existing conditions and impact assessment for physical, biological, and social resources, and cumulative impact analysis.

EA&MP for Off-shore Exploration Drilling, Guyana 2019
Managed the production of an Environmental Assessment and Management Plan for an offshore exploration drilling project including existing conditions and impact assessment for physical, biological, and social resources, and cumulative impact analysis.

Supplemental EIAs for Two Off-shore Drilling FPSOs, Guyana 2019
Managed the production of two addendum EIAs for two FPSOs based on input from the Department of Energy. The supplemental EIAs included updates to the Development Plan, definitions of magnitude and sensitivity, descriptions of Best Available Technologies, alternatives for treatment and disposal of produced water, analyzing impacts from greenhouse gas emissions, and updates to the Environmental and Socioeconomic Management Plan, Waste Management Plan, Decommissioning Plan, and Oil Spill Response Plan.

EMP for Off-shore Exploration Drilling, Guyana 2019
Assisted in managing team in writing an Environmental Management Plan for an offshore exploration drilling project. Authored the existing conditions and impact assessment sections for special status species and protected areas.

Technical Review for ESIA, Columbia
Managed a large team to provide a technical review of an ESIA for a mining site in Columbia. The review included revisions to proper English from its original Spanish translation.

Permitting and Environmental Surveys for a Pipeline, Wyoming & Colorado
Assisted in regulatory permitting with U.S. Army Corps of Engineers, Wyoming state permitting, and Colorado local county permitting. T&E species lead and coordinator for MOCs in Wyoming and Colorado. Authored species memos for burrowing owls and raptors, and coordinated with state agencies to discuss recommendations for state T&E species. Conducted surveys for burrowing owls.

SEIS for Transmission Line Project for a Large Pipeline, Montana, South Dakota, and Nebraska
Wrote the water resources section in a draft SEIS for a large crude oil pipeline crossing three states. The SEIS project is for the transmission and distribution lines and substations connecting to the pipeline.

Exploration Drilling EA, Arizona
Completed a preliminary data adequacy review of the client's survey data to determine data gaps or needs for the Section 7 consultation process. Served as project coordinator by maintaining the administrative record, authoring meeting notes, RFAIs, monitoring the project schedule, and scheduling meetings with USFS. Developed an administrative record index, RFAI tracking spreadsheet, and QC of the author

templates. Project management activities include cost monitoring, budgeting, invoicing, and preparing monthly progress reports.

Annual Greater Sage-grouse Lek Survey, Nevada
Managed the project from 2018 through 2020 including staff, schedule and survey logistics, protocols, cost monitoring, budgeting, invoicing, and quality control of collected data in Survey123. Conducted Greater sage-grouse lek surveys and habitat reconnaissance using the Nevada Department of Wildlife (NDOW) protocol, Survey123, and ArcGIS Collector. Analyzed the collected data and completed a final technical review of all survey reports. Built a strong working relationship with NDOW that has aided in opening the doors of communication and allowed flexibility in protocols to ensure better data collection at lek sites.

Greater Sage-grouse Lek Survey, Nevada
Managed a new sage-grouse survey program for a mine in the Battle Mountain range of Nevada, including development of the program, coordination with NDOW, survey logistics, cost monitoring, and cloud-based data collection in Survey123.

Biological Baseline Studies for a Legacy Uranium Mine, New Mexico
Managed and authored the Phase I Environmental Report associated with a legacy uranium mine site to support future compliance with NEPA. Conducted migratory and breeding bird surveys along transects at 300 m intervals as part of the Phase II Environmental studies. Completed a desktop assessment of habitats to digitize transects for the surveys and develop the survey protocol and forms using ArcGIS Collector and Survey123. Analyzed the collected data to author the final Phase II report. Created maps for the report using ArcGIS. Completed project management duties including field scheduling, Level 3 HASP compliance, cost monitoring, budgeting, and oversight of subcontractors.

Biological Baseline Studies for a Mining Site, Nevada
Managed the project including staff, schedule, survey logistics, subcontractor, protocols, budgeting, and invoicing. Performed a desktop assessment prior to field work to establish survey transects in locations of suitable habitat. Conducted surveys for migratory and breeding birds, burrowing owls, and pygmy rabbits following BLM protocols. Determined appropriate sites for deployment of a bat acoustic monitor. Processed all collected data for analysis and authoring the final Biological Baseline Report.

Sage-grouse Mitigation Program, Nevada
Managed and authored the first agency Annual Report containing implementation data for activities performed to restore habitat for greater sage-grouse as part of a Bank Enabling Agreement (BEA) between the client and Bureau of Land Management (BLM). Analyzed annual monitoring data to create implementation data sheets to present to BLM. Project management activities include budgeting and invoicing.

Kangaroo Mouse Survey at a Mining Site, Nevada
Performed a desktop assessment prior to field work to determine areas of suitable habitat in a leach pad expansion area for the dark and pale kangaroo mouse. Managed the field staff who conducted the survey, analyzed data collected in the field, and authored the final survey report.

Biological Baseline Report for a Mining Site, Nevada
Provided technical authoring and editing for the 2017 Biological Baseline Report containing 5 years of collected data to support future NEPA compliance. Compiled data from the survey years to create final report tables and appendices. Implemented BLM comments and prepared responses. Performed quality control of presented data and figures, and assumed project management duties including invoicing, budgeting, and cost monitoring.

Wildlife Impact Assessment for a Mining Site, South Carolina
Authored a wildlife impact assessment including using existing data from previous baseline surveys. Project management duties included budget and schedule oversight, and review of authored reports and data.

Cyanide Audit for a Mining Site, South Carolina
Project manager for cyanide code audit to ensure client is ready for an audit. Provided project oversight to ensure gaps were being addressed on-site, all ERM and client H&S measures are being followed, and management of the budget and schedule.

Burrowing Owl Surveys for a Pipeline, Wyoming
Conducted burrowing owl surveys as a lone-worker along a pipeline ROW to confirm presence/absence of species in accordance with state requirements. Validated the Environmentally Sensitive Areas (ESA) established to protect the burrowing owls.

Emergency Permitting for Wildfire Rapid Response EP, Environmental Coordinator, and Business Unit Staff Coordinator, California
Wrote biological permits for an emergency response project along an existing transmission line in Northern California. Permits were written to agencies including USFS and BLM. Managed biological monitors on daily surveys and data collection. Coordinated and vetted staff from the Mountain West Business Unit for long-term deployment to the project site.

Bald Eagle Survey for Pipeline ROW, West Virginia
Performed aerial bald eagle nest surveys via helicopter in Monongahela National Forest for existing pipeline constructions. Compiled the collected data and edited the final survey report.

Morriah Fickes

Aquatic Biologist, Project Manager

Morriah is an aquatic ecologist with technical expertise in environmental impact assessments, biomonitoring, and regulatory compliance, with extensive experience in the mining sector. Morriah often provides subject matter expertise in impact analyses and reporting related to various National Environmental Policy Act (NEPA) projects in aquatic and other biological resources, and is a skilled technical writer, providing both technical review and editorial support. She has developed and directed fieldwork and reporting efforts for various ecological systems throughout the United States and has extensive experience scoping and managing aquatic-related projects, and providing fieldwork support including operating boats and sampling macroinvertebrates, zooplankton, fish, and periphyton, collecting tissues, and conducting stream and river habitat assessments. Post-fieldwork studies, she most enjoys client interfacing and mentoring junior staff.

Experience: 13 years of experience in natural resources in mining, oil and gas, power, and government sectors

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LinkedIn: www.linkedin.com/in/morriah-fickes

Education

- MS. Fisheries Science, Texas A&M University, 2012
- BS. Biology, University of Colorado, 2009

Professional Affiliations and Registrations

- 24-hour Mine Safety and Health Administration (MSHA) Training, current
- American Fisheries Society, Member
- Association of State Wetland Managers, Member
- Emergency Medical Technician (Basic), expired
- Professional Association of Diving Instructors (PADI) Certified Rescue Diver

Languages

- English, native speaker
- Spanish, proficient

Fields of Competence

- Baseline studies, biological resource monitoring, and impact assessment analysis
- Environmental Assessment (EA) and Environmental Impact Statement (EIS)
- Threatened and endangered species surveys
- State and federal permitting and regulatory compliance: NEPA, Clean Water Act (CWA), Endangered Species Act (ESA)

Key Industry Sectors

- Mining
- Oil & Gas
- Energy Utility

Publications

- Professional paper: “Selenium Ecotoxicology: A Context for Fisheries Managers”

Key Projects

Environmental Impact Assessment for Offshore Drilling and Production, Guyana
Reviewed and authored biological resource sections for offshore oil and gas Environmental Impact Assessment. Assisted in managing client comments and updating technical aspects of biological resources.

Biological Baseline Inland Fish Study, Gas to Energy Project, Guyana
Project manager; developed inland fish study, provided technical oversight of methodology and coordinated fieldwork activities with CSBD team in Guyana. Provided senior technical review for all reporting efforts.

Environmental Assessment and Management Plan, Offshore Exploratory Campaign, Kaieteur Block, Guyana
Project manager; directed the authoring of the Terms of Reference and EA&MP and provided senior review. Provided client coordination and management of reporting needs as requested by the Guyanese EPA.

Environmental Assessment and Management Plan, Offshore Exploratory Campaign, Canje Block, Guyana
Authored and reviewed the EA&MP.

Mining Sector, Red River Aquatic Biological Monitoring, Questa, New Mexico
Directed habitat surveys and sampling of fish and invertebrate populations in the Red River as part of a long-term annual monitoring plan to investigate Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) issues and to monitor the changes in the river over time. This information was also used by the State of New Mexico as part of a Total Maximum Daily Load (TMDL) study on the river.

Mining Sector, Environmental Impact Statement, Salmon River Drainage, Idaho
Provided senior technical review on fisheries and aquatic resource sections for a project proposed for the East Fork Salmon River drainage; provided technical guidance on implementation of metal contaminant regulations, data, and reporting.

Mining Sector, Cortez Ore Transportation Project, Nevada
Provided senior technical review and guidance on natural resource sections authored for the Baseline Report for the proposed Ore Transportation Project spanning a 110-mile corridor connecting Cortez, Gold Quarry and Goldstrike Mine Complexes.

Mining Sector, Rasmussen Valley Baseline, Soda Springs, Idaho
Directed fish and invertebrate population studies of fish tissues for analysis of mercury, cadmium, selenium, and lead concentrations in streams within the Upper Blackfoot River Drainage, Idaho. Analyzed data and prepared report detailing aquatic resources baseline study of these streams.

Aquatic Monitoring Oversight, Riverton, Wyoming
Provided oversight of sampling conducted by state agency conducted biomonitoring and water sampling for a confidential energy client. Provided analysis of findings to incorporate into a Use Attainability Analysis (UAA) for the client's discharge location.

Mining Sector, Biomonitoring Studies, Elko, Nevada
Managed fieldwork and analysis of fish and benthic invertebrate population data and prepared technical reports assessing the potential effects of mining activities on aquatic populations.

Mining Sector, Agrium Aquatic Biological Monitoring, Soda Springs, Idaho
Prepared study plans for the aquatic biological monitoring and conducted data analysis on monitoring data for two phosphate mines in southeastern Idaho.

Mining Sector, Regulatory Support in relation to Notice of Violation, Hayden, Colorado
Conducted field collections of benthic invertebrate and fish populations for stream sites on several tributaries to the Yampa River.

Mining Sector, Selenium Site-specific Standard Development, Hayden, Colorado
Conducted an evaluation of habitat and aquatic biology to better understand appropriate aquatic life use classifications and water quality standards for streams in the vicinity mining activities.

Mining Sector, Development of Selenium Site-specific Standards for Southwestern West Virginia Watersheds, Charleston, West Virginia
Assisted with all biological sampling activities and composed report used for a Federal Energy Regulatory Commission (FERC) licensing.

Mining Sector, Aquatic Biomonitoring Study, Lead, South Dakota
Conducted field collections of benthic invertebrate, fish, and periphyton populations for stream sites in the Black Hills, South Dakota. Sampling included backpack electrofishing, field fish identifications, collections of benthic invertebrates using kick nets, collections of stream algae (periphyton), and habitat delineations. Analyzed resulting data from these collections and assisted in preparation of technical reports assessing the potential effects of mining activities on aquatic populations.

Mining Sector, Regulatory Support, Use Attainability, and Stream Classification, Hayden, Colorado
Conducted field collections of benthic invertebrate and fish populations for stream sites. Sampling includes backpack electrofishing for population estimates and tissues samples, field fish identifications, collections of benthic invertebrates using multiple sampling techniques, and habitat delineations.

Arkansas Valley Environmental Impact Statement, Arkansas River Basin, Colorado
Conducted biological surveying and assisted with data collection.

Mining Sector, Regulatory Support/Biomonitoring, Boulder, Colorado
Conducted an evaluation of habitat and aquatic biology to better understand appropriate aquatic life use classifications and water quality standards for streams in the vicinity of mining activities.

Mining Sector, Biomonitoring and Bioaccumulation Studies, Clayton, Idaho
Collected and processed biological samples from stations on Thompson and Squaw creeks, tributaries of the Salmon River, for an annual biological monitoring program. This long-term monitoring program of fish and invertebrate populations was initiated in 1980 and has continued to present.

Mining Sector, Evaluation of Arsenic in United States Drinking Waters, Salt Lake City, Utah
Assisted in determining the range of copper concentrations and associated bioavailability parameters in several Alaskan streams known to support healthy salmon populations. This work involved obtaining and analyzing data to address a variety of questions related to the growing interest in the potential effects of copper on salmonid olfaction in the Pacific Northwest.

Use Attainability Analysis Study, Pueblo, Colorado
Conducted a UAA of the study area to determine appropriate use classifications and water quality standards. This study involved collecting fish, benthic macroinvertebrate, amphibian, reptile, periphyton, water quality, sediment, and habitat data to evaluate appropriate use classifications and water quality standards.

Federal Energy Regulatory Commission Relicensing, Georgetown, Colorado
Assisted with macroinvertebrate report and analysis for FERC relicensing project.

Monitoring and Hearing Support, Colorado Springs, Colorado
Conducted a UAA of the study area to determine appropriate use classifications and stream segmentation. This study involved collecting fish, benthic macroinvertebrate, and habitat data.

Snowmass Creek Aquatic Biological Monitoring, Snowmass Village, Colorado
Analyzed fisheries data to determine impacts from sanitation district diversion on resident fish populations in Snowmass Creek. Prepared a Technical Memorandum summarizing the results of the analyses.

Waldyke S. Prince

Leon Moore Nature Experience: Biological Resources Specialist

Mr. Prince is a Wildlife Biologist and Naturalist Guide, and one of Guyana's premier natural history tour-guide and interpretation instructor. His 25 years' experience in field research has focused on faunal surveys, community-based wildlife management, traditional ecological knowledge, applied wildlife and fisheries research, capacity building, and environmental education.

Experience: 25 years' experience in fauna surveys, community-based wildlife management, traditional ecological knowledge, applied wildlife and fisheries research.

Email: Waldyke.prince@erm.com

Education

- Bachelor of Science – Biology, University of Guyana

Languages

- English

Fields of Competence

- Tour Guide
- Wildfire Management
- Environmental Awareness and education

Key Industry Sectors

- Tourism

Honors and Awards

- Nov 2010 & 2016 - Tour Guide of the Year Award – Guyana Tourism Association
- May 1996 - PL480 Small Grants for Natural Resource Management
- August 1990 - Guyana Taxidermy Course Award; Most Outstanding Field Student
- May 1995 - UNOPS Fellowship for the Smithsonian Institution's Man and the Biosphere Biodiversity Course

Publications

- Costello, Leandro, Waldyke Prince, and Graham Watkins. 2001. The Status of Arapaima (*Arapaima gigas*) Populations in the North Rupununi, Guyana
- G. Watkins, W. Prince, D. Jafferally, C. Chin, D. Arjoon, D. Fernandes, Rewa Village, Fairview Village, Apoteri Village, Crashwater Village and the North Rupununi District Development Board. 2001. Recovery of the Black Caiman (*Melanosuchus niger*) in the North Rupununi, Guyana
- G. Watkins, D. Arjoon, D. Jafferally, W. Prince, C. Chin, toka Village, Massara Village, Yakarinta Village and the North Rupununi District Development Board. 2001. A collaborative Study of White-tailed Deer (*Odocoileus virginianus gymnotus*) Populations in the North Rupununi Savannas, Guyana
- Lehman, Shawn M., Waldyke Prince, and Linda L. Taylor 1997. "Habitat disturbance, hunting pressures and primate distribution in Northeast Guyana." *American Journal of Primatology*
- Lehman, Shawn M., Prince, Waldyke & Mayor, Mireya. 2001. Variations in Group size in White-Faced Sakis (*Pithecia pithecia*): Evidence for Monogamy or Seasonal Congregations? *Neotropical Primates*. Vol.9(3):96-101

Key Projects

Coastal Bird Surveys in Guyana

Oct 2017–Oct 2029 – Team leader for coastal birds surveys and habitat sensitivity mapping along Regions 1 – 6 of Guyana. ExxonMobil (EEPGL).

Key Projects Prior to Joining ERM

Operations Manager (AG
Nov 2008–Aug 2009 - Iwokrama Field Station & Lodge

Iwokrama Tour Guide Coordinator & Head Guide
Jan 2004–Aug 2010 - Supervises and trains the guides and rangers, guides high-profile visitors, designs and creates PowerPoint presentations, conducts mini-lectures to visitors, designs and develops new tourism products for the Iwokrama Forest, hosts visitors, and trains the drivers and boat captains in Hospitality Etiquette.

Manager
Nov 2001–Nov 2003 - Manager of the Audubon Citizen Science Programme in Guyana, a project that focuses on community-based wildlife management, environmental awareness, and education and research within 14 indigenous communities within the North Rupununi.

Co-supervisor
April 2001 - Along with Mr. Leandro Costello for the Arapaima survey of the North Rupununi District.

Team Leader
June 2001 - As team leader, trained and supervised members of the EPA-Guyana National wildlife Survey team for the survey on Spectacle Caiman.

Team Leader
Feb–Mar 2001 - As team leader, supervised and trained participants and organized logistics for the Black Caiman survey of the North Rupununi.

Principal Investigator
January 1997 - As Principal Investigator, designed and wrote proposal, organized the logistics, selected and trained the participants (Uni. of Guyana undergrads) for an Ornithological Expedition at Shell Beach in northwest Guyana. Management responsibilities included work program and budget planning.

Freelance Naturalist Guiding Instructor & Tour Leader – Guide
Nov 2010–Present

Faunal Biodiversity Specialist

Nov 2010 – present for faunal surveys for EIAs; EMC & GSEC.

Part of the Faunal Team to survey the fauna at the Amalia Falls

April 2009 - Hydro-falls area.

Rapid Biodiversity Assessment

May–Sept 2007 - RBA of the extension to the Stratagold Mining area (Tassawini) as the field researcher; Birds and Mammals.

Survey of the Biodiversity for the Toroparu/ETK Mining Area.
Aug 2007–June 2008 - Team Leader

Survey of the Biodiversity
Aug–Sept 2004 - Team Leader: of the proposed Shell Beach Protected Area; designed, planned, and implemented the research methodology for the area.

Survey of the North Rupununi Wetlands
January 2004 – Set up the Wetlands Monitoring Program.

Survey of Arapaima within the Lakes and Ponds of the North Rupununi District
May 2001

Researcher
March 2001 - Surveyed the spectacled caiman (*Caiman crocodilus crocodilus*) and dwarf caiman (*Paleosuchus palpebrosus*) population in the central coastal lowlands of Guyana.

Black Caiman Survey of the North Rupununi District
Jan–Feb 2001

Project on Feeding Ecology of Primates within the Iwokrama International Forest
Aug–Sept 2000

Preliminary Deer Survey of the North Rupununi District
June 2000

Surveys of Ponds and Rivers
March 2000 - Surveys of Ponds and Rivers within the Iwokrama International Forest and North Rupununi District on caimans, giant otters, giant river turtles and arapaima.

Research Assistant (RA)
Jul–Aug 1999 - Investigation into the host Specification for Nibbi in the Iwokrama Reserve, with Tamsyn Butler, Aoife Flynn, and Liz Scott from University of West England (UWE).

Co-researcher
April 1999 - A joint expedition to Mt. Ayangana to survey the butterflies and bird species present there, with Bob Hanner and Steve Fratello.

RA
March 1999 - Ornithological expedition to Gunns Village (Wai-Wai community) with Dr. Mike Braun, Brian Schmidt, and Chris Milensky; Smithsonian Institution. Collected and prepared specimens.

RA
January 1999 - Investigation into the home-ranging habits of some species in the Satyrine group of butterflies in the Iwokrama reserve, with John Weaver and James Martin; University of Herfordshire. This entails capture-mark-recapture techniques.

RA
Oct–Nov 1998 - Historical expedition to retrace Eigenmann's Ichthyologic Expedition (1908), with Dr. Lawrence Page and team (Univ. of Chicago), and Fin Montaigne and Randy Olson (National Geographic Society).

RA
Aug–Sept 1998 - Ornithological expedition to Accari Mountains on the southern border of Guyana. Collected and prepared specimens. Drs. Mike Braun and David Clarke and team (Smithsonian Institution), and Mark Robbins (Univ. of Kansas Museum of Natural History).

RA
Nov–Dec 1997 - Ichthyological Survey – Iwokrama Faunal Survey; Iwokrama Rainforest Reserve, with Dr. Graham Watkins. Collected and prepared specimens.

RA
Sept–Oct 1997 - Ornithological expedition to Baramita, in northwest Guyana. Dr. Mike Braun and team (Smithsonian Institution), and Mark Robbins (Univ. of Kansas Museum of Natural History).

RA
Jul–Aug 1996 - Ichthyological expedition with Terry Bergquist (Univ. of St. Louis; Missouri grad student) to the Berbice savannahs. A comparative study of fish ecology in clear water streams in non-mining vs. mining areas.

RA
March 1996 - Herpetological studies at CEIBA Biological Station (Madewini), with Dr. Godfrey Bourne (Univ. of St. Louis; Missouri). Specimen preparation, morphometrics, and behaviour of lizards.

RA
Mar–April 1996 - Ornithological expedition to Dubulay Ranch in the intermediate savannahs of Berbice, with Mark Robbins (Univ. of Kansas Museum of Natural History), Brian Schmidt and Chris Milensky (Smithsonian Inst.).

Co-researcher
December 1995 - Survey of the distribution of Primates in the northeast (Canje River) of Guyana, with Shawn Lehman.

RA
May–June 1995 - Examined the anti-predator behaviour and parental investment of the Wattled Jacana (*Jacana jacana*), with Rachel Polster (Univ. of St. Louis; Missouri grad student).

Co-researcher
April 1995 - Survey of the distribution of primates in northeast Guyana, focusing on the Mahaica-Mahaicony area, with Shawn Lehman.

Co-researcher
December 1994 - Survey of the distribution of primates in northeast Guyana (Berbice county) with Shawn Lehman.

RA
Ornithological expedition to Rockstone and Mabura Hill (central Guyana), with Dr. Robert Ridgely, Dr. Robert Brown, and David Agro. Specimen collection and preparation.

RA
Herpetological studies on morphometrics and behaviour of lizards with Dr. Jay Cole and Carol Townsend.

Curriculum Vitae

Elford Alwin Liverpool
University of Guyana: Consultant Coordinator/Zoologist

584 West Ruimveldt H/S, Georgetown, Guyana, South America
Tele: 592-223-3257, 626-4109, 6256558
E-mail: elfordliverpool@yahoo.com, elfordliverpool@gmail.com

Personal Information

Nationality -	Guyanese
Date of Birth -	August 30th 1984
Marital Status -	single

Education

DOCTOR OF PHILOSOPHY (Ph.D) BIODIVERSITY CONSERVATION –STUDENT
Thesis topic: Mining impacts, mercury and food web ecology in fishes of the Middle Mazaruni River Drainage, Guyana
UNIVERSITY OF GUYANA AND (COL: SAM HOUSTON STATE UNIVERSITY, U.S.A.
SEPT 2015-PRESENT

MASTERS OF SCIENCE (MSC) IN FOREST BIOLOGY)
SEPT2010- NOV 2013
UNIVERSITY OF GUYANA AND (COL: ROM AND UOFT, CANADA) GEORGETOWN, GUYANA

TURKEYEN CAMPUS
Thesis: **Impacts of environmental degradation on fish assemblage structure in the Upper Mazaruni River Basin, with description of their community structure and habitat requirement, Guyana, South America**
Advisors; Dr. Hernan Lopez, University of Toronto and Royal Ontario Museum, Canada and Dr. A. Ansari, Mr. P. Da Silva; Faculty of Natural Sciences, University of Guyana

INT'L DIPLOMA PROJECT MANAGEMENT **APRIL–AUGUST 2010**
EDEX U.K. AND UNITED KINGDOM
ROYAL ACADEMY GEORGETOWN, GUYANA

INTERNATIONAL CERTIFICATE IN MUSEUM STUDIES **2008**
COMMONWEALTH ASSOCIATION OF MUSEUM (CAM) CANADA

TRAINED IN TAXIDERMY AND MUSEUM CONSERVATION **DEC 2008 - 2009**
GUYANA NATIONAL MUSEUM GEORGETOWN, GUYANA
INSTITUTE OF ECOLOGY AND SYSTEMATICS (CUBA) & MINISTRY OF CULTURE, GUYANA)
HAVANA, CUBA
Advisor; Mr. Marco Olcha, Institute of Ecology and Systematics, Cuba

BACHELOR OF SCIENCE DEGREE (BSC BIOLOGY) **2001 - 2005**
UNIVERSITY OF GUYANA GEORGETOWN, GUYANA
Major: Biology *Minor:*Chemistry
Activities: Member of UG football club (Natural sciences).
Major Research: **The effects of *momordica charantia* (karela) and *apium graveolens***

(celery) on high blood pressure and blood glucose levels in laboratory rats.
Supervised by; Dr. Emanuel Cummings, Faculty of Health sciences

Certificate in Laboratory Techniques **May- Sept. 2005**
GOVERNMENT ANALYST FOOD AND DRUGS DEPARTMENT KINGSTON GEORGETOWN
MINISTRY OF HEALTH BRICKDAM, GEPRGETOWN

Guyana Zoo Education Volunteer Certificate April- **Aug 2004**
GUYANA NATIOINAL ZOO GEORGETOWN, GUYANA

Certificate in Ornithological (bird) field and taxidermy Techniques **Aug 2004**
Smithsonian Institute WASHINGTON DC, U.S.A.
Centre for the Studies of Biological Diversity UNIVERSITY OF GUYANA.

EIGTH (8) CARIBBEAN EXAMINATION COUNCIL (CXC) - GENERAL PROFICIENCY LEVEL
1996 – 2001.
ST. JOHN'S COLLEGE. GEORGETOWN, GUYANA
ENG/A-111, MATHS-111, SOC.STUDIES-111, HISTORY-11, BIO-11, AGRI-SCI-11, INTE-SCI-11 AND ENG/B 1V
Awards: Second best graduating student for the year **2001.**
Best graduating student in **Biology, Agriculture Science** and **History** for the year **2001**

Research Projects/ Papers/Publications

Shark identification using DNA barcoding from fin clips in Guyana (in Darft) Oct, 2016

Scoping study for sharks and rays from artisanal fisheries in Guyana (Funded by WWF-Guianas) 2015-2016

Impacts of environmental degradation on fish assemblage structure in the Upper Mazaruni River Basin, with description of their community structure and habitat requirement, Guyana, South America. E. Liverpool (in Draft and review) 2016

Mind the (information) gap: the importance of exploration and discovery for assessing conservation priorities for freshwater fish.
Alofs, Liverpool, Lopez, Bernard & Taphorn **(**Pub) Aug 2013

New species of *Cichlid* (Teleostei: Cichlidae) *Krobia aff. potaroensis* from the upper Mazaruni River drainage, Guyana. Steele, Liverpool and Lopez (Pub) Jul 2013

New species of *Lebiasina* (Ostariophysi: Characiformes: Lebiasinidae) from the upper Mazaruni River drainage, Guyana. reira, Taphorn, Liverpool *etal* 2012 (pub) Jan 2013

Phylogenetic diagnosis and expanded description of the genus *Mazarunia* Kullander, 1990 (Teleostei: Cichlidae) from the upper Mazaruni River, Guyana, with description of two new species
Lopez, Taphorn and Liverpool Pub 2012

Taxidermy and Museum conservation Manuals composed, developed and edited with Cuban Museum Specialist: Mr. Marco Olcha and Elford Liverpool **December 2008-2009**

Formula for Taxidermy Works, Guide to taxidermy classes, Procedure manual for crustacean taxidermy (crab), Procedure manual for crustacean taxidermy (lobster), Procedure Manual for Liquids Collections, Procedure Manual for Preparation of Chelonian (turtles), Procedure Manual for Preparation of Fishes with scale, Procedure Manual for the Preparation of Bats, Procedure manual for preparation of bird for study skins, Procedure manual for reptiles, Procedure manual for Snakes, Procedure manual for taxidermy of amphibians, Procedure Manual for the preparation of Skeletons, Procedure manual for preparation of small mammals, Procedure manual for taxidermy of mammal heads for trophy, Recommendations for the capturing and mounting insects and butterfly,

Recommendations for the conservation of the zoological collections and Recommendations for the Preparation of Shells and Snails, A proposal on the general recommendations for the Guyana National Museum developed by Mr. Marco Olcha and Elford Liverpool.

The effects of *momordica charantia* (karela) and *apium graveolens* (celery) on high blood pressure and blood glucose levels in laboratory rats; this research was done in the aim of suitable alternatives to treat High blood pressure and Diabetes in Guyana using natural plant
extracts that are found locally in Guyana**.** **Elford Liverpool Sept. 2005** (unpublished)

Completion of a **tour guide booklet** for the Guyana National Museum.
It is based on Guyana's Natural history (faunal biodiversity and the taxidermy specimen) and social history collections displayed at the National Museum. (MCYS printed)

Employment/Research Experience

Head, Department of Biology
Management of Biology Department on day to Day basis, Budgeting, Development and Implementation of Programmes, Human Resource management, policy decisions, Examinations.

July 2017-
July2019

Lead Researcher/Consultant NAPPI Reservoir Fisheries Project CI-Guyana
Biodiversity and Fisheries survey for NAPPI Reservoir project, Nappi Village, Region 9, 2019. Fisheries and other biodiversity assessment of reservoir including water quality data collection, Checklist/inventory of species, characterization of habitats. Conservation International Funded Project.
February- April 2019

Museum conservation Workshops
Chief Instructor and Trainer for two workshop programs for Ministry of Culture, Government of Guyana on Museum conservation and preservation techniques for natural history collections (flora and fauna) and ethnographic artifacts (basketry, craft etc) from Amerindians in Guyana. Twenty (20) persons were trained in theoretical and practical work in Care for Museum
collections**.** **Novermber-December, 2017**

Co-Lead Researcher: Length Frequency Data Guyana-Suriname-WWF Guianas
Development of protocols for length frequency and size at maturity data for commercially important fish species in Guyana and Suriname. Coordination of data collection for Guyana in collaboration with Tomas Williams in Suriname.
August 2017-2018

Museum conservation Workshops
Chief Instructor and Trainer for two workshop programs for Ministry of Culture, Government of Guyana on Museum conservation and preservation techniques for natural history collections (flora and fauna) and ethnographic artifacts (basketry, craft etc) from Amerindians in Guyana. Twenty (20) persons were trained in theoretical and practical work in Care for Museum
collections**.** **Novermber-December, 2016**

Public Presentation: Sharks and Rays
Scoping study for sharks and rays from artisanal fisheries in Guyana at Muray House Georgetwon, (Funded by WWF-Guianas)
November, 2016

Executive Board Member Wildlife Scientific Authority (CITES) Board
Aid in policy decision making for wildlife studies and related issues in Guyana. Monitoring of permits and wildlife related activities in Guyana. **January 2016-present**

Lead Researcher: Dry season Field Survey and data collection on mining impacts on fishes and food web ecology in mid and lower Mazaruni River, region 7 Guyana.
Project in collaboration with IDB-UGSTSP, ROM Canada, Auburn University USA, WWF-

Guyana, GGMC and EPA Guyana. **July- August, 2016**

Temp. Marine Officer: WWF-Guiana
Temporary staff with responsibility for the marine programs in Guyana. Assist with completion for two sets of proposals (SRJS & EU MPA/MSP) and WWF country programs and budgets. Interacted with stakeholder's including Department of Fisheries, Protected Areas Commission, CI-Guyana, FAO and other NGOs for successful participation and implementation of projects related to the Marine Sector.

May-July, 2016

Lead Researcher: Wet season Field Survey and data collection on mining impacts on fishes and food web ecology in mid and lower Mazaruni River, region 7 Guyana.
Project in collaboration with IDB-UGSTSP, ROM Canada, Auburn University USA, WWF-Guyana, GGMC and EPA Guyana. **March- April 6, 2016**

Identification and survey of Sting Rays on the Coast of Guyana
Survey of Sting Ray diversity on the Coast of Guyana using various gear types (with Mohini Sooklall. **Sept-2015-May, 2016**

Estuarine Fish Diversity project
Seasonal variations in diversity of Fishes in the estuarine of the Demerara and atlantic coast Guyana. (with Ajuba Clarke) **Sept-2015-May, 2016**

WWF-Guyana: Survey of Sharks and Rays landed at fisheries sites on the coast of Guyana
General survey including questionnaire instrument, shark and ray identification, collection of socio-economic data and morphometric data and DNA samples from sites in Region 2, 3, 4, 5 and 6.

June-July, 2015

Awardee: IDB-University of Guyana Science and Technology Support grant (33,000 USD)
Impacts of Mining on Fish Community Structure and trophic levels (diet) using stable isotopes in the Lower Mazaruni River basin, Guyana. Donald Taphorn, Royal Ontario Museum Canada, Hernan Lopez-Fernandez, Royal Onatrio Museum Canada and University of Toronto; Jon Armbruster, Auburn University USA, Abdullah Ansari, University of Guyana; World Wildlife Funds (WWF)-Guyana, EPA-Guyana, GGMC-Guyana. **June 2015- Present**

Lead Researcher-Guyana Gold Fields
Assessment of Stream Health and mercury analysis of macro-invertebrates and fishes of the Cuyuni River, Guyana. Guyana Gold Fields **June-July 2015**

Co-Lead Researcher-Estuarine and Marine fisheries Survey
Survey of Freshwater, Estuarine, and Marine fishes of Demerara and coast of Guyana; In collaboration with CSBD, ROM and University of Toronto, Canada. **March-April, 2015**

Researcher: WWF-Guyana and Global Wildlife Conservaion

Assessment of stream health and fishes of the Konawaruk and Mazaruni rivers and Exploration of Upper Berbice river. Sampling of fishes and marco-invertebrates using various methods and techniques and recording water quality data. Collection of tissue samples for Mercury analysis from fishes in all locals. Assessment of habitat and technical report writing and submissions.

Sept 1-30, 2014

Amaila Falls Consultancy: Assistant Research Consultant: WWF and IDB

Lead by Prof. Donald Taphorn, this exercise embarked on collection of specimens for newly described *Characiduim amaila* fish species from the Amaila falls and ecological habitat data to better understand their population genetic structure and habitat requirement needs, to assess other potential habitats that will reduce any impacts of dam construction on species population of this fish species, and to provide strong recommendations to mitigate any threats from such projects. This is to assist with the implementation and construction of the Amaila hydroelectric dam on the Kuribrong river, Guyan**.** **March to April 2014**

Scientific Officer/Lecturer

University of Guyana, Faculty of Natural Sciences, Department of Biology; teaching Taxonomy, ecology, biostatistics, biodiversity surveying techniques to Biology Undergraduate students. Aslo works on verification of specimens for export from field researches in Guyana at the CSBD with collaborations with the EPA and CITES Deparments. Supervision of Undergrad final year projects.

September 2013-present

Amaila Falls Consultancy SITHE Global: Assitant Research Consultant

This excercise embarked on collection of specimens for newly described *Characiduim* and *Lebiasina* fish species from the Amaila falls and ecological habitat data to better understand their population genetic structure and habitat requirement needs. This is to assist with the implementation of the next phase for the construction of the Amaila hydroelectric dam on the Kuribrong river**.**

April-May 2013

Teaching assistant (TAs) for **Ornithology** and **Herpetology** studies at **Camp Seywao, Linden Highway** to University biology students. This involved trapping using various methods, collecting, Taxonomy: identifying species and environmental impact such as food resources, human impact etc. and methods in preservation of specimen. **March 2013**

Project Manager and Coordinator:

The preparation and launching of a Museum Mobile and School Loan Programme for the

Guyana National Museum and schools around Guyana; The programme involved taking Museum exhibits to schools and uses them as teaching aids in classrooms with work sheets. It also aims to promote museum awareness and preserve our cultural heritage in Guyana.

February 2013

Government Chief Museum Rep.
Cross-Border Network of Amazonian Museums Conference and meeting win Suriname, French Guiana and Brazil to assess the situation of Museums across the region and to establish bi-lateral and concrete agreements with these neighbouring countries. Presentation was done on Museums and our cultural programmes in Guyana to the audience. **December 2012**

Teaching assistant (TA): for **Mammology** and **Ichthyology** studies at **Chikabaru- Region 10** to University biology students. This involved trapping using various methods, collecting, identifying species and environmental impact such as food resources, human impact etc. and preservation of museum specimens (fishes and small mammals). **November 2012**

Chief Instructor and coordinator for The Children's Taxidermy Camp 2012: at the Guyana National Museum. It involved lessons and practical work on wildlife biodiversity, environmental problems and taxidermy preparation of simple specimens along with roles of Museums. Organizations involved are Iwokrama, University of Guyana, Centre for the Study of Biodiversity, and the Environmental Protection Agency. **July- August, 2012**

Project Planner: Annual Immigration exhibition at the Guyana National Museum
The objectives of the exhibition are: to highlight the Cultural Impacts of Indentured Immigrants since their arrival to Guyana, to develop a program of activities that would promote Cultural Diversity in Guyana using the Indentureship Experience and to commemorate the arrivals of the Chinese, Portuguese, East Indian and African Immigrants to Guyana. **May 2012**

Training in Data and Statistical Analysis:
During the period April to June 2012, worked on data analysis for ecological data collected over the past four years for Habitat requirement for Fish fauna of the Upper Mazaruni river basin Guyana. Training involved preparation of data for CANOCO (Canonical Correspondence Analysis), ANOSIM (Analysis of Similarity) and DFA (Discriminant Function Analysis); to test the effects of environmental variables on fish community structure as a result of mining activities in the Mazaruni Region. **ROM Canada** **April to June 2012**

Coordinator/facilitator: preparation and launching of Ministry of Culture Mash Exhibition at the Guyana National Museum as part of our public programmes for educational development. It was the sixth successful exhibition held as part of our annual programme of activities. **February 2012**

Chief Researcher
Research and Ecological survey of fishes in the upper Mazaruni basin and its tributaries

The research focused on the sampling of all fishes in various reaches of the Upper Mazaruni river basin with ecological data between and including Kukui, kako, waruma, piakwa and kamarang rivers and Assessing species richness and abundance of the fish fauna of the upper Mazaruni river basin, Museum specimen collections etc. This was collaborated with the CSBD University of Guyana, the Guyana National Museum, and Royal Ontario Museum, Canada

November 2011

Country Supervisor:
Supervisor for Commonwealth Association of Museum Internship Exchange Programme between Guyana and Canada; Intern Ms. Renee Homiak from Canada for six months internship in Guyana at several Government Museums. The focus was on developing public programming and conservation for Museums. Oct 2010 to April 2011

MSc research and Ecological survey of fishes in the upper Mazaruni basin and its tributaries
The research focused on the sampling of all fishes in various reaches of the Upper Mazaruni river basin with ecological data between and including Kukui, kako, waruma, piakwa and kamarang rivers and Assessing species richness and abundance of the fish fauna of the upper Mazaruni river basin; Museum specimen collection. This was collaborated with the CSBD University of Guyana, the Guyana National Museum, and Royal Ontario Museum, Canada

March 2011

Coordinator/facilitator: preparation and launching of Ministry of Culture Mash Exhibition at the Guyana National Museum as part of our public programmes for educational development. Feb, 2011

Coordinator/facilitator: preparation and launching of Curio shop at the Guyana National Museum: The shop served to provide additional services for visitors to the Museum as part of a visiting experience. **December 2010**

Coordinator and Organizer: Mexican Exhibition for the Mexican Embassy and the Ministry of Culture, Youth and Sport and National Museum. November, 2010

Coordinator and Organizer: Annual Chinese Exhibition for the Embassy of the People Republic of China and the Ministry of Culture, Youth and Sport.
September 2008 to 2010

Coordinator: Children's Taxidermy Camp 2010: at the Guyana National Museum. It involved lessons and practical work on wildlife biodiversity, environmental problems and taxidermy preparation of simple specimens along with teaching students about roles of Museums. Organizations involved are Iwokrama, University of Guyana, Centre for the Study of

Biodiversity, National Trust and the Environmental Protection Agency.

July-August, 2010

Coordinator Museum Policy Committee:
The objective is to develop and implement a National Museums of Guyana Policy and a Museum Act for all Museums in Guyana. June, 2010- present

Project Manager /Coordinator: Cartographic Museum/map room project, Guyana National Museum, Ministry of Culture, Youth and Sport. The aim was to establish a Map/Cartographic Museum to display Guyana's cartographic heritage, boundary disputes etc from the 1500s to current. Sept 2009 to May, 2010

Coordinator and Organizer: Russian Exhibition for the Embassy of Russia and the Ministry of Culture, Youth and Sport Titled: '*'the Great Patriotic War"* at the Guyana National Museum May 2010

Coordinator/facilitator: Annual Immigration exhibition at the Guyana National Museum. The objectives of the exhibition are: to highlight the Cultural Impacts of Indentured Immigrants since their arrival to Guyana, to develop a program of activities that would promote Cultural Diversity in Guyana using the Indentureship Experience and to commemorate the arrivals of the Chinese, Portuguese, East Indian and African Immigrants to Guyana. **May 2010**

Commonwealth Association of Museum executive Board Member and Youth Representative: Assistance in technical advice and planning programmes, conferences etc, Guyana representative **Feb, 2010-present**

Coordinator for the Preparation of the Megatherium: at the Guyana National Museum. All technical planning, monitoring and evaluation and Implementation of Mega-T specimen within the National Museum **Jan-April, 2010**

Technical Assistant/Assistant Lecturer and Co-Researcher to University of Guyana third and final year Biology students. Pibiri forestry concession, Mabura trail, **Ornithology** and **Herpetology** studies; involved teaching trapping using various methods, collecting, identifying/Taxonomy of species and environmental impact such as food resources, human impact etc. and preservation of specimen for Museum collection. **January 2010**

Field Expedition for excavation of Giant Ground Sloth bones: collaboration with: Berkley University, U.S.A, Walter Roth Museum and CSBD University of Guyana.

Oct. 2009

Chief Instructor and coordinator for The Children's Taxidermy Camp 2009: at the Guyana National Museum. It involved lessons and practical work on wildlife biodiversity, environmental problems and taxidermy preparation of simple specimens along with roles of Museums. Organizations involved are Iwokrama, University of Guyana, Centre for the Study of Biodiversity, and the Environmental Protection Agency. **July 07- August 07, 2009**

Coordinator- Annual Indentureship exhibition, mounted at the Guyana National Museum, highlighting Guyana's Cultural heritage. This exhibition focused on the arrival of Indentured Immigrants to Guyana after the abolition of Slavery. Objectives were to highlight the Cultural Impacts of Indentured Immigrants since their arrival to Guyana, to develop a program of activities that would promote Cultural Diversity in Guyana using the Indentureship Experience, to increase the public`s awareness on the in-depth history of Indentured servants, to assess the impacts of European influences on Guyana. **May 2009**

Commonwealth Association of Museums (CAM) student; the Program is a distance learning program with CAM, involves Museum management, conservation, preservation and restoration and managing visitors to the museum. **April 2009**

Project Manager and coordinator Giant Sloth/Megatherium Project and Recon Field Expedition: responsible for laying out and setting up giant sloth exhibit at the Guyana National Museum and to develop further research in the paleontology and paleobiology areas.
March 2009

Administrator, Taxidermist and Curator (Guyana National Museum): involves managing the National Museum on a day to day basis, financial transactions and budget preparation for National budget for the Museum, planning and executing programme of activities etc
October, 2008-present

Technical Assistant to University of Guyana third and final year Biology students. Chikabaru forestry concession, Ituni trail, region 10, **Ornithology** and **Herpetology** studies; involved trapping using various methods, collecting, identifying species and environmental impact such as food resources, human impact etc. and preservation of specimen for Museum collection.
February 2009

Global Information system (GIS), Global Positioning System (GPS), MapInfo software program training; involves reading of Maps, using of spatial data in map Software, creating maps, and taking coordinates for input.
Guyana Geology and Mines (GGMC) **Jan 2009.**

Taxidermist/Conservator; Completion of a one year training on museum conservation, preservation, restoration and taxidermy and taxonomy; Tr ainer and facilitator: Cuban Museum Specialist and Taxidermist- Mr. Marco Anthonio Olcha; from the Institute of Ecology and Systematics, Cuba. **Dec 2007- Dec 2008.**

External Supervisor/Assessor/Examiner- Faculty of Natural sciences, University of Guyana, Final year Biology Students Research presentations at **Conservation International conference room.** This involved analysis research data presented by research students and grading them according to preparation, content, knowledge and skills, response to questions asked etc. The following researches were examined: A survey of the Avifauna diversity at OMAI Gold Mines Ltd, A survey of the Herpetofauna diversity at OMAI Gold Mines Ltd, To investigate the fecundity rates in *Poceila sp* during capitivity, A study of Oma ponds as a

traditional Natural Resource Management Approach in the North Rupununi, Guyana, Survey of mammals in gallery forest of the Upper Rupununi River, Guyana, Optimizing in-vitro growth for cellulytic bacteria from the cattle rumen, Pilot investigation of the possible anticarcinogenic effects of local fruits on Leukemia, Study of the aquatic Macro-invertebrate community at the Yararibo lake system, Mc Kenzie, Linden, Guyana, A investigative study on primates in the Iwokranma forest conservation. **July 30-September 11, 2008.**

Co-researcher/Assistant supervisor- field survey on 'hassar' Loricariidae catfishes in the Mahaicony conservancy area using drag seining techniques and collecting museum specimens to enhance the national collection. This study is to assess the economic importance of the hassar in Guyana. **August 22, 2008.**

Co-researcher/assistant supervisor- ecological and species diversity survey of fishes at Lake Mainstay Essequibo, Guyana. This research involved the surveying of fishes in the lake using methods of drag seining, gill netting and hand netting. Water parameter tests were conducted on PH, temperature, depth and range finder, along with GPS coordinates. Diurnal and nocturnal surveys were done over a three days period. **Aug 15-17, 2008.**

External Assessor/Examiner- Faculty of Natural sciences, University of Guyana, Final year Biology Research presentations at Conservation International conference room. This involved analysis research data presented by research students and grading them according to preparation, content, knowledge and skills, response to questions asked etc. **July 30, 2008.**

Assistant supervisor/Co-Reasercher: biodiversity survey on avifauna and herpetofauna studies for reclamation project OGML, Omai Gold Mines Limited and environmental effects. Assisting University of Guyana Final year biology students in field techniques and writing criterias for their final year research projects, in addition preparation of ornithological museum study skins and museum wet collections of herpetofauna. **June18-25, 2008**

Cheif/ Head Researcher: Faunal diversity survey and Impact Assessment**,** The Amaila Falls Transmission line Hydropower Alignment project. Assessing and analysing faunal data and reporting on such in relation to environmental impact and checklist on fauna etc.
Potaro region, Guyana, South America **May 2008**

Co-Researcher/Assistant Researcher: Ichthyofaunal survey of the Upper Mazaruni River, **Guyana, South America.** The research focused on the sampling of all fishes in various reaches of the Upper Mazaruni river basin between and including Kukui, kako, waruma, piakwa and kamarang rivers and Assessing species richness and abundance of the fish fauna of the upper Mazaruni river basin; Museum specimen collection. This was collaborated with the CSBD University of Guyana, the Guyana National Museum and Royal Ontario Museum, Canada
14- 25 April, 2008.

Teaching assistant (TA): for **Mammology** and **Ichthyology** studies at **Pibrie- Mabura area** to University biology students. This involved trapping using various methods, collecting, identifying species and environmental impact such as food resources, human impact etc. and preservation of museum specimens (fishes and small mammals). **4-7, April 2008.**

Assistant supervisor/Co-Reasercher: biodiversity survey on avifauna and herpetofauna studies for reclamation project OGML, Omai Gold Mines Limited and environmental effects. Assisting and teaching University of Guyana Final year biology students field techniques and writing criterias for their final year research projects**.** **Feb 27- March 5, 2008.**

Anthropological (Scientific) Officer and Taxidermist at the **Guyana National Museum**, chief functions and protocols involves head of taxidermy department with a supervisory roles and responsibility for anthropological assistants and duties thereof to the department. Responsibility for planning and coordinating field works for specimen collections, analysing the data for biological and other natural history specimens in the museum laboratory and providing updated information on Natural history (biodiversity) aspects, preparation of scientific study skins and mounting of taxidermy specimens. Cleaning, conservation, preservation and restoration of natural history collections a.g. Deputy to Administrator with duties of management at the National Museum among many other assigned duties which includes lectures and tour guides to various organisations, schools and the general public. **June 2007 – October 2008**

Assistant and external supervisor;
Supervisory role to students at the University of Guyana with respect their final year research projects. Involves identification and classification of biological specimens along with relevant information and approaches in analysis of data. **2005 –present**

Teaching Assistant (TA)
Mammology and **Ornithology** studies TA at **CEIBA** for University biology students. This involved trapping using various methods, collecting, identifying species and environmental impact such as food resources, human impact etc. and preservation of specimen for Museum collection. **Nov 16- 19 2007**

Assistant supervisor/ researcher on final year research project to University of Guyana student: studies based on the use of entomology or insects in forensic studies. Done by; C. Horatio. **July - Oct. 2007.**

Chief Instructor and deputy coordinator for The Children's Taxidermy Camp 2007 at the Guyana National Museum. It involved lessons and practical work on wildlife biodiversity, environmental problems and taxidermy preparation of simple specimens along with roles of Museums. Organizations involved are Iwokrama, University of Guyana, Centre for the Study of Biodiversity, and the Environmental Protection Agency.

July 07- August 07, 2007.

Teaching assistant (TAs) for **Mammology** and **Ichthyology** studies at **CEIBA** to University biology students. This involved trapping using various methods, collecting, identifying species and environmental impact such as food resources, human impact etc. and preservation of specimen for Museum collection. **April 2007.**

Research field assistant on **Ornithology** studies and **bird museum** (wet and dry) collections at Paurima and Holitipu, Upper Mazaruni region #7. This included preparation of specimens, trapping of birds, identification of birds. **Feb-March 2007**

Teaching assistant (TAs) for **Ornithology** and **Herpetology** studies at **CEIBA** to University biology students. This involved trapping using various methods, collecting, identifying species and environmental impact such as food resources, human impact etc. and preservation of specimen. **Nov 2006**

Head faunal researcher/Assistant researcher for **Environmental Impact Assessment** (EIA) on floral and faunal studies at Guyana gold fields, Aurora, Upper Cuyuni River**.** **Oct. 2006.**

Research field assistant on **floristic studies** and sample collections at Kaieteur National Park, Amatuk, Madahia, Eagle Mountain and Micobe. This was done in Collaboration with Smithsonian Institute and Centre for the Study of Biodiversity. **August- sept. 2006.**

Head faunal researcher/Assistant researc her for **Environmental Impact Assessment** (EIA) on floral and faunal studies at Guyana gold fields, Aurora, Upper Cuyuni River**.** **July 2006.**

Assistant researcher for **Environmental Impact Assessment** (EIA) on baseline study of aquatic environment at Yararibo old mines Omai bauxite mining inc. (OBMI) Mc Kenzie, Linden. **June 2006.**

Teaching assistant (TAs) for **Ichthyology** studies at CEIBA to University biology students. This involved trapping using various methods, collecting, identifying species and environmental impact such as food resources, human impact etc. and preservation of specimen. **April 2006.**

Centre for the Studies of Biological Diversity Volunteer/ researcher; involves local field research, expeditions, techniques in trapping, DNA and Tissue sampling, Study of Biodiversity and ecological studies, Museum techniques and preparation of Museum Specimens, training of Biology students, research with Smithsonian Institute and Royal Ontario Museum, Auburn University, and Texas A&M university. **Jan. 2006-present.**

Research field assistant on **ichthyology** studies/survey and sample collections at Iwokrama, Annai, Piarra, Takutu river, Ireng river, Kurupukari and upper Essequbo River. This involved trapping using various methods, collecting, identifying species and preservation of specimen. **Nov-Dec. 2005.**

Teaching assistant (TAs) for **Mammology** and **Ichthyology** studies at CEIBA to University biology students. This involved trapping using various methods, collecting, identifying species

and environmental impact such as food resources, human impact etc. and preservation of specimen. **Nov 2005.**

Ministry of health: Government Analyst Food and Drugs Department. Work study attachment, functioning as **Laboratory technician** in the department of food chemistry, water chemistry, microbiology. **Jul-Sept. 2005.**

Teaching assistant (TAs) for **Ornithology** and **Herpetology** studies at CEIBA to University biology students. This involved trapping using various methods, collecting, identifying species and environmental impact such as food resources, human impact etc. and preservation of specimen for Museum collection. **Apr. 2005.**

Faunal researcher/Assistant researcher for **Environmental Impact Assessment** (EIA) on floral and faunal studies at Guyana gold fields, Aurora, Upper Cuyuni River**.**

Jan. 2005.

Teaching assistant (TAs) for **Ornithology** and **Herpetology** studies at CEIBA to University biology students. This involved trapping using various methods, collecting, identifying species and environmental impact such as food resources, human impact etc. and preservation of specimen for Museum collection. **Nov 2004.**

Ornothological field and taxidermy training: this involved the field techniques in trapping, taxonomic identification of birds, taxidermy-skinning, preservation of skins and stuffing, Preparation of bird reference collections for museums. **Aug. 2004.**

Guyana Zoo education volunteer: include giving informal cage side talks, guided zoo tours, and policing the zoo and giving factual information on animals in the zoo

Jun 2004-present.

Contributing Researcher to the development of the Bird checklist of Guyana, Herpetofauna and Mammalian fauna Checklist of Guyana. Jan 2004 to Present

Ministry of health: Work study attachment at the **Georgetown Public Hospital** in **Orthopaedic clinic**, duties include setting and casting of broken bones and removal of casts.

Jul-Aug. 2001.

Current/Pass Project Supervision: BSc students

Adele Elcock, The effects of various nutrient types on the rate of eutrophication ex situ.

Ajuba Clarke, Survey, seasonal diversity and diet of Estuarine and Marine fishes from the Demerara and its immediate coast.

Mohini Sooklall, Survey of Sting Ray diversity on the Coast of Guyana using various gear types.

Mohinder Deven Itwaru; To investigate the effects of applying different sources of animal manure on the yield and growth rate of tomatoes (Solanum lycopersicum) plants grown Geoponically.

Bhagmadai Sooku; Bio-survey on water quality and fishes in central Georgetown, with assessment of morphology, diet and heavy metal content in tissues of selected species.

Ferial Pestano; An investigation on entamo-pathogenic fungus found on insects at the University of Guyana campus. (Main Supervisor: Prof. A. Ansari)

Jenelley Lewis; The effects of brewery wastewater on tilapia sp at Banks DIH ltd.

Nichloas Ali; Investigating the efficiency and effectiveness of the wastewater treatment at the Banks DIH wastewater treatment plant.

Mark Bastian; Variations of microbiota found in the alimentary canals and on the external bodies of Rhinella marina toads within rural and surban areas. (Main Supervisor: Prof. A. Ansari)

Devya Hemraj; The effects of Neme and pronto on tadpoles and paddy bugs in rice fields of Guyana. (Main Supervisor: Ms. Jewel Liddel)

Kellisha Edwards, Topic: Quantitative Analysis of Heavy Metals in Sugar Cane (*Saccharum officinarium*) in Administrative regions (three, four and six) of Guyana. **Lab analysis**: testing sugar cane samples (stem, roots and leaves) for the presence of **heavy metals** which includes **Cadmium (Cd), Copper (Cu), Lead (Pb), Nickel (Ni), Iron (Fe)** and **Cobalt (Co).**

Lokaya Wrights, Topic: Phytoremediation and Adsorption of contaminated water using Duckweed (*Lemna minor*) and Coconut (*Cocos nucifera*) shell Biochar. **Lab analysis**: test for **Iron, Lead** and **Manganese** in Coconut Biochar and Duckweed samples.

Sueellen Ewing-Chow, Topic: Gastrointestinal and external Parasites found among Monkeys in captivity at the Guyana National Zoological Park

Radha Permaul, Topic: Oil content in selected species of algae in Guyana. **Lab analysis**: measuring the rate of growth and biomass (density) of algal species samples and testing for the amount of oil generated from the various algae species grown under different conditions.

Curtly Critchlow, Topic: The prevalence of Helminths found in cattle and pigs that are slaughtered at the Georgetown Abattoir**.**

Vishaul Bhryo, Topic: An ecological study of the Rufous Crab Hawk (Buteogallus aequinoctialis) and the effects of anthropogenic activities on their habitats along the Coast in Regions 3 and 4, Guyana.

Pryia Singh, Topic: To investigate microbiological organisms that is common among selected fruits and vegetables in local markets.

Tameka King; A survey of the Avifaunal diversity at OMAI Gold Mines Ltd (Main Supervisor: Mr. C. Bernard) 2008

Rydel Moore; A survey of the Herpetofauna diversity at OMAI Gold Mines Ltd (Main Supervisor: Mr. C. Bernard) 2008

Odile Broomes; Mammalian Diversity in mined and non-mined sites at at Yararibo old mines Omai bauxite mining inc. (OBMI) Mc Kenzie, Linden. (Main Supervisor: Mr. C. Bernard) 2008

Romeo Singh; Survey on 'hassar' Loricariidae catfishes in the Mahaicony conservancy area (Main Supervisor: Mr. C. Bernard) 2008

Roschelle Grant; Ecological and species diversity survey of fishes at Lake Mainstay Essequibo, Guyana (Main Supervisor: Mr. C. Bernard) 2008

Candace Horatio; The use of entomology or insects in forensic studies (Main Supervisor: Mr. C. Bernard) 2007

Conferences/Seminars/Training Courses/Workshops

Public proposal Presentation

Impacts of environmental degradation on fish assemblage structure in the Upper Mazaruni River Basin, with description of their community structure and habitat requirement, Guyana, South America by Elford Liverpool **March 2013**

Attended Training programs in Supervisory Management at Public Service Ministry
June, 2010

Glimpses of Amazonia: A display and celebration of Amerindian heritage Month 2009. Walter Roth Museum of Anthropology.
Sept 15, 2009

Introduction to the taxonomy of amphibians of Kaieteur National Park, Guyana, By Philippe Kok and Michelle Kalamandeen,
Sept 2009

Three part lecture series, Walter Roth Museum of Anthropology**, Umana Yana**
August, 2009

The Launching of Kaieteur National Park Management Planning Process, Dr. Graham Watkins
A celebration of Kaieteur by: Mr. Bobby Fernandes. **June 25, 2009**

Conference: Theme; Communities and Ecological Sustainable Development;

- **The Guiana Shield Initiative project- Lesson of Iwokrama;** Dr. Raquel Thomas
- **Galapagos-Both sides of the coin;** Dr. Graham Watkins

April 22, 2009.

GIS, GPS and MapInfo training; Guyana Geology and Mines Commission
Jan 2009.

Taxidermy, Museum conservation, preservation and restoration training at the Guyana National Museum
Training executed by Mr. Marco Olcha, Cuban Museum specialist.
Dec 2007-Dec 2008.

A survey of the Avifaunal diversity at OMAI Gold Mines Ltd: by Ms. Tameka King**.**
September 11, 2008.

A survey of the Herpetofauna diversity at OMAI Gold Mines Ltd: By Mr. Rydel Moore.
September 11, 2008.

To investigate the fecundity rates in Poceila sp during capitivity. By; Ruth Rampersaud.
September 11, 2008.

A study of Oma ponds as a traditional Natural Resource Management Approach in the North Rupununi, Guyana. By; Diana Seecharan.

July 30, 2008.

Survey of mammals in gallery forest of the Upper Rupununi River, Guyana. By Ms. Diana Singh. **July 30, 2008.**

Optimizing in-vitro growth for cellulytic bacteria from the cattle rumen. By; Padmini Ragnaugth. **July 30, 2008.**

Pilot investigation of the possible anticarcinogenic effects of local fruits on Leukemia. By; Seleyna Headley. **July 30, 2008.**

Study of the aquatic Macro-invertebrate community at the Yararibo lake system, Mc Kenzie, Linden, Guyana. By; Crissaundra Mohabir.

July 30, 2008.

An investigative study on primates in the Iwokranma forest conservation: CI conference room. June 2008.

Museum development workshop at the Guyana National Museum, Lecture room. Aspects on history, management and maintenance of the museum were scoped, along with staff development, approach to the visiting public, museum conservation and policies, it also entaled museum education and preservation principles.
PREPARED AND PRESENTED BY: MS. T. BOATSWAIN

Dec. 11- 14, 2007.

INTERNATIONAL CONFERENCE ON THE STATUS OF BIOLOGICAL SCIENCES IN THE CARIBBEAN AND LATIN AMERICAN SOCIETIES: HOSTED BY THE DEPARTMENT OF BIOLOGY, FACULTY OF NATURAL SCIENCES, UNIVERSITY OF GUYANA AT BUDDY'S INTERNATIONAL HOTEL, PROVIDENCE.

September 24- 25, 2007

ASSISTANT AT THE CHILDREN'S ZOO CAMP: FACILITATED BY THE GUYANA NATIONAL ZOO AND WORLD'S WILDLIFE FUNDS (WWF): HOSTED BY **DR. FELIX (WWF**), TOPICS INCLUDED MARINE TURTLES, THEIR STATUS, AND CONSERVATION POLICES AND STRATEGIES. **September 22- 23, 2007**

Presentation on the floristic studies in selected regions of Guyana. By Dr. K. Redden Jan, 2007.
.

Guyana Zoo education volunteer training: Jun-Aug 2004.

Centre for the studies of Biological Diversity Volunteer training.

Jan. 2006-Present.

Training on basic laboratory techniques: Government Analyst Food and Drugs Department. **Jul-Sept. 2005.**

Ornothological field and taxidermy training: CSBD and Smithsonian Institute Aug. 2004.

Laboratory work on sample/specimen collections from field expeditions/works and other researches done in Guyana 2004- Present.

Skills

Basic Electronics, Carpentry, Masonry, Computer (Excel, Word, PowerPoint, Publisher and more), Moulding and casting, tanning etc.

Hobbies

Football, cricket, swimming, running, meeting and interacting with people, music, studying, life guarding etc.

Reference

PHILIP DA SILVA - Senior Lecturer, University of Guyana, Tain Campus, Berbice.

DR.HERNANLOPEZ FERNANDEZ- Assistant Professor, Department of Ecology and Evolutionary Biology, University of Toronto, Canada and Curator, Royal Ontario Museum, Toronto Canada.

DR. NATHAN LUJAN- NSF International Fellow, Royal Ontario Museum, Toronto Canada

DR. JAMES G. ROSE - Director of Culture, Department of Culture, Ministry of Culture, Youth and Sport

PROF. ABDULAH ANSARI- Professor, Department of Biology, Faculty of Natural Sciences, University of Guyana.

CURRICULUM VITAE

Gyanpriya Maharaj
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E-mail: gyanpriya.maharaj@uog.edu.gy

EDUCATION

Ph.D. (2016) Biology; focus areas: Evolution, Ecology, Behaviour and Systematics, University of Missouri St. Louis, USA. Dissertation: Colour-mediated foraging by pollinators: A comparative study of two passionflower butterflies at *Lantana camara*.

M.Sc. (2011) Plant and Environmental Sciences (By Research), University of Warwick, UK. Thesis: The biodiversity and ecology of the butterflies of the Iwokrama Rainforest Reserve and the communities of the North Rupununi District, Guyana, South America.

Dip. at Professional Level (2006) Cambridge International Diploma for Teachers and Trainers. University of Cambridge, UK.

B.Sc. (2005) Biology, University of Guyana. Thesis: The effects of soil water on sucrose level in sugar cane varieties in Guyana.

PROFESSIONAL EXPERIENCE

Director (2017-Present); Centre for the Study of Biological Diversity (CSBD), University of Guyana.
Manage all administrative and training activities of CSBD; oversee student interns, research grants and specimen identification, verification and curation, co-coordinator of student volunteer programme, and in country manager of all externally funded projects involving the CSBD.

Lecturer (2017- Present); Department of Biology, University of Guyana.
Courses: Genetics and Evolution (BSc Level), Special Topic Essays (MSc Level), Undergraduate and Graduate research advisor in Faculties of Natural and Health Sciences. Research examiner in BSc Biology, Chemistry, Environmental Sciences, MSc Forest Biology and PhD Biodiversity.

Coordinator (2017-2018, 2019-2020); MSc Forest Biology programme, University of Guyana.
Courses: Special Topic Essays and Biometrics. Manage all incoming and current students, assist in proposal and thesis preparation, presentation and examination, and mentorship of students.

Visiting graduate student researcher (2016); Ware Lab, Rutgers University, USA.
Research: Geneflow of select butterflies of South and Central America.

Graduate student researcher (2015-2016); Missouri Botanical Gardens, Butterfly House, USA.
Research: Foraging behaviours of butterflies.

Teaching Assistant (2014– 2016); University of Missouri St. Louis, USA.
Course: Human Anatomy and Physiology.

Research Assistant (2013– 2015); Dunlap Lab, University of Missouri St. Louis, USA.
Research: Colour tracking in bumble bees.

Field researcher (Entomologist) (2011 – 2012); World Wildlife Fund Guianas, Guyana.
Projects: General insect surveys of Kaieteur National Park. Survey of selected Wetland sites throughout Guyana.

Principal Investigator and Field Researcher (2011-2016); CEIBA Biological Center, Guyana.
Projects: Survey of butterflies of CEIBA. Study of fruit feeding preferences by Nymphalid butterflies. Study of time activity budgets and temporal ambient temperature variations and its correlation with thoracic temperatures and abundance across butterfly families, genera and species. Colour mediated foraging of passionflower butterflies.

Scientific Officer (2009 – 2016); Centre for the Study of Biological Diversity, University of Guyana.
Courses: Entomology, Systematics and Vertebrate Zoology. Other duties: Specimen identification, verification and cataloguing, and management and curation of museum and herbarium specimens.

Assistant Lecturer (2007-2009); Department of Biology, University of Guyana.
Courses: Introductory Biology, Entomology, Systematics and Vertebrate Zoology.

Researcher and Team Lead (biodiversity surveys) (2007-2009); Iwokrama International Centre for Rainforest Conservation and Development and University of Guyana.
Darwin Initiative Project (ref. 15/013), Biodiversity survey of butterflies of Central Guyana and Sustainable butterfly farming in the Rupununi Savannas.

Part-time Lecturer (2006); Department of Agriculture, University of Guyana.
Courses: Zoology

Part-time Teacher (2005-2007), Queen's College.
Classes: Integrated Sciences and Biology

SELECT PUBLICATIONS & CONFERENCES

Journal Articles

Stoll, E., Roopsind, A., **Maharaj, G.**, Velazco, S., & Caughlin, T. T. (2022). Detecting gold mining impacts on insect biodiversity in a tropical mining frontier with SmallSat imagery. Remote Sensing in Ecology and Conservation.

Dasrat, C. M., & **Maharaj, G.**, 2021. Biological control of mosquitoes with odonates: A case study in Guyana. Nusantara Bioscience, *13*(20): 163-170

Singh, N., Singh. D., **Maharaj, G.**, and Persaud M.,2019. The effect of infestation with rice water weevil (Helodytes foveolatus Duval) on the growth and development of rice (Oryza sativa L.) in Guyana. Tropical Agriculture (Trinidad) 96:86-92

Maharaj, G., Winstanley, D. and Bourne, G.R., 2019. Diversity and habitat affinities of butterfly families in Central Guyana South America. Journal of Entomology and Zoology Studies. 7(5): 411-417

Maharaj, G., Horack, P., Yoder, M. and Dunlap, A.S., 2018. Influence of pre-existing preference for color on sampling and tracking behavior in bumble bees. Behavioral Ecology. 30(1):150-8.

Maharaj, G. and Bourne, G.R., 2017. Honest signalling and the billboard effect: how heliconiid pollinators respond to the trichromatic colour changing *Lantana camara* l. (Verbenaceae). Journal of Pollination Ecology, 20(5):40-50

Book Contributions

2021 **Maharaj, G.**, Bourne, G., & Ansari, A. A Review of Floral Color Signals and Their Heliconiid Butterfly Receivers [Online First], IntechOpen, DOI: 10.5772/intechopen.98666. Available from: https://www.intechopen.com/online-first/77291 (Book Chapter)

2020 Guyana SAVE Travel guide. Published by Guyana Tourism Authority. Contributing Author. https://guyanatourism.com/exploreguyana/conservationtravel/savetravel/

2016 State of the Environment Report. Chapter 6- Biodiversity, p251-302. Contributing Author. https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/GUYANA%29%20State%20of%20the%20Environment%20Report%202016.pdf

2012 Wetlands of Guyana. An insight into the Ecology of Selected Wetlands with recommendations from WWF-Guianas. Published by WWF Guianas. Contributing Authors Patrick Williams, Aiesha Williams, Elroy Charles, Calvin Bernard, Oronde Drakes, Waldyke Prince, Sopheia Edhill, Dulcie Abraham, Glenny King, **Gyanpriya Maharaj**, Tameka King. 249 p ISBN 8577155005, 9788577155002.

2009 Butterfly Farming in the Iwokrama Forest and the North Rupununi Region of Guyana, South America – Farming Manual. The Darwin Initiative Project (ref. 15/013). Contributing Author.

2009 An Introduction to the Butterflies of the Iwokrama Forest and the Communities of the North Rupununi District of Guyana, South America. The Darwin Initiative Project (ref. 15/013). Coordinating and Contributing Author.

Recent Conference Presentations, Published Abstracts and Articles

Uzzi, M, **Maharaj, G**, Chesney, C, Daniel, R. 2021. Gender Inclusiveness In The Natural Resources Sector In Guyana: A Focus On Education And Employment. 22nd Biennial CAS conference.

Rampertab, S.K., **Maharaj, G,** Seecharran, D, Hemraj, D. 2020. Road Mortality of Herpetofauna along Selected Roads in Georgetown, Guyana–A Baseline Study. *2020 NCUR Proceedings*. (***Full paper accepted for publication***)

Maharaj, G. 2019. Presentation of the Centre for the Study of Biological Diversity. V International Congress on Biodiversity of the Guiana Shield. Colombia, South America.

Maharaj, G, Wu, Y, Bourne, G. R. 2017. Foraging movement patterns of passionflower butterflies at a long- term feeding patch. Conference: Latin America and Caribbean Congress for Conservation Biology, University of West Indies, Trinidad.

John, R. & **Maharaj, G**. 2017. A comparative study of the behaviour and population density of agoutis in Bartica, Guyana. Conference: Latin America and Caribbean Congress for Conservation Biology, University of West Indies, Trinidad.

Dasrat, C. & **Maharaj, G**. 2017. Biocontrol of mosquito population: exploiting predator-prey relationships between mosquitoes and Odonates. Latin America and Caribbean Congress for Conservation Biology, University of West Indies, Trinidad.

Horack, P, **Maharaj, G**, Dunlap, A. 2014. Sensory bias and environmental tracking in a foraging context in Bumble Bees (*Bombus impatiens*). St. Louis Ecology, Evolution and Conservation (SLEEC) Retreat, Missouri, USA.

Maharaj, G, O'Dean, O & Bourne, G. R. 2013. Temporal ambient temperature variations correlate with thoracic temperatures and abundance across butterfly families, genera and species in Guyana. Published abstract, Poster Participant, SLEEC Retreat, Missouri, USA.

Maharaj, G & Bourne, G. R. 2013. Impacts of temporal and abiotic factors on the time activity budgets of selected butterflies at CEIBA Biological Center, Guyana. Published abstract, Poster Participant, University of Missouri-St. louis Graduate Research Fair, Missouri, USA.

Selected Technical Reports

2020 Technical Report. **Maharaj, G.** Project Title: Achieving a Green State: Building human capacity for natural resource management in Guyana. Submitted to and approved by World wildlife Fund Guianas. Part 2

2020-2019 Technical Reports. **Maharaj, G**. Project Title: Restoring ecosystem functions to degraded mining site in Guyana. Submitted to and approved by Conservation International Guyana.

2018 Technical Reports. **Maharaj, G**, Chesney, C, Uzzi, M, Daniel, R. Project Title: Gender inclusiveness in Science (Departments of Biology, Chemistry, Computer Science and Mathematics/Physics/ Statistics) at the University of Guyana. Submitted to and approved by World wildlife Fund Guianas

2018-2016 Technical Reports. **Maharaj, G**. Project Title: Achieving a Green State: Building human capacity for natural resource management in Guyana. Submitted to and approved by World wildlife Fund Guianas. Part 1

Recent Press Articles

Gyanpriya Maharaj and Anand Roopsind. UG students secure research grant for natural resource management. Kaieteur News, Feb 16, 2018.

Christell Chesney and Gyanpriya Maharaj. First Guyanese for Conservation Leadership in the Caribbean Programme, Guyana Times, May 6, 2018

Matt Hallett, Anand Roopsind and Gyanpriya Maharaj. UG wildlife survey course helped students build practical skills. Stabroek News. May 8, 2018

Gyanpriya Maharaj. Butterflies: Our critical pollinators. Guyana Times, Mar 5, 2017

Anand Roopsind, Fancis Putz and Gyanpriya Maharaj. New Discoveries in Guyana's Forest. Guyana Times, Aug 27, 2017

SELECT GUEST LECTURES

2020, EPA's Facebook Live panel discussion in celebration of World Environment Day. Panelist – hosted by Guyana EPA.

2019, GIPEX. Panelist and moderator.

2018, Gender Inclusiveness in Science Education - a focus on the University of Guyana, Oral presentation at a Gender talk at the University of Guyana. Co-presented with M.Uzzi,

2018, Gender Inclusiveness in Science Education - General Findings in Guyana, Presented at Gender forum conducted by WWF Guianas. Co-presented with C. Chesney.

2018, General Trends in Biodiversity in Tropical Countries, Speaker and Panellist – Turkeyen and Tain Talks 15. Biodiversity and Guyana's Future, University of Guyana (UG).

2017, Science for the Green economy, Invited Speaker - University of Guyana Executive Workshop- The resource-based Economy and Environment: Cooperation and Coordination for Green Growth.

2017, Research in Biodiversity, Invited Speaker – Undergraduate Research Conference, UG.

2017, Women in Science and Engineering, Invited Speaker – Undergraduate Research Presentations and Round Table discussions, UG.

2017, Challenges for Women in Science, Invited speaker – UG's Biology Club, Women in Science Talk, UG.

2016, Passionflower butterflies, *Heliconius melpomene* and *Dryas iulia* prefer flowers that match their wing colours, Keynote Speaker – Inaugural Undergraduate Research Conference, UG

2015, Colour mediated foraging of passionflower butterflies at *Lantana camara*. Invited Speaker – Webster Grove Nature Society, St. Louis Missouri, USA

SELECT GRANTS

Guianas Sustainable Natural Resources Management Project, WWF-GUIANAS, NORAD Grant, 2020. Project Title: Achieving a Green State: Building human capacity for natural resource management in Guyana. Role: In-country coordinator, Part 2.

Internal Global Challenges Research Fund (England), 2019. Project Title: Geospatial capacity building to forecast vulnerability of forest carbon stocks to climate change feedbacks in the Guiana Shield ecoregion. Role: Contributor and in-country project co-coordinator.

Conservation International, NORAD Grant, 2018. Project Title: Restoring ecosystem functions to degraded mining site in Guyana Role: Co-Principal Investigator.

Shared Resources Joint Solutions (SRJS) programme in the Guianas Grant. 2018. Project Title: Gender inclusiveness in Science (Departments of Biology, Chemistry, Computer Science and Mathematics/Physics/ Statistics) at the University of Guyana. Role: Co-Principal Investigator and co-coordinator.

Guianas Sustainable Natural Resources Management Project, WWF-GUIANAS, NORAD Grant, 2017.
Project Title: Achieving a Green State: Building human capacity for natural resource management in Guyana. Role: In-country coordinator.

Idea Wild research grant, 2015
Project Title: Colour-mediated foraging by pollinators: A comparative study of two passionflower butterflies at *Lantana camara*. Role: Principal Investigator.

University of Missouri St. Louis Biology Graduate Student Association Research Grant, 2015
Project Title: Colour-mediated foraging by pollinators: A comparative study of two passionflower butterflies at *Lantana camara*. Role: Principal Investigator.

Rufford Foundation Small Grant for Research, 2014
Project Title: Colour-mediated foraging by pollinators: A comparative study of two passionflower butterflies at Lantana *camara.* Role: Principal Investigator.

SELECT SERVICE

University of Guyana Membership
Women in Science and Engineering, member
University of Guyana Biology Club, Advisor
Faculty Coordinating Committee, member

Professional Membership
National Focal Point for Taxonomy under the CBD 2020-Present
Guyana Wildlife Scientific Committee 2019-Present
Environmental Assessment Board 2019-2020
National Technical Working Group on Data and Statistics 2019-2020
Multilateral Environmental Agreements Committee 2019-Present

AWARDS

2016 Arnold B. Grobman Scholarship, University of Missouri St. Louis
2008 Darwin Scholarship Programme, Field Studies Council UK
2005 John Caesar Plant Physiology Prize, University of Guyana

LANGUAGES

English, native speaker
Spanish, intermediate spoken and written
French, beginner spoken

CURRICULUM VITAE

Rovindra Lakenarine

Cell No. +592 656 0012 Email: rlakenarine@gmail.com/ rovindra.lakenarine@uog.edu.gy

EDUCATION

- MSc. (2021). Global Technology and Development, College of Global Futures, Arizona State University. Thesis: Characterization and Fisher Perceptions of bycatch in Guyana's Gillnet and Chinese Seine Fisheries.

- PgDipEd. (2020). Concentration: Higher Education, University of Guyana. Research: Impacts of large classes on students' performance in the Department of Biology, University of Guyana.

- B.Sc. (2018) Biology, University of Guyana. Thesis: Impacts of climate change on farmers and their adaptive strategies along the Essequibo Coast, Guyana.

PROFESSIONAL DEVELOPMENT COURSES

- Wildlife Research Techniques (2018), University of Guyana.
- Guiding Tools for Scientific writing (2018), University of Guyana.
- Qualitative Research Methods for wildlife conservation (2018), University of Guyana.
- Preparing Field Guides (2018), Field Museum Chicago
- Mushroom cultivation and vermicomposting (2019), University of Guyana
- Quantitative Data Analysis using R (2020), University of Guyana
- Human Relations Course (2021), University of Guyana
- IRB Social and Behavioral Research Certification (2021), CITI PROGRAM under the requirements for Arizona State University

PROFESSIONAL EXPERIENCE

Lecturer I (2021- present); Department of Biology, University of Guyana
Main Duties –Delivering of course content to undergraduates in Introductory Biology and Ecology, Laboratory and Field Biology, Terrestrial and Fresh Water Ecology, Coastal Zone Management; supervision of internship students and undergraduate research students

Faculty Representative (2021 – **present) on the Faculty of Earth and Environmental Science's** Faculty Board, University of Guyana
Main Duties – Represent and report to the Faculty of Natural Sciences in all areas of interest to the faculty.

Instructor (2019- 2021); Department of Biology, University of Guyana
Main Duties – Aid in the delivery of course content to undergraduates in Introductory Biology and Ecology, Laboratory and Field Biology, Terrestrial and Fresh Water Ecology, Coastal Zone Management; supervision of internship students

Laboratory Demonstrator and teaching assistant (2017- 2019); Department of Biology, University of Guyana
Main Duties – Facilitating Laboratory exercises, field training and tutorials to undergraduates in Introductory Biology, Genetics and Evolution, Ecology, Laboratory and Field Biology, Plant Biology, Animal Biology, Biochemistry, Microbiology, Biotechnology, Molecular and Cellular Biology

Coordinator (2018); Guyana Gateway initiative Seminar – Developing a conservation plan for Guyana's Natural Resources, University of Guyana in collaboration with Queens University Belfast.
Main Duties – Supporting the Project manager in all aspects of coordinating the event.

Intern (2018 – 2019); WWF, University of Guyana, University of Florida, NORAD Grant Programme
Main Duties - Ensuring grantees submit financial reports, and spending was in accordance with the requested budgets, preparing financial reports for training sessions.

RESEARCH EXPERIENCE

Functioned in the capacity of a Research Assistant on the following projects:

- Impacts of mangrove degradation on fish assemblages along Guyana's coastal regions (2017) led by Mark Ram (MSc. Student).
- An investigation of the endoparasitic diversity of *Serrasalmus rhombeus* of the middle Mazaruni, Guyana (2017) led by Sherica Issacs (MSc. Student)
- Tree diversity in Urban landscapes; interactive roles of socioeconomic and environmental variables (2017) led by Nadia Hunte (MSc. Student)
- Benefits of Biodiversity: Human wildlife interactions in Urban Guyana (2018) led by Jess Fisher (PhD. Student)
- Incidental capture of sea turtles by fishing gears (2018) led by Bibi Shazeela (BSc. Student)
- Fish species composition, distribution and abundance of the Moruca river, Guyana (2019) led by Daniella DeCoasta (BSc. Student)

STUDENT MENTORING (ADVISOR)

- Impacts of shoreline hardening on fish community structure (2020)- Amira Azam
- Gender Roles in Guyana's Artisanal Fisheries Chain (2021) – Judea Crandon
- Distribution and abundance of crabs in restored and natural mangrove forests along Guyana's Coast (2021) – Randolph Jacobis
- Abundance and Behavior of three migratory birds in mangrove and salt marsh ecosystems at Ogle, East Coast Demerara, Guyana (2021) – Annushka Shiwdas
- Characterization, source and retention of microplastics in Guyana's mangroves (2022) – Sarah Ali

CONSULTANCY

- Liverpool, E., Ram, M., Hemraj, D. and Lakenarine, R. (2018) Mercury content analysis of Fishes from the Demerara River.
- Lakenarine, R. (2018). Length based spawning potential rate assessment of commercially important coastal fishes on the Essequibo, Coast, Guyana.
- Prince, W., Hemraj, D. and Lakenarine, R. (2019). Biodiversity Rapid Assessment of Sophia's Point Research Station, Essequibo River, Guyana
- Liverpool, E., Hemraj, D. and Lakenarine, R. (2019). Fish diversity and mercury content analysis of the Potaro and Essequibo Rivers, Guyana.
- Ram, M. and Lakenarine, R. (2021). Fish Survey – Hope Windfarm Project, Guyana
- Ram, M., Lakenarine, R. and Isaacs, S. (2021) Fish4ACP Project (specifically looking at the seabob fisheries in Guyana).
- Ram, M., Liverpool, E., Lakenarine, R., King, T., Hemraj, D. & Bastian, M. (2021). Biodiversity Assessment of project Sites for the Guyana Shore Base Project Environmental Management Plan, Guyana.

PUBLICATION

- Lakenarine, R., Seecharran, D. and Ram, M. (2020). Impacts of Climate Change on Farmers and their adaptive strategies along the Essequibo Coast, Guyana. International Journal of Scientific and Research Publications (IJSRP) 10 (02) (ISSN: 2250-3153). http://dx.doi.org/10.29322/IJSRP.10.02.2020.p9861

Manuscript Submitted for Publication

- Alfred, S., Ram, M., Lakenarine, R., Hemraj, D. & Maharaj, G. (2022). Occurrence and types of microdebris in commercial fish species of Guyana, South America. Gulf and Caribbean Research, University of Southern Mississippi.

MANUSCRIPTS IN PREPARATION

- Azam, N., Lakenarine, R., Ram, M., Maharaj, G & Hemraj, D. Impacts of Shoreline Hardening on Fish Community in Guyana. Targeted Journal: Gulf and Caribbean Research, University of Southern Mississippi. Proposed submission Date: April 2022.
- Lakenarine, R., Jesse, S., Chhetri, N. & Chhetri, N. Characterization of Small-Scale Net Fisheries off the Coast of Guyana. Targeted Journal – Fisheries Management and Ecology, Wiley Online Library. Proposed Submission Date: July 2022

CONFERENCE PRESENTATIONS AND PUBLISHED ABSTRACTS/ PROCEEDINGS

- Awareness of farmers to climate change and their adaptive strategies along the Essequibo Coast, Guyana. Oral Presentation, University of Guyana Undergraduate Research Conference (2017)

- Awareness of farmers to climate change and their adaptive strategies along the Essequibo Coast, Guyana. Poster Presentation, Latin American and the Caribbean Congress for Conservation Biology (2018).

- Awareness of farmers to climate change and their adaptive strategies along the Essequibo Coast, Guyana. Oral Presentation, National Agriculture and Research Extension Institute Research Conference, Guyana (2018).

GRANTS AND AWARDS

- 2021 Faculty of Natural Sciences Dean's Publication Award. This is a USD 250 award given to an instructor in the faculty that achieves a publication within the first year of service.
- 2021 Dean's Honor Roll, Faculty of Education and Humanities, University of Guyana.
- 2018 University of Guyana-University of Florida-WWF NORAD Research grant (USD 750).
- 2018 Best student paper presentation award- Latin America and Caribbean Congress for Conservation Biology, UWI St. Augustine, Trinidad and Tobago.
- 2018 University of Guyana Student Society Award.
- 2018 John Caesar Plant Physiology Award, University of Guyana.
- 2018 Aspire Youth Guyana, Youth Recognition.

VOLUNTEERING AND CO-CURRICULAR ACTIVITIES

- Member, Caribbean Youth Environment Network (2019- 2020)
- Advisor, University of Guyana Biology Club (2018- present)
- Faculty of Natural Sciences representative- Ministry of Education Guyana, National Science Fair (2018)
- Faculty of Natural Sciences representative- GTT Innov8 Summit (2018)
- Judge, Georgetown International Academy Science Fair, Junior Category (2018)
- President, University of Guyana Biology Club (2017-2018)
- Volunteer, Center for the Study of Biological Diversity (2017-2018)
- Volunteer International Coastal Cleanup, Guyana (2017-2018)

- University of Guyana Representative- UN/UNESCO Youths on the frontline of climate change webinar (2017)
- Founding member, University of Guyana Biology Club (2017)

REFERENCES

Dr. Gyanpriya Maharaj
gyanpriya.maharaj@uog.edu.gy
Director
Center for the Study of Biological Diversity
University of Guyana

Dr. Jesse Senko
Jesse.Senko@asu.edu
Assistant Research Professor
School for the Future of Innovation in Society, College of Global Futures
Arizona State University

CURRICULUM VITAE

Mark Ram
University of Guyana: Biodiversity Specialist

Education	PG Dip (2019) Higher Education, University of Guyana, Guyana MSc (2018) Forest Biology, University Guyana, Guyana. BSc (2016) Biology, University of Guyana, Guyana.
Current Position	Lecturer, Department of Biology, University of Guyana.
Office Address	D5 Department of Biology, University of Guyana.
Contact Information	
– **telephone:**	+1 592-611-9927
– **email:**	mark.ram92@yahoo.com mark.ram@oug.edu.gy
– **website:**	http://fns.uog.edu.gy/staff/mr-mark-ram

Research Interests	Marine Ecology, Marine Conservation Science, Coastal ecosystems, Oceanography, Forestry, Climate Change, Habitat Degradation and Restoration.

Professional Experience	April 2019– Present: **University of Guyana** **Student Internship Coordinator** Main duties: Responsible for the selection, placement and supervision of interns in the Department of Biology. April 2017– Present: **University of Guyana** **Scientific Officer/Assistant Lecturer** Main duties: Aid in the delivery of course content to undergraduate students, co-supervise undergraduate research projects, involved in the day to day management of a museum and herbarium, verification of biodiversity specimens and samples for export and individual research. September 2016 – June 2017 **University of Guyana** **Laboratory Demonstrator (part-time)** Main duties: Supervision of laboratory exercise, graded and recorded marks for lab assessment and aid in designing practical field exercise.
Publication In-preparation	(1) Fish community composition after mangrove restoration along the Northern Atlantic Coast of Guyana. (2) Regeneration of *Chlorocardium rodiei* (greenheart) in logged and unlogged forest in Guyana
Professional Courses & Training	• Forest Landscape Restoration • Quantitative Analysis of Ecological Data • Qualitative Research Methods • Forest Research Methods • Ocean Governance-University of Sao Paulo • Tropical Coastal Ecosystems • Wildlife Survey Techniques • Disasters Environment Risk Reduction • Life on Earth: Biomes, Climates, Ecology and Evolution • Scientific Writing • Principles of Biochemistry • Ecological Monitoring • Species Conservation • Field Guide Preparation

CURRICULUM VITAE

Teaching Experience

University of Guyana-Department of Biology

Instructor (Undergraduate Courses)

- Marine & Coastal Ecology
- Biology of Marine Organisms
- Coastal Zone Management
- Ecology and Environmental Biology
- Biometry & Biostatistics
- Introduction to the Biology and Ecology of Living Organisms
- Conservation & Management of Forest Ecosystems
- Laboratory Instructor (2016-2017) for the following courses: Introductory Biology, Ecology, Biochemistry, Parasitology, Animal Physiology, Biotechnology, Microbiology, Plant Ecology, Taxonomy& Systematics, Vertebrate Zoology, Biology of Animals and Biology of Plants.

Instructor (workshops)

- Data Analysis in R (2018) Centre for the Study of Biodiversity, University of Guyana.

Research and Fieldwork

- Impacts of mangrove habitat degradation on fish community structure along Guyana's coastal regions (2018) MSc. Thesis.
- Socio-Economic Survey and Length-Based Stock Assessment Guyana and Suriname (2017-2018) for WWF Guianas.
- Regeneration of *Chlorocardium rodiei* (greenheart) in logged and unlogged forest in Guyana
- Survey of ecotourism resources and aquatic and terrestrial ecosystems of Orinduik falls and the upper Ireng river drainage, Region 8, Guyana (2016) led by Dr. Nathan Lujan
- Assessment Sharks & Rays Diversity of the North Atlantic Ocean, Guyana (2016) led Elford Liverpool
- Stream quality assessment and mercury content analysis using fishes and macroinvertebrates at Cuyuini Guyana (2015) led by Mr. Elford Liverpool.
- Comparison of avian and fish diversity in disturbed and undisturbed mangrove ecosystem (2015) led by Kavita Dookram.
- Effect of changing climatic variables on butterflies at CEIBA Biological Centre (2016). BSc. Thesis.

Talks

- Wetlands in Guyana (2019) Biology Club at the University of Guyana

Awards & Grants

- World Wildlife Fund- Education for Nature Professional Development Grant (2019)
- Conservation Leadership Progamme. Population dynamics of *Chlorocardium rodiei* (Greenheart) in Guyana, South America (2019).
- UG-UF (NORAD/WWF-Guianas). Achieving a Green State: Building human capacity for natural resource management in Guyana (2018)
- National Agriculture Research and Extension Institute, Guyana Mangrove Restoration Project small Grant (2017)

Posters and presentations

- Distribution, abundance & types of plastics debris along selected beaches in Guyana. Gulf & Caribbean Fisheries Institute 72nd Conference (2019) Punta Cana, Dominica Republic.
- Impacts of mangrove habitat degradation on fish community structure along Guyana's coastal regions. National Agriculture Research & Extension Institute Research Conference (2018), Guyana.

- Impacts of mangrove habitat degradation on fish community structure along Guyana's coastal regions. Latin America Caribbean Conference for Conservation Biology (2018) University of West Indies, Trinidad.
- Impacts of climate change on farmers and their adaptive strategies along the Essequibo Coast, Guyana. Latin America Caribbean Conference for Conservation Biology (2018) University of West Indies, Trinidad.
- Impacts of mangrove habitat degradation on fish community structure along Guyana's coastal regions. Sao Paulo School of Advanced Science on Ocean Interdisciplinary Research and Governance. (2018) University of Sao Paulo, Brazil.
- Regeneration of *Chlorocardium rodiei* (greenheart) in logged and unlogged forest in Guyana. The University of Guyana and The University of Florida in collaboration with WWF launch NORAD Funded Partnership, Guyana.

Consultancies

- Barima-Mora Passage Mangrove Special Protected Area (2019) Landel Mills International
- Coastal Sensitivity Mapping for Oil Spill Response in Guyana (2019) for Pragmatics Inc.
- Fishes of the Nappi Water Catchment Area, Nappi Village, Rupununi, Region 9 (2019). Conservation International Guyana.
- Identification of Marine Deepwater Specimens (Macro-Invertebrates and Fishes) (2018) Environmental Resource Management.
- Survey of mangrove fishes at Hope, Guyana. (2018). The Conservation Leadership in the Caribbean.

Associations

- Society for Conservation Biology
- Global Youth Biodiversity Network
- University of Guyana Biology Club
- Caribbean Youth Environment Network Guyana

Supervision of undergraduate Research Projects

- Brea Aaron (2019). Assessment of Crustaceans abundance and diversity in different mangrove ecosystems in Demerara-Mahaica (Region 4), Guyana.
- Waynace Forde (2019). The distribution, abundance, and characteristics of Marine debris along beaches in Demerara-Mahaica (Region 4), Guyana.
- Daniella Decosta (2019). Distribution, Composition and Abundance of fishes from the Moruca river (Region 1), Guyana.
- Jaishri Jethu (2019). A partial baseline study of the Butterfly Diversity within the Biodiversity Gardens of the Botanical Gardens, Georgetown, Guyana.
- Joanna Porte (2018) Impacts of water quality on fish diversity, richness and abundance in mining-impacted and non-mining impacted sites at Kaieteur National Park.
- Rovindra Lakenarine (2018) Impacts of climate change on farmers and their adaptive strategies along the Essequibo Coast, Guyana.

References

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Leon Moore

Naturalist Guide, Bird Specialist, and Wildlife Photographer

Mr. Moore specializes in the field of ornithology and is actively concerned about Guyana's ecosystem and the preservation of its wildlife. He enjoys working with people, is experienced in the photography of birds and mammals, and is a knowledgeable nature guide.

Experience: 10 years' experience in bird observations and the evaluation of ecosystems in Guyana and other countries such as Suriname and Brazil.

Email: leon.moore@erm.com

Education

- High School Diploma, Linden Foundation Secondary School, Guyana, 2002.

Languages

- English

Fields of Competence

- Hospitality THAG Certificate
- Tour Guide Training
- Water Quality Testing Training
- Emergency First Responders Training
- Conservation and development
- Preservation of wildlife
- Ornithology
- Photography

Key Industry Sectors

- Tourism

Honors and Awards

- Tour Guide of the Year (Guyana Tourism Authority)

Publications

- Developed the Rock View Lodge Bird List

Key Projects

Coastal Mapping Sensitivity and Bird Survey
Nov 17 to 24, 2019. Conducted for Environmental Resources Management (ERM)

Coastal Mapping Sensitivity and Bird Survey
Apr 16 to 24, 2018. For Environmental Resources Management (ERM)

Key Projects Prior to Joining ERM

Guyana Defense Force
2002–2006

Auto Mechanics
2007–2008

Guest Service Officer, General Tour Guide
June 2008–June 2009 - Developed Bird List.

Bird Censor as Field Officer
August 2008. Baganara Island Resort - GATBS /Wetland International in the Essequibo River.

Bird Guide Tours and Surveys
Jan 2008–2017. Bird Guide Tours and surveys in Regions 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 Guyana.

Rock View Lodge
Sep 2009–2012. Tour Guiding, Appointed Team Leader, Assistant Tourism Manager, and General Assistant Manager.

Tour Guide
Jan 2012–Feb 28, 2014. Atta Rainforest Lodge & Iwokrama Canopy Walkway

BBC Guyana Documentary
Oct 2013. Worked with BBC team conducting a documentary in Guyana.

www.ebirds.org (Guyana) volunteer
Apr 6, 2014. Started volunteering as regional reviewer.

Assistant Instructor Bird and Tour Guide
Oct 2014. Training at Iwokrama International Research Center for rainforest conservation and development.

Conducted Bird Guide Training
Nov 2014. At Iwokrama International Research Center for rainforest conservation and development.

Bird Survey
Aug 20 to Sep 21, 2016, at Guyana Goldfields Inc.

Bird Survey
Feb 6 to Feb 24, 2017. At Guyana Goldfields Inc.

Bird Survey
June 4 to June 13, 2017. At Environmental Services & Support (ESS) in Suriname.

Bird Survey
Feb 26 to Mar 6, 2018. At Guyana Goldfields Inc.

Shorebirds Survey
Along the coast of Guyana for (United States Shorebirds Consecration Plan). Currently in progress.

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Estación Biológica
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RELEVANT AREAS OF EXPERIENCE:

Protected areas and natural resources management and research
Wildlife and biodiversity assessments
Scientific and technical writing
Technical translating English-Spanish
Rural development project management, monitoring, and evaluation
Value chain assessment, certifications, traceability
Environmental impact assessment and environmental management (wind, hydroelectric, canal, petroleum, agro)

PERSONAL:

Male, born 6-28-59; U.S. citizen; permanent resident of Nicaragua; fluent in English, Spanish; read Portuguese; BOSIET/HUET certification; Open Water SCUBA certification; Protected Species Observer certification.

EDUCATION:

Ph.D., Rice University 1994
Thesis: Direct Measurement of Binding of Plasma Protein von Willebrand Factor to Human Platelets in Response to Shear Stress

M.S., Rice University 1989
Thesis: Van der Waals Model of Liquid Wetting Layers

B.E., Chemical Engineering and Chemistry, Vanderbilt University 1981

PROFESSIONAL EXPERIENCE:

Protected Species Observer, RPS Group, Houston 2020-present
Research Professor, Environmental Science Doctoral Program, UNAN Managua 2016-present
Co-director and negotiator, Biodiversity Management Plans, HKND-FUNDAR 2016
Editor, *Estudios Ambientales*, scientific research journal 2013-present
Director, Basic Science Department, Central American University 1999-2003
Supervision of 5 full-time professors, 4 full-time staff, 24 part-time professors, 4 laboratories
Program director, FUNDECI 1998-present
Supervision of 2 research stations in protected areas, technical assistance to numerous projects including wind energy, hydroelectric, canal, reforestation, protected area management, environmental monitoring
Research Associate, National Agricultural University, Managua 2005-2006
Faculty Associate, Conservation Management Institute, College of Natural Resources, Virginia Tech 2000-2004
Professor, Environmental Science, Central American University 1998-2004
Assistant Professor, Biology and Chemistry, University of Mobile Nicaraguan Campus 1996-1997
Adjunct Professor, College of Natural Resources, Virginia Tech 1995-1999
Research Associate, Virginia Tech 1995
Visiting Instructor, Chemical Engineering, Virginia Tech 1994-1995
Research Associate, Rice University 1994
Graduate Research Assistant, Rice University 1986-1993
Process Engineer, Conoco/Vista Chemical Company 1981-1985

COURSES TAUGHT:

Non-Timber Forest Products (doctoral program)	UNAN	2018
Freshwater Fish Biology	FUNDECI/GAIA	2010
Birdwatching and Tourism	COMAP/CANTUR	2006
Biodiversity Measurement Techniques	UNA	2006
Graduate Biochemistry	UNI	2003
Zoology (birds, fishes)	UCA	2001, 2002
Biodiversity and systematics of freshwater fishes	UCA	2000
GIS/Biodiversity (graduate—birds)	UCA	2000-4
Physical Chemistry	UCA	2000
Organic Chemistry	UCA	1999, 2001-3
World Forestry and Forest Products	Virginia Tech/UCA	1998-2000
Biochemistry	U. of Mobile, UCA	1997, 2000-3
Analytical Chemistry	U. of Mobile	1997
General Chemistry I	U. of Mobile	1996, 1997
Introduction to Biology	U. of Mobile	1996, 1997
Environmental Science	U. of Mobile	1996, 1997
Ecology and Evolution	U. of Mobile	1997
Field Techniques in Ornithology	U. of Mobile	1997
Microbiology	U. of Mobile	1996
Human Ecology	U. of Mobile	1996
Chemical Engineering Thermodynamics	Virginia Tech	1994
Plant Design and Economics II	Virginia Tech	1995
Graduate Chem. Eng. Thermodynamics	Virginia Tech	1995

Guest Lectures:

Animal Taxonomy	UNAN-Managua	2008
Protected Areas Management	UNAN-Managua	2007
Protected Areas Management	UNA	2006
General Chemistry II	U. of Mobile	1997
Chemical Engineering Thermodynamics	Virginia Tech	1995
Graduate Transport Phenomena	Virginia Tech	1995
Separation Processes	Virginia Tech	1995
Plant and Process Design	Rice U.	1989
Unit Operations Laboratory	Rice U.	1986, 1987
Thermodynamics	Rice U.	1986
Graduate Thermodynamics	Rice U.	1986

PEER REVIEWING:

2010	Transactions American Fisheries Society
2009	Ecological Applications
2008	Quarterly Reviews in Biology
2008	International Journal of Tropical Biology
2007	Aquatic Conservation: Marine and Freshwater Ecosystems
2006	Marine and Freshwater Research
2005	Forest Ecology and Management
2004	Oxford University Press
2003-2005	Gaia
1999-2012	Encuentro

GRANTS, CONTRACTS, AWARDS:

2020-present	Protected species observer, offshore wind energy (RPS)
2018-present	Environmental impact assessment petroleum exploration, Guyana (ERM)
2016	Biodiversity Management Plan, Nicaragua Canal (FUNDAR)
2013-5	Stream, lake, wetland fish, bird assessments-Nicaragua Canal (ERM)
2012-3, 2018	Migrating bird assessment-wind farm (EOLO SA)

2012-6	Migrating bird assessment-wind farm (Blue Power SA)
2010	Stream fish assessments-hydroelectric power (CABAL SA)
2007-10	Golden-cheeked Warbler winter habitat assessment (Texas Parks and Wildlife)
2006-7	Migrating bird assessment-wind farm (COVENSA)
2006-7	Ambassador's Democracy Fund (US Embassy/FUNDECI)
2006	School construction, Escuela Héroes y Mártires de Xiloá (Japanese Embassy/FUNDECI)
2005-6	Management Plan, Laguna de Apoyo Nature Reserve (Servicio Autónomo de Parques Nacionales de España/CLUSA)
2005	Forest use and fisheries, project formulation (Development Alternatives, Inc.)
2005	Fish pathology workshop (DANIDA/UNA)
2005	Travel award (US Embassy)
2005	Invasive Species Grant (DANIDA/UNA)
2003-6	Promotion of nature tourism in Nicaragua (USDA/ IITF)
2004	Environmental impacts of tilapia introductions (Central American Water Tribunal)
2003-13	Sustainable agriculture, project formulation and evaluation (CLUSA/NCBA
2003-4	Study of parasites in Lake Apoyo (UCA/DANIDA)
2002	Book contract (Cornell University Press)
1998	Conservation, Food and Health Foundation, Inc. (with T. Hammett-Virginia Tech)
1998-9	Fulbright Senior Faculty Fellowship, renewal (UCA)
1998	USAID Environmental Education Grant (Virginia Tech)
1998, 2000	Canada-Nicaragua Environmental Grants (FUNDECI)
1997	Environmental sciences curriculum development (UCA)
1996-7	Environmental Education Grant (EPA/Virginia Tech)
1995-7	Computer software and programming, environmental consulting (FUNDECI)
1995	Mini-Grant, Center for Excellence in Undergraduate Teaching (Virginia Tech)
1994	Industrial chemistry, physiology, and toxicology of polychlorinated biphenyls (Fisher, Gallagher, and Lewis, Houston)
1993	Houston Peace and Justice Award
1989, 1993	Rice Chemical Engineering Department Symposium Awards

SELECTED PUBLICATIONS:

"Nicaragua: Biodiversity on canal route already at risk", McCrary JK, A Hernández-Portocarrero, R Rueda-Pereira, & O Saldaña-Tapia, *Nature* 525:33 (2015). 3 citations.

"Dos registros nuevos de peces en aguas continentales de Nicaragua", JK McCrary, S Montenegro Guillén, T Salvatierra, & MF Geiger, *Revista Estudios Ambientales* 1:88-92 (2014). 1 citation.

"*Ficus cotinifolia* (Urticales: Moraceae), planta hospedera de *Marpesia petreus* ssp. *tethys* (Lepidoptera: Nymphalidae)", Somarriba PA, JK McCrary, & A Cruz, *Revista Estudios Ambientales* 1:93-100 (2014). 0 citations.

"Crater lake Apoyo revisited: Population genetics of an emerging species flock", Geiger MF, JK McCrary, & UK Schliewen, *PLoS one* e74901 (2013). 12 citations.

"Introduced predator elicits deficient brood defence behavior to a crater lake fish", Lehtonen TK, JK McCrary, & A Meyer. *PLoS one*, 7(1), e30064 (2012). 21 citations.

"Not a simple case-A first comprehensive phylogenetic hypothesis for the Midas cichlid complex in Nicaragua (Teleostei: Cichlidae: *Amphilophus*)", MF Geiger, JK McCrary, & UK Schliewen, *Mol. Phylog. Evol.* 56:1011-1024 (2010). 44 citations.

"Lepidoptera de la Reserva Natural Laguna de Apoyo", van Dort J & JK McCrary, *Revista Biodiv. A.P.* 2:87-92 (2010). 0 citations.

"Territorial aggression can be sensitive to the status of heterospecific intruders", Lehtonen TK, JK McCrary, & A Meyer, *Behavioural Processes*, 84:598-601 (2010); doi:10.1016/j.beproc.2010.02.021. 52 citations.

"Description of two new species of the Midas cichlid complex (Teleostei: Cichlidae) from Lake Apoyo, Nicaragua", Geiger MF, JK McCrary, & JR Stauffer, Jr., *Proc. Biol. Soc. Wash.* 123:159-173 (2010). 22 citations.

"A contribution to Nicaraguan ornithology, with a focus on the pine-oak ecoregion", McCrary JK, WJ Arendt, L Chavarría, LJ López, P A Somarriba, P-O Boudrault, AL Cruz, FJ Muñoz, & DG Mackler, *Cotinga* 31:89-95 (2009). 9 citations.

"El monitoreo de las mojarras (*Amphilophus* spp.) en Nicaragua con aportes sobre su ecología y estado de conservación en la Laguna de Apoyo", McCrary JK, & LJ López, *Rev. Nic. Biodiv.* 1:43-50 (2008). 3 citations.

"New and novel observations of birds during raptor migration in Nicaragua", McCrary JK, & D Young, *Ornitología Neotropical* 19:573-580 (2008). 8 citations.

"Description of three new species of cichlid fishes (Teleostei: Cichlidae) from Lake Apoyo, Nicaragua", Stauffer JR, Jr., JK McCrary, & K Black, *Proceedings of the Biological Society of Washington* 121:117-129 (2008). 43 citations.

"Comparison of gastropod mollusk (Apogastropoda: Hydrobiidae) habitats in two crater lakes in Nicaragua", McCrary JK, H Madsen, I González, I Luna, & LJ López, *Revista de Biología Tropical*, 56(1), 113-120 (2008). 11 citations.

"Tilapia (Teleostei: Cichlidae) status in Nicaragua natural waters", McCrary JK, BR Murphy, JR Stauffer, Jr., & SS Hendrix, *Environmental Biology of Fishes*, 78(2), 107-114 (2007). 56 citations.

"**Mercury in fish from two Nicaragua lakes: A recommendation for increased monitoring of fish for international commerce"**, McCrary JK, M Castro, & KR McKaye, *Environmental Pollution*, 141(3), 513-515 (2006). 16 citations.

"Habitat use, social behavior, and female and male size distributions of juvenile Midas cichlids *Amphilophus* cf. *citrinellus* in Lake Apoyo, Nicaragua", Oldfield RG, JK McCrary, & KR McKaye, *Caribbean Journal of Science* 42(2), 197 (2006). 16 citations.

"The effects of introduced tilapias on native biodiversity", Canonico GC, A Arthington, JK McCrary, & MI Thieme, *Aquatic Conservation: Marine and Freshwater Ecosystems*, 15(5), 463-483 (2005). 537 citations.

"Complex Connections: The role of non-timber forest products in urban and rural livelihoods in Nicaragua", Shillington LJ, JK McCrary, & AL Hammett, Proceedings *Urban-Rural Interfaces Conference*, USDA-FS, Washington, pp. 254-260 (2005). 1 citation.

"Species, sources, seasonality, and sustainability of fuelwood commercialization in Masaya, Nicaragua", McCrary JK, B Walsh, & Hammett AL; *Forest Ecology and Management*, 205:299-309 (2005). 31 citations.

"Participación de los productos no maderables del bosque en la economía informal: Un estudio de caso", McCrary JK, LJ Shillington, R Santana, AL Hammett, & J Rivieri; *Encuentro* 69:58-68 (2004). 3 citations.

"Illegal extraction of forest products in Laguna de Apoyo Nature Reserve, Nicaragua", JK McCrary, AL Hammett, ME Barany, HE Machado, DJ Garcia, & JI Barrios, *Caribbean Journal of Science* 40:169-181 (2004). 9 citations.

"Behavioral, morphological, and genetic evidence of divergence of the Midas cichlid species complex in two Nicaraguan crater lakes", McKaye KR, JR Stauffer, Jr., EP van den Berghe, R Vivas, LJ López, JK McCrary, & TD Kocher, *Cuadernos de Investigacion*, 12:19-47 (2002). 66 citations.

"Direct demonstration of radiolabeled von willebrand factor binding to platelet glycoprotein Ib and IIb-IIIa in the presence of shear stress", McCrary JK, Nolasco LH, Hellums JD, Kroll MH, Turner NA, & Moake JL, Annals of Biomedical Engineering, 23, 787-793 (1995). 64 citations.

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Position Title and No.	Regulatory and Permitting Support
Name of Firm:	E&A Consultants Inc.
Name of Expert:	Delshah Hamid
Country of Citizenship/Resident:	Guyana

Education:

- Bachelor of Science Degree in Environmental Studies, Faculty of Earth and Environmental Sciences, University of Guyana (2014 - 2018) - GPA: 3.2
- Caribbean Secondary Education Certificate (CSEC®) at the General Proficiency Level, Saraswati Vidya Niketan (2008 – 2013)

Employment Record Relevant to the Assignment:

Period	**Employing organization and title/position. Contact information for references.**	**Country**	**Summary of activities performed relevant to the Assignment**
April, 2021 - Present	**E&A Consultants Inc.** Regulatory and Permitting Support Reference: Miss Anasha Ally Executive Director Email: eaconsul@guyana.net.gy Telephone: (592) 226-8247	Guyana	**Gas to Energy Project** Identifying and liaising with applicable regulatory agencies, and completing applications for permits/approvals necessary for the execution of the Client's Project.
April, 2021 - Present	**E&A Consultants Inc.** Regulatory and Permitting Support Reference: Miss Anasha Ally Executive Director Email: eaconsul@guyana.net.gy Telephone: (592) 226-8247	Guyana	**FOC Project – Environmental Services (Mangroves)** Providing regulatory and permitting support, conducting pre-construction vegetation survey for the Project, assisting with the preparation of the pre-construction vegetation survey report, assisting with the supervision of the extracting and replanting of mangroves, and

			assisting with monitoring the growth of the mangroves.
September, 2019 - March, 2020	**E&A Consultants Inc.** Assistant Environmentalist Reference: Miss Anasha Ally Executive Director Email: eaconsul@guyana.net.gy Telephone: (592) 226-8247	Guyana	**East Coast Demerara Public Road Widening and Improvement Project -** **Better Hope to Belfield Village** Conducting daily inspections along the length of the Project Site and of the construction of bridges for environmental, traffic and safety compliance; conducting regular inspections of stockpile yards, laboratory and asphalt plant for health, environmental and safety compliance; preparing and filing daily and weekly logs and reports; preparing Meeting Minutes for Monthly Socio-Environmental Meetings; monitoring the clean-up of the entire Project Site after construction; assisting engineers and architect with road marking design and road signs and application; and assuming duties and responsibilities of the Environmental Specialist in her absence.

Membership in Professional Associations and Publication:

- None.

Language Skills:

- Excellent in speaking, reading and writing English.

Adequacy of the Assignment:

Detailed Tasks Assigned on Consultant's Team Experts:	**Reference to Prior Works/Assignments that Best illustrates Capacity to handle the Assigned Tasks.**
• Identifying relevant regulatory agencies from which permits/approvals need to be sought for the Project at hand; • Liaising with regulatory agencies to gather details on the requirements for permits/approvals; • Managing a Permitting Matrix and Schedules to track permits; • Preparing content to populate the forms/applications; and • Preparing correspondences to be sent out to various regulatory agencies.	1. **Gas to Energy Project** 2. Providing permitting support to EACI's Client) - Current
• Providing regulatory and permitting support to EACI's Client to include mangroves in their approvals; • Conducting pre-construction vegetation survey for the Project (characterise, classify, and quantify the vegetation along the Project Site; identify areas where wild seedlings could be collected for the replanting process; leaf-litter assessment; crab hole count; and classify and quantify refuse.); • Assisting with the preparation of the pre-construction vegetation survey report; • Assisting with the supervision of the extracting and replanting of mangroves from the construction footprint; and • Assisting with monitoring the growth of the mangroves.	1. **FOC Project – Environmental Services (Mangroves)** 2. Providing environmental consultancy services to EACI's Client - Current

• Conducting daily inspections along the length of the Project Site for environmental, traffic and safety compliance; • Conducting regular inspections of stockpile yards, laboratory and asphalt plant for health, environmental and safety compliance; • Conducting daily inspections of the construction of bridges along the Project Site for health, environmental and safety compliance; • Preparing and filing daily and weekly Environmental Logs, Weekly Reports, and Inspection Reports; • Preparing Meeting Minutes for Monthly Socio-Environmental Meetings with Contractors and Client; • Monitoring the clean-up of the entire Project Site after construction; • Assisting engineers and architect with road marking design (pedestrian crossings, yellow and white lines, bollards, etc.) and road signs; • Assisting engineers with the application of road markings when necessary; and • Assuming duties and responsibilities of the Environmental Specialist in her absence.	1. **East Coast Road Widening and Improvement Project – Better Hope to Belfield** 2. Providing environmental consultancy services to EACI's Client - 2020

Karin K. Nunan

Technical Director – Social Performance and Human Rights

Ms. Karin Nunan is a Technical Director and senior social and human rights specialist based in Washington DC. She has over 25 years of experience in the fields of social impact assessment, social performance, human rights, indigenous people, and stakeholder engagement. She has spent the past 10+ years focused in the extractives sector and has led over 50 social impact projects, most of which relate to international financing and standards. Over the past five years, she has been extensively advising Oil and Gas clients in various capacities, including acting in a senior advisory capacity for EEPGL in Guyana on socioeconomics and stakeholder engagement. Prior to consulting, Karin worked for both ExxonMobil and Chevron in their Socioeconomics/Public and Government Affairs teams developing and implementing social performance policies; developing training programs; and ensuring projects met all social corporate guidelines and international best practice. A former US diplomat and Human Rights officer, Karin has worked in over 100 countries, including throughout Guyana. She has published several technical papers on the positive socioeconomic impacts of extractives companies in disadvantaged communities.

Experience: 25 years of experience in impact assessment and planning for oil & gas, power, mining, and major capital projects

Email: Karin.Nunan@erm.com

LinkedIn: https://www.linkedin.com/in/karin_nunan

Education

- MSc, International Relations and Conflict Resolution, AMU
- MBA, International Business, UMass
- BSc, Civil Engineering, Norwich University

Professional Affiliations and Registrations

- Women in the Environment, Society of Petroleum Engineers (SPE), and International Association of Impact Assessment – speaker and author
- Qualified Environmental Facilitator (QEF)
- US Institute for Peace Certification in Conflict Analysis
- US Government Human Rights Officer Training and Trafficking in Persons training

Languages

- English, native speaker
- French, basic
- Russian, intermediate

Fields of Competence

- Environmental and Social Impact Assessment
- Local Content and Industrial Baseline
- Stakeholder Engagement
- Human Rights
- Indigenous People (IFC PS7)
- Community Health and Safety (IFC PS4)
- Labor and Working Conditions (IFC PS2)
- Social Performance
- Community Investment Planning

Key Industry Sectors

- Oil & Natural Gas
- Mining
- Transportation
- Power
- Sustainable Finance

Key Projects

Social Impact / Stakeholder Engagement Director
Liza Offshore Development ESIA
ExxonMobil, Guyana
For the past 3 years has been managing social impact assessment, local content, socioeconomics, human rights, indigenous peoples and stakeholder engagement for all environmental permitting for Guyana's first offshore oil and gas developments. Provide advisory services to client on government, NGO, and civil society engagement, development of local content strategies, and communications and outreach programs. Developed ecosystem services community-based research program in conjunction with the nation's regulatory body and indigenous population.

Social Impact Due Diligence and Monitoring
Offshore Gas Development
Noble Energy, Israel
For several years, has been leading social impact assessment and due diligence for all offshore and onshore existing and planned operations for the Leviathan/Tamar Offshore Gas Project in Israel. Includes due diligence against IFI standards; development of management plans related to social impact, human rights, labour management, industrial relations and supply chain.

Technical Advisor – Social Supply Chain
Management Protocols
Confidential Mining Client, DRC
Developing mine-specific audit criteria and supplier management vetting process for major mining company operating in DRC with concerns related to strategic mineral supply chain. Developed labor and working conditions, supplier management and community health and safety protocols. Includes internal stakeholder engagement across corporation and site-specific engagement.

Technical Advisor – Social
TsF Mining Questionnaire Revisions
BASF, Global
Revision of the enhanced Together for Sustainability (eTfS) Questionnaire for mining operations on behalf of BASF and consortium of mining companies. Developed audit template and methodology for mining-specific chapter and global audit guidance, so that it may be formally adopted by TfS. Includes guidance pertaining to the rights of stakeholders, land users, water users, and indigenous populations.

Social Impact Technical Advisor
ESIA Development for Offshore Seismic Survey
Confidential Client, Suriname
Technical Advisor for an O&G company's foray into Suriname – mapping regulatory environment, stakeholder engagement, and obtaining environmental authorization for proposed seismic activities. The process involves close engagement with regulatory and other stakeholders, including the indigenous population.

Technical Advisor
Labor and Worker Welfare Assessments
EBRD, Kuwait
On behalf of an Equator Principles Bank, developed the scopes of work and audit protocol for a 60,000 worker energy development project with social impacts including local fishing populations, traffic and noise concerns with local residents, and worker livelihood concerns.

Technical Advisor – Stakeholder Rights
SIOA and Human Rights Assessment
Confidential Mining Company, Arizona
Developed social baseline study, social impacts and opportunities assessment (SIOA) and human rights due diligence for mining in Arizona. Includes external stakeholder engagement to enhance the mine's understanding of the community context and guide its strategy in engaging with stakeholders, mitigating negative impacts, enhancing benefits, and outlining community investment opportunities.

Social Issues Lead
Country Risk and Opportunity Report (Asia)
Confidential Global Mining Company
Developed environmental and social indicators for new country entry programs in Asia/SE Asia including social, community, political and environmental risks and links to related IFI standards. Also focused on responsible sourcing, including research on required

chemical bans and restrictions on sales and exports of minerals and materials.

SIA Lead
ESIA Port Project
Port Gentil, Gabon
Provided social impact assessment technical expertise to the ESIA of a new port, as part of wider freezone development in Port Gentil, Gabon. Scope included development of SIA and ESMP to IFC standards as part of a permitting strategy encompassing resettlement, water management, dredging for fill and subsequent land reclamation, as well as port and channel construction and operations. Port facilities include general cargo, containers liquids and bulk cargo terminal and associated infrastructure.

SIA and Stakeholder Monitoring Manager
Solar Power Facility
Confidential Power Client/IFI, Jordan
Conducted site visit and project document review of existing construction operations for solar power facility with significant stakeholder opposition due to livelihood expectations, as well as labor and working condition issues. Developed labor action plan, stakeholder engagement plan, training plans, and outreach tools. Including assessment of impacts on neighboring indigenous population.

Geothermal ESIA Lead
Geothermal Power Plant Development
IDB, Saint Vincent and the Grenadines
Social impact specialist for an IFC PS and IDB Environmental Safeguards Compliance Policy aligned ESIA for a geothermal power development on Saint Vincent and the Grenadines. Author of social baseline and impact assessment portions of ESIA.

ESIA and Resettlement Action Plan Lead
Power facility and Transmission Lines
African Development Bank, Cameroon
Drafted SIA to IFC PS standards, included development of a stand-alone Resettlement Action Plan to relocate families in rural communities along 200-mile long transmission line right of way. Developed mitigations and community investment programs focused on agribusiness, microfinance in the small-scale service sector, and local content

Technical Advisor
Socioeconomics Standards
Hess, Global
Developed corporate policies, plans and procedures, including tools, guidance notes, and project-level implementation plans for various socioeconomic aspects, including local content development, indigenous people, stakeholder engagement, social investment, resettlement and human rights.

Lead Facilitator for Capacity Building Workshop
Social Challenges in Power Projects
World Bank/IFC, Pakistan
Designed, organized and facilitated a capacity-building workshop in partnership with IFC and their lending partners for Pakistan-based Infrastructure clients – with a focus on mining, power and renewable sectors. The focus of the workshop was developing solutions to the challenges faced by companies when trying to implement IFC social standards in a difficult regulatory and operating environment.

Technical Lead / Program Manager
Human Rights/Labor Conditions Advisory
MCC, Global
Technical Director for Millennium Challenge Corporation (MCC) as an advisory consultant for labour and working conditions issues in accordance with IFC Performance Standard 2. Developed global guidance documents, training programs and bespoke country-level advice on human rights, labour and working conditions, supply chain, and other issues and concerns related to human rights. Responsible for training MCC partner organizations across the globe.

Program Manager
Gender Impact Assessment and Mainstreaming
World Bank, Africa-wide
Completed a gender impact assessment on 25 projects across nine countries in Africa to assess gendered impacts and opportunities to increase shared prosperity between men and women. Developed a gender mainstreaming implementation plan to be incorporated

in the agency's processes moving forward. Included leading field visits and client workshops.

Social Cumulative Impact Assessment Lead
Wind Farm facility
OPIC/IFC, Pakistan
Development of social impact assessment portion of cumulative IA for a wind farm facility in southern Pakistan with multiple developer and international financiers. Conducted site visit, village surveys, and assessed a suite of social and health impacts related to influx, livelihoods and project security. Included engagement with indigenous communities never previously engaged. Provided detailed management planning.

Technical Lead / Social Impact Manager
South Stream Pipeline Project
SSTTBV, Russia, Bulgaria, Turkey
Technical editor for three lender ESHIAs and three national ESIAs for all three countries. Worked alongside the South Stream ESIA teams to lead the stakeholder engagement efforts (from identification to disclosure through to monitoring) for Bulgaria, Russia and Turkey. Trained the client's key departments, including HSE, Procurement, HR and Security, on the importance of adhering to stakeholder engagement standards as outlined by WB, IFC and other IOs.

Technical Advisor
Human Rights and SIA
INPEX, Indonesia
Developed draft assessment for Masela Offshore LNG facility which was part of the SIA and included regulatory framework comparison, local stakeholder expectations (including development and analysis of household survey and focus group questions on jobs), review of potential labour base for the Project and relevant skill levels, economic impact evaluation, training plans and identification of relevant management plans (developed at later stages of project). Inclusion of labour and working conditions information into ESMP framework – all to IFC and ADB standards.

Social Due Diligence Lead
Offshore and Onshore Assets
Confidential O&G Client, Global
Performed social due diligence for offshore and onshore existing operations, including in Cameroon, Congo, Nigeria and Kurdistan for an oil and gas exploration company seeking external finance. Included review of potential compliance concerns related to conflict minerals. Conducted review in all four countries and prepared a gap analysis and social action plan, including for issues pertaining to human rights, for company to enhance their public outreach and disclosure efforts to meet international standards.

SIA and RAP Technical Lead
Nicaragua Canal ESIA
HKND, Nicaragua
Senior reviewer of the social impact assessment for a major infrastructure development crossing the country of Nicaragua. Assessed a suite of social and health impacts related to resettlement, labor, human rights, influx, conflict, health, natural resource, livelihoods and project security linked to development and operations. Developed management and monitoring plans pertaining to influx, resettlement, stakeholder engagement, and indigenous people.

Anna Sundby, MSc

Socioeconomic, Stakeholder Engagement, and Ecosystems Services Specialist

Anna is an experienced and versatile consultant with a background in social performance, communications, and project management. Her expertise includes community and indigenous engagement, land use, livelihoods, impact assessment, and risk management. She is skilled in rapid appraisals and due diligence, as well as comprehensive research and analysis over a project's lifecycle. In addition to consulting activities, Anna has spent extensive periods seconded to clients providing in-house advisory and management services. She has worked across Canada and internationally and is skilled in the application of IFC Performance Standards and other international guidelines. She is comfortable working in politically and culturally complex regions, and works with clients and stakeholders to manage expectations, improve communication, and achieve productive outcomes.

Experience: 13 years' experience in social performance for extractives industries and other sectors.

Email: anna.sundby@erm.com

LinkedIn: https://www.linkedin.com/in/anna-sundby-a4b63029

Education

- MSc. Environment and Development, University of Edinburgh, UK, 2005
- BSc (Hon). Environmental Sciences, University of British Columbia, Canada, 2002

Professional Affiliations and Registrations

- International Association for Impact Assessment (IAIA)
- International Association for Public Participation (IAP2)

Training and Certification

- Human Rights Impact Assessment
- Standard First Aid and CPR-C

Languages

- English, native speaker
- Spanish, intermediate
- French, intermediate

Fields of Competence

- Project management
- Community and indigenous engagement
- Social and environmental impact assessment
- Human rights impact assessment
- Risk identification and analysis
- Strategic plans and toolkits
- Baseline research and reporting
- Management planning
- Site assessments
- Environmental and social due diligence
- Facilitation and training
- Communications and messaging
- Non-technical writing
- IFC Performance Standards, Equator Principles, and other international guidelines

Key Industry Sectors

- Mining
- Oil and Gas
- Transportation
- Utilities

Key Projects

Facilitator
Managed and facilitated a comprehensive alternatives assessment process for a proposed mine in Yukon, Canada, involving a high level of engagement between the proponent, multiple indigenous groups, and regulatory authorities.

Social Impact Assessment
Managed social, economic, land use, and indigenous baseline studies and impact assessments for a proposed mine in BC, Canada. Also oversaw consultation and engagement programs.

Community-Based Research
Interviewed service providers and land users in remote Arctic communities to support socio-economic and land use impact assessments for a proposed mine in Nunavut.

Technical Oversight and Quality Control
On behalf of the client, provided senior technical review and quality control of social, economic, community health, and land use deliverables for a contentious proposed mine in Canada.

Plain Language Reports
Developed a series of non-technical summary reports describing the expected environmental, socio-economic and health effects of a proposed mine adjacent to a mid-sized city in Canada, including a review of studies completed, management measures, and monitoring programs.

Communities Audit
Completed a community-focused audit for a mine site in Canada. Included commitments from agreements with four indigenous groups and other social risks.

Community Liaison Group
Worked with a mining proponent and municipality to establish a framework and detailed terms of reference for a multi-stakeholder community liaison group to support ongoing engagement and monitoring programs for a sub-urban mine site.

Social and Economic Effects Management Plan
Developed a management plan to address social and economic effects, and community/indigenous engagement, throughout construction and operation of a mine in BC, Canada. Provides regular reports on company and contractor performance.

Due Diligence for Financing and Acquisitions
Led multiple due diligence assessments on behalf of potential investors and buyers, in accordance with international standards and guidelines including IFC Performance Standards and Equator Principles. Includes mining, LNG, and energy assets.

Fisheries Livelihoods Assessment
Assessed potential impacts on fishing activities and livelihoods in relation to a major marine infrastructure project in Nicaragua.

Social Responsibility Advisor
Seconded for two years as an in-house advisor on social responsibility, impact assessment, and stakeholder engagement for a natural gas pipeline through three countries. Provided review and quality control of EIA and ESIA reports for each country. Provided management oversight and quality control.

Construction Management Plans
In Bulgaria, worked with client and contractors to ensure that construction management plans addressed expected socio-economic risks and impacts, and to optimize potential benefits of local employment and procurement.

Stakeholder Engagement Program
For a multi-national pipeline project, developed and implemented stakeholder engagement programs in Bulgaria, Russia and Turkey in collaboration with local consultants. Represented the proponent in public consultation activities, and in meetings with landowners and government.

Social Assessment and Management Plans
Completed a social impact assessment for a proposed power plant in Egypt. Prepared operational management plans related to employment and working conditions.

Social Impact Assessment
Led the social impact assessment for a 700 km rail line associated with a proposed mine in Guinea.

Monitoring and Evaluation
Developed indicators and monitoring measures to evaluate impact and outcomes of a women's economic development NGO activities in East Africa.

Environmental and Social Impact Assessment
Managed the ESIA process for a proposed mine in Greenland. Conducted community-based research to gather socio-economic baseline information. Challenges included remote communities and a relatively new legislative process.

Guidance Note on Community Development Agreements in the Mining Industry
Prepared a guidance note for the World Bank summarizing recent research, best practices, and recommendations related to community development agreements (e.g. IBAs), focused on the mining industry, and aimed at supporting the needs of proponents, governments, and civil society.

Global Stakeholder Management Platform
Worked with a major mining company to develop and implement a web-based system to manage their relationships with government, local communities, indigenous groups, landowners, and other stakeholders. The program was implemented across all of the client's sites worldwide.

Social Responsibility Toolkit
Developed a series of practical and informative social performance tools for site-level staff at a major mining company with global operations. Included thematic and process tools focused on gender, indigenous peoples, social impact assessment, health, stakeholder engagement, and other topics.

Resettlement Framework
Developed a resettlement framework for involuntary land acquisitions associated with a proposed mine, including guidance to ensure the objectives of the IFC Performance Standards are achieved through, and beyond, the government-led expropriation process.

Key Projects Prior to Joining ERM

Stakeholder Engagement and Needs Assessment
Needs assessment and in-country consultation program in Albania engaging government, community members, and employees. Identified potential issues or challenges from government and community perspectives, and ideas for local community investment, capacity building and other benefits. Included an assessment of gender challenges in rural Albania, and consultation with local women's groups.

Land Use Impact Assessment
Evaluated impacts on land users in rural Argentina in relation to a proposed mine and associated transportation and utility infrastructure.

Socio-Economic Impact Assessment
Led the socio-economic and land use assessments for a 350 km transmission line, including nine indigenous groups with varying land claim status. There was a high level of interest in the project, with contrasting priorities for industrial, recreation, and subsistence values. Also coordinated the stakeholder engagement program for this complex project.

Land Use and Livelihoods Study
Conducted workshops and interviews with land users in the Canadian Arctic to understand potential impacts of a proposed mine on land-based livelihoods and subsistence harvesting.

Candice Ramessar

Socioeconomic, Stakeholder Engagement, and Ecosystems Services Specialist

Ms. Ramessar is part of ERM Guyana office acting as the Social Team Lead. She has More than 20 years of relevant professional experience as an international consultant in Guyana, Jamaica, St. Vincent & The Grenadines, Barbados, Trinidad and Tobago, Grenada, Antigua, Barbuda, and the United States. Along her career, she had been part of projects related to environmental and social issues including gender equality and mainstreaming. Ms. Ramessar is familiar with the EHS International Guidelines of the World Bank and IFC Performance Standards.

Experience: 20 years' experience in international consulting, environmental and social development, gender equality and environmental and social research in Guyana and across the Caribbean.

Email: Candice.ramessar@erm.com

Education

- Graduate certificate. Project Leadership, Cornell University, NY, 2011
- Certificate. Applied Project Management, Boston University, Boston, 2010
- Master of science. Geography Virginia Polytechnic Institute and State University, VA, 2003
- Master's certificate. International Research Development, Virginia Tech, VA, 2003
- Bachelors. Biology/ Geography, University of Guyana, Georgetown, 1995

Professional Affiliations and Registrations

- Women Organizing for Change in Natural Resources Management

Languages

- English

Fields of Competence

- International Consulting
- Environmental and social development issues
- Gender Equality
- Environmental and social research

Key Industry Sectors

- Sustainable Finance
- Governance
- Financial
- Agricultural

Key Projects

Applied Political Economy Analysis Consultant
Develop a country strategy for Pact USAID funded project on capacity building of indigenous organizations in Guyana and extractive industries and natural resources management issues.

Stakeholder and Institutional Assessment and Gender Expert
Gender, Social and Institutional Assessment expert for Guyana for the preparation of two UNDP-GEF proposals for USD 20 Million project in mainstreaming biodiversity in small-scale gold mining in Guyana. Conducted Stakeholder Analysis and Gender analysis through Key Informant Interviews etc

Social Specialist World Bank Projects
Ensure compliance of all World Bank-funded projects implemented by the Government of Grenada complies with the World Bank Environmental and Social Operational guidelines. Conduct training and workshops for the government of Grenada staff and local and international contractors

Consultant Results Based Framework
Conducted a two-day workshop on Results-Based Management and facilitation of the planning and development of the Work Plan for the agency for the year 2019. Application of ARC-D toolkit and integration of the Guyana Green State Development Strategy framework for resilient communities

Gender and socio-economic expert
Gender and socio-economic expert for Grenada and St Vincent and the Grenadines for the preparation of two UNDP-GEF proposals for USD 19 Million and 20 Million projects respectively in biodiversity mainstreaming and climate resilient agriculture. Conducted Stakeholder Analysis and Gender analysis through Key Informant Interviews.

Volunteer
Conducted project management and other training for the NGOs and CBOs associated with the Civil Defense Commission as part of the CDC activities to build resilient communities in Guyana and their Community-Based Disaster Management initiatives. Application of the ARC-D toolkit.

Consultant
Conduct an assessment of the users and holders of Biodiversity information including a needs assessment and a capacity development strategy.

Women and Child/Social Inclusive Expert
Designed and developed 10 children friendly regional profiles to be used by the Civil Defense Commission for the Ministry of Communities and the Civil Defense Commission in climate-smart and disaster planning for the 10 regions of Guyana using the data and indicators from the 2016 MICS Survey.

Environmental Sociologist
Conducted socio-economic analysis including gender analysis of the Rio Conventions implementation in Guyana (United Nations Convention on Climate Change, Desertification, and Biodiversity). Design and implement a national KAP survey to assess the perceptions of the public to the conventions. Conducted an assessment of the awareness of the Rio Conventions in 28 Governmental Agencies in Guyana.

Consultant Social Specialist
Serves as the social consultant for World Bank-funded projects at the Ministry of Agriculture, Guyana. Responsible for the implementation of social safeguards according to World Bank OP guidelines, including voluntary resettlement. Develop and implement a monitoring framework and collect baseline social indicators. Monitor social indicators.

Social Consultant
Part of a team that conducted an -ex-ante economic analysis of a USD 20 Million IDB housing project in

Sophia, Guyana. Served as the environmental/social consultant. Conducted Key Informant Interviews and provided social indicators in the development of the economic analysis tool.

National Researcher/Consultant Women
Researcher for a National Qualitative Study on Indigenous Women and Children in Guyana. Conducted focus groups, key informant interviews, and individual profiles in 20 indigenous hinterland communities across Guyana.

Gender Environmental and Social Consultant
Safeguards Consultant for the development of a stakeholder engagement plan, indigenous peoples plan and gender plan for a GEF 3.5 million USD project on the elimination of mercury in small-scale gold mining in Guyana.

Socio-economic and Gender Consultant
Conducted a rapid socio-economic impact assessment including a gender analysis of the Caribbean Marine Bio-diversity Project on the fisherfolk in the islands of St. Vincent and the Grenadines and Grenada

Researcher, Social Analysis
Prepared three country reports for Guyana, Saint Vincent and the Grenadines and Suriname on the HDI indices, institutional, gender and human capacities of the Water and Sanitation (WASH) sector in the respective countries. Interviewed key governmental officials in the water, health, and education sectors.

National Project Consultant
Consultant in the Sustainable Financing and Management of Eastern Caribbean Marine Ecosystems Project. Guided all the activities of the project especially the development of a conservation trust fund for funding of environmental NGOs by providing technical support, including baseline assessment of financing, sustainable finance options and the development of a business model. Collaborated closely with other project consultants, the NIE within the government of Saint Vincent and the Grenadines, the project focal point within the NIE, and other government, regional and international partners and stakeholders. Carried out gender and vulnerability analysis.

Consultant Environmental Communications
Designed and implemented a 7-day workshop and modules on Environmental Awareness and Communications for the staff of the Ministry of Agriculture and Rural Development of Saint Vincent and the Grenadines

Social and Gender Consultant
Georgetown Solid Waste Project/ Social Development Specialist as part of the study of an Environmental and Social Audit of the Haggs Bosch landfill; Eccles. Using PRA methodologies researched, analyzed, and present the findings, including a gender analysis of the impacts of the landfill on the surrounding communities. Data were analyzed using SPSS and differentiated impacts by gender calculated.

Consultant on Communications for Development
Developed and implemented a 5 module Communication for Development Programme for the farmers of the Peter's Hope Bordisen area in Saint Vincent and the Grenadines.

Social sector Consultant Project Management
Sustainable Grenadines GEF Civil Society Capacity Building Project Developed a toolkit for civil society organizations in SVG on Basic Project Management including data management and use of project management software. Conduct two-day training on Project Management for CSOs.

Consultant on Communications and Knowledge Management
Developed a toolkit for civil society organizations in SVG on Monitoring and Evaluation, Communications and Knowledge Management. Conduct two-day

training on M& E-communications and Knowledge Management for CSOs.

Consultant in gender in a DRM project
Conducted a vulnerability assessment of the agriculture sector of SVG including gender and social analysis using PRA methodologies and other qualitative tools. Major stakeholders included female farmers, farmers' association's cooperatives, NGOs and governmental bodies. Developed a methodological tool for the assessment of vulnerability. The gender dimensions of vulnerability were noted and actions to address impacts were recommended.

Consultant, Project manager
Served as the consultant and project manager for an IDB Funded Caribbean project targeting the capacity building and institutional strengthening of consumer organizations in three Caribbean countries, Jamaica, Trinidad, and Tobago, and Barbados. Reported to the Director of Global Operations and was responsible for all aspects of the project including financial management.

Social Specialist
Facilitated, designed and coordinated a Social Monitoring Study of Rose Place, Kingstown, Saint Vincent in collaboration with the Ministry of Agriculture and Fisheries and the fishermen society. Designed a qualitative study, coordinated interviewers and the collection of data, analyzed primary data using SPSS to produce a final document.

Consultant
Designed Public Awareness and Promotional materials for the Environmental Health Division of the Ministry of Health and Environment St Vincent and the Grenadines

Consultant in DRM
Designed and conducted a desk study on the status of and debate and actions on Community Disaster Management (CDM) in the Caribbean and recommendations for a workshop on Farmers Association and CDM in the Caribbean region.

Consultant
Prepared two modules and conducted two workshops on Solid Waste Management and Corporate Citizenship in Kingstown, SVG

Consultant
Prepared a Strategic Plan for the Caribbean Farmers Network for the years 2008-2010 and an Action Plan for the year 2008.

Volunteer Natural Resources Management Expert
Conducted research on areas such as the World Trading Organization, Economic Partnership Agreements, Served as Technical Adviser to several Agricultural Projects on Sustainable Agriculture and Climate Change

Adjunct Professor
Taught a senior level class of Human Geography to final year undergrad students.

Science Teacher
Taught 9th and 10-grade environmental science classes per New Jersey Core Curriculum in Biology and Physical science

Teaching Assistant
Taught undergrad classes in Environmental and Physical Geography, served as an Assistant to several Professors, also gave guest lectures on Caribbean environmental and social issues.

Program Officer
Designed and Implemented a one-year USAID funded programme to increase the political participation of women, youth and indigenous peoples in various aspects of governance in Guyana including capacity building of the organizations.

Director
Co-Founded and managed an environmental organization in Guyana focused on watershed issues particularly a cyanide spill in the Essequibo River. Research projects for GREEN were funded by several international organizations including the IUCN. The advocacy work of the organization was also featured in several international media outlets including German Public TV.

Cross-Cultural Facilitator
Conducted training exercises with new volunteers on Guyanese society particularly on topics of Guyanese women, African Guyanese, local geography and local dialect.

Technical Assistant to the Minister
Designed, implemented, and monitored and evaluated projects for women's groups and organizations across Guyana. Served as a contact with the press for the Women Affairs Bureau and the Ministry of Labour in Guyana. Represented the government minister at meetings.

Ashanta Osborne Moses

Social Specialist

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SERVING PEOPLE FOR DEVELOPMENT. GUIDED BY PRINCIPLES OF: HONESTY; INTEGRITY; RESPECT; DIGNITY; AND TRANSPARENCY

SUMMARY OF KEY COMPETENCIES

COMPETENCE	EXPERTISE	YEARS OF EXPERIENCE
Programme Management	Managing programmes that promote community resilience using integrated programming models. Focus areas: Gender; Health - Sexual and Reproductive Health (SRH), HIV and STI prevention, Non-Communicable Diseases, Vector-borne Diseases, First Aid; Disaster Risk Reduction and Management; Youth Development. Water and Sanitation. Leadership Capacity Development	18 years
Planning, Monitoring, Evaluation and Reporting (PMER)	Developing Monitoring and Evaluation frameworks for projects/programmes. Designing monitoring, evaluation and reporting tools. Training practitioners. Designing and implementing assessments and evaluations including but not limited to: performance appraisals, capacity assessments, impact evaluations, satisfaction surveys, Gap Analysis.	16 years
Facilitation (Facilitator, Trainer of Trainers and Coach)	Development of agenda using pedagogical and participatory approaches, coordination and facilitation of community, national, regional, and global level workshops, conferences, training, meetings, consultations, and other fora. Trainer of trainers (TOT)	18 years
Community Life Competence (CLC) Facilitator and Coach	Integrating CLC into community programming to identify and maximize strengths, capacities, and resources by harmonizing vision, conducting self and situation assessments, and developing action plans to achieve community goals	12 years
Designing for Behaviour Change (DBC)	Designing programmes using Social and Behaviour Change Communication (SBCC) models. Integrating behaviour change models in program implementation. Providing training for programme planners and implementers. Designing M&E tools for measuring change	8 years
Project/Programme Planning Process - Trainer of Trainers, Facilitator and Coach	Conducting certificate training adapted for Community Leaders, Civil Society groups, programme implementers, youth organizations, other institutions and agencies; enabling them to identify and analyze issues, develop strategies for comprehensively addressing them, and designing projects/programmes for implementation.	16 years

KEY ROLES/PROFESSIONAL EXPERIENCE

CONSULTANT: SOCIAL SPECIALIST – DEVELOPMENT OF THE LINDEN-MABURA HILL SOCIAL IMPACT AND GENDER ANALYSIS, NOVEMBER 2020 – JANUARY 2021

Supported the process by conducting stakeholder and community consultations for updating the feasibility study and prepare detailed designs for the Linden-Mabura Hill Road upgrade and bridge at Kurupukari through a review of the existing studies and undertake the necessary surveys, studies, analysis and designs. Contributed to the preparation of tender documents for the upgrade of the Linden-Mabura Hill Road and bridge at Kurupukari inclusive of, but not limited to, final detailed designs, bills of quantities, environmental and social impact assessment and management plan, technical specifications and conditions of contract. Specifically produced; revised Environmental and Social Impact Assessment (ESIA), and revised Environmental and Social Management Plan (ESMP).

PROJECT COMMUNITY LIAISON OFFICER/SOCIAL SPECIALIST – SHERIFF STREET MANDELA AVENUE ROAD EXPANSION PROJECT, FEBRUARY 2020 – PRESENT

Provide construction management, contract administration and resident engineering services to the Works Services Group of the Ministry of Public Infrastructure for the Implementation of the Sheriff Street – Mandela Avenue (SSMA) Roadway Enhancement Project funded by the Inter-American Development Bank (IDB). Implemented all activities and tasks outlined in the project's Stakeholder Engagement Plan (SEP). Provided oversight for the implementation of the social aspects of the project Environmental and Social Management Plan (ESMP). Coordinated and conducted quarterly frequent stakeholder consultation meetings to discuss all social and environmental issues on the project. Continuously monitored the conduct of workers towards neighbouring communities and the quality of the social engagement activities of the Contractor. Investigated and solved issues raised by communities related to abuses, violations and conflicts caused by the behaviour of workers and other construction activity (e.g., traffic, accidents with victims, dust, property damage, conflicts with communities, etc.).

CONSULTANT: TEAM LEADER – GENDER AND SOCIAL ANALYSIS, GEF-GOLD PROJECT, CONSERVATION INTERNATIONAL-GUYANA (CI), AUGUST 2019 – APRIL 2020

Lead the process of designing process, methodology and tools, and conducted a baseline gender and social
assessment to evaluate participation and contribution in the gold value chain. The assessment specifically identified and examined gender roles in the artisanal and small-scale gold mining value chain, with specific emphasis on constraints and opportunities for participation, livelihood options and income generation; evaluated awareness about the use, handling and effects of mercury on humans and the environment;
and assessed local interest, and potential incentives, for the transition towards more responsible use of mercury and mercury free approaches.

CONSULTANT: NATIONAL GREEN STATE DEVELOPMENT STRATEGY (GSDS) CONSULTATIONS, WWF GUIANAS CONTRACTED. JUNE, DECEMBER 2018

Facilitated planning and execution of national consultation processes conducted in Regions 1, 2, 7, 8, 9, and 10. Included leading preparation of detailed, well-designed consultation process document. Lead and facilitated consultation process at cluster locations according to plan. Ensured meaningful stakeholder engagement and inputs. Compiled regional reports. Analyzed data and drafted recommendations for the Green State Development Strategy

ORGANIZATIONAL DEVELOPMENT CONSULTANT: NATIONAL SOCIETY DEVELOPMENT, INTERNATIONAL FEDERATION OF RED CROSS RED CRESCENT. FEBRUARY – MAY 2018

Provided support to the thirteen Red Cross National Societies (Red Cross organizations) of the Caribbean in updating and modernizing their way of operating by primarily addressing internal pressures related to the areas of National Society leadership, integrity, accountability, development strategy, financial sustainability and internal reforms. This included related development areas such as Learning and Innovation, Federation Data Reporting Systems and Volunteering and Youth Development as prescribed in the Development Operational Plan.

CAPACITY DEVELOPMENT CONSULTANT: NORTH RUPUNUNI DISTRICT DEVELOPMENT BOARD AND SOUTH CENTRAL PEOPLES DEVELOPMENT ASSOCIATION CAPACITY BUILDING, WWF GUIANAS CONTRACTED. NOVEMBER – DECEMBER 2017

Designed and facilitate capacity building training with the North Rupununi District Development Board (NRDDB), South Central Peoples Development Association (SCPDA) Leadership and Community Monitors, and other direct and indirect project partners of the WWF SRJS Project.

AUTHOR: INTERNATIONAL RED CROSS RED CRESCENT GLOBAL YOUTH ENGAGEMENT STUDY REPORT 2017. AUGUST – DECEMBER 2017

Analyzed findings of the Global Youth Engagement Study of 2017 (122 National Societies /Countries participated), and wrote a comprehensive report: "IFRC Global Youth Engagement Study Report 2017". conducted a comparative analysis of the 2017 findings with those of the 2015 Global Report, and produced recommendations for improving and increasing meaningful youth engagement in the context of 'youth as leaders, 'youth as members of affected communities' and 'youth as volunteers.'

CONSULTANT: GENDER MAINSTREAMING AND INCLUSIVENESS WORKSHOPS, WWF GUIANAS AND IUCN GLOBAL GENDER OFFICE. NOVEMBER 2017 AND JUNE 2019

Coordinated, design methodology, and facilitated Gender Mainstreaming and Inclusiveness Workshop. Prepared substantive content for learning sessions covering the topics Gender, Intersectionality, Diversity and Mainstreaming; Rights based approach for environmental governance; and gender and inclusiveness.

CAPACITY DEVELOPMENT CONSULTANT: SOUTH CENTRAL PEOPLES DEVELOPMENT ASSOCIATION, CAPACITY DEVELOPMENT OF MONITORS - WWF GUIANAS. AUGUST 2017

Designed, prepared materials for and facilitated capacity development exercise to support SCPDA by training Community Monitors and technical/project staff in the areas behavioural change communication and advocacy communication, addressing issues such as mining impacts on environment and human health and legislation (natural resources and environmental management).

PROGRAMME MANAGER: BUILDING RESILIENT COMMUNITIES IN REGIONS 1 AND 7, GUYANA RED CROSS SOCIETY. 2013-2017

Lead a team of 15 persons on the strengthening community resilience programme. Specifically to: Lead the process of adopting new ways of strategically engaging key stakeholders and build alliances at grass root levels. Transformed the involvement of the programme in addressing community vulnerabilities by transitioning from a position of ‘project experts’ to one of partners and facilitators of comprehensive and holistic approaches intended to: a. foster cohesiveness within communities; b. build capacity of local leadership to identify, analyze, and respond to challenges; c. increase dialogue for greater connectedness; d. provide technical expertise in specific areas of vulnerability in an integrated manner; e. train community members as resources in diverse sector specific disciplines; and f. build alliances

with local and external partners increasing the impact of the programme. The programme directly reached over ten thousand people and indirectly impacted many more.

OTHER ROLES

FACILITATOR: EXCHANGE MEETING ON COMMUNITY MONITORING REPORTING AND VERIFICATION – NORTH RUPUNUNI DISTRICT DEVELOPMENT BOARD AND KANUKU MOUNTAINS COMMUNITY REPRESENTATIVE GROUP --- REGION 9, WWF GUIANAS CONTRACTED. 2017

FACILITATOR (WWF GUIANAS): STAKEHOLDER MEETING "PROMOTING INTEGRATED AND PARTICIPATORY OCEAN GOVERNANCE IN GUYANA AND SURINAME: THE EASTERN GATE TO THE CARIBBEAN" - GEORGETOWN, GUYANA. 2017

EVALUATOR (THE CONSULTANCY GROUP - TCG): POST ASSIGNMENT EVALUATION OF CI-IDB BASELINE FARM SURVEY. 2015

NATIONAL PROGRAMME MANAGER: CARIBBEAN HIV AND AIDS PREVENTION PROJECT FOR 'AT-RISK' POPULATIONS - REGIONS 1 AND 7, GUYANA RED CROSS SOCIETY. 2010 – 2013

FIELD MANAGER (USAID/PEPFAR): HIV AND AIDS PROGRAMME INITIATION MANAGER - REGIONS 1, 4 AND 9, 2004-2010

PROJECT MANAGER (WORLD BANK): REGIONS 1, 4, AND 10. 2006 - 2010

FIRST AID (FA) COORDINATOR, NATIONAL, 2002-2004

EDUCATION

St. Ignatius Secondary School
Dip. Public Management, University of Guyana
BSc. Sociology, University of Guyana
Certificate – Youth Leadership, Commonwealth Youth Programme
Certificate – Programme Management in Development (PMD Pro), APMG International Certificate
Certificate - Community Engagement and Accountability (IFRC)
Certificate - Project/Programme Planning Process (Programme Development)

Amanda Sahai–Alli

42 Houston Gardens,
Georgetown, Guyana
Mobile: 592–6716343⁄Email: Amanda.sahai@hotmail.com

PROFILE

Dynamic, hardworking and detail-oriented professional with over ten years' experience engaging members of diverse communities, government agencies and private sector organisations to effectively and efficiently build and maintain cross-functional relationships that contribute to capacity building, community development, and client health and wellness. Works independently with minimal oversight to prioritize tasks and meet tight deadlines in high-pressure environments. Adept in conducting research and synthesizing large volumes of information into concise and informative reports.

CORE COMPETENCIES

- ❖ Stakeholder Engagement
- ❖ Project Management
- ❖ Statistical Package for Social Sciences
- ❖ Research
- ❖ Logistics
- ❖ Monitoring & Evaluation
- ❖ Social Impact Assessment
- ❖ Mental Health

Computer Skills: Microsoft Office Suite

EDUCATION

- **Master of Science (Public Health),** University of Bedfordshire, London, England, 2019–2021
- **Bachelor of Science in Social Work**, University of Guyana, Turkeyen, Guyana, 2005–2007
- **Diploma in Social Work**, University of Guyana, Turkeyen, Guyana, 2003–2005

CERTIFICATION

- Corona Virus Workforce Preparedness Training, Corporate Health and Wellness Association, October 2020
- Certified Training in Statistical Package for Social Sciences (SPSS), Nations University, July 2020
- Certificate in Psychological First Aid for Children (A&B) and Worker Care Module 1, Guyana Red Cross Society, February 2008

PROFESSIONAL EXPERIENCE

March 2017 –Present **Social Work Consultant**
Panacea Consulting

Provide Employee Assistant Programme (EAP) services to organisations in the public and private sectors of Guyana to help employees manage life-stressors of various kinds. The services offered include:

- individual counseling through the practice of social work
- interactive group sessions on mental health awareness
- corporate wellness and pertinent social issues
- corporate social responsibility and
- social impact assessments for projects

February 2008–2011 **Project Manager**

Health Sector Development Unit, Ministry of Health

- Provided oversight of projects managed by the Health Sector Development Unit particularly budget preparation and addressing implementation issues for Human Resource Management Information System Project and other donor funded projects.
- Provided capacity building support for Civil Society Organizations in Project Management.
- Participated in the formulation of the National Mental Health Strategic Plan (2008-2012) including addressing gaps in the then Mental Health Legislation.

Monitoring & Evaluation Officer

Health Sector Development Unit, Ministry of Health

- Responsible for the monitoring of IDB, World Bank and Global Fund Projects including the Basic Nutrition Programme, Guyana HIV/AIDS Reduction Project, the Global Fund Malaria and Tuberculosis Projects.
- Assisted in the adaptation of M&E Tools by Civil Society Organizations and Line Ministries implementing HIV interventions in Guyana.

Assistance Mental Health Coordinator

Health Sector Development Unit, Ministry of Health

- Facilitated workshops under Programme including "Enhancing the Capacity of First Responders to Provide Therapeutic Psychosocial and Basic Mental Health Interventions to Children Affected by Trauma".
- Served on National Suicide Prevention Committee.
- Represented Ministry of Health on "Mental Health and Media Reporting" forum organized by the Ministry of Health in

collaboration with the IDB and the Pan American Health Organization.
- Participated in the preparation and planning of the Treatment and Rehabilitation Program for Substance Abusers in Guyana.
- Planned and executed several psychosocial interventions in the Lusignan Community, Bartica Community and Linden Region.

VOLUNTARY WORK

- Current Director of Public Relations, Rotary Club of Garden City Georgetown Guyana
- Volunteer Counselor with Guyana Foundation , 2012 - 2016
- Member and Social Worker for the Central Islamic Organization of Guyana (CIOG) Medical Outreach Committee, 2008 – 2010
- "Humanitarian Assistance Program" (HAP); which included workshops and seminars [US Embassy Office – Georgetown, Guyana], July 2007
- Community Service Work with the Transfiguration Church, August 2005

REFERENCES:

Mr. Keith Burrowes	Former Executive Director Health Sector Development Unit, Ministry of Health Contact #: 647-991-9954
Mrs. Greta Mc Donald	Registrar General, General Register Office Contact #: 216-1240
Justice Roxane George – Wiltshire	Chief Justice, The Supreme Court of Guyana. Contact #: 225-6823
Ms. Gina Arjoon	Development Officer, Canadian High Commission, Guyana Email: gina.arjoon@international.gc.ca Contact #: 227-2081, Ext 398-3452

Kevin Malloy, PhD., RPA

Archaeologist

Dr. Malloy has 14 years of experience in archaeological excavation and analysis, and three years of experience in cultural resources management. He is proficient in zooarchaeological faunal analysis and is experienced in bioarchaeology. Dr. Malloy has worked on both domestic and international projects in Ireland, the United Kingdom, Peru, and Vietnam. He has planned and directed several international excavations and has worked in conjunction with the Defense POW/MIA Accounting Agency and the U.S. Military. Domestic work has consisted of working with regulatory agencies including BOEM, FERC, USACOE, and USFS on large-scale energy projects, such as offshore wind farms and inter-state pipelines, in multiple states across the U.S. Dr. Malloy meets the U.S. Secretary of the Interior's (36CFR61) Professional Standards for Historic and Prehistoric Archaeology.

Experience: 14 years experience in archaeology and 3 years of experience in cultural resources management.

Email: kevin.malloy@erm.com

Education

- Ph.D. Anthropology, University of Wyoming, USA, 2015
- M.Res. Environmental History, University of Stirling, United Kingdom, 2010
- B.A. Anthropology and History, University of Minnesota, 2009

Professional Affiliations and Registrations

- Register of Professional Archaeologists
- Society of American Archaeology

Languages

- English native speaker

Fields of Competence

- Zooarchaeology
- Bioarchaeology
- Landscape archaeology
- Environmental archaeology
- Cultural Resources Management
- Technical writing/editing
- Phase I,II, and III archaeological field investigations
- Corporate training
- Section 106 of the National Historic Preservation Act

Key Industry Sectors

- Wind Energy
- Oil and Gas
- Power

Publications

- Kevin Malloy and Derek Hall, 2018. "Archaeological Excavations of the Royal Kincardine Landscape in Aberdeenshire". In *Medieval Archaeology.* 62:1:157-176
- Kevin Malloy and Derek Hall, 2018 (online; 2019 in press). "Medieval Hunting and Wood Management in the Buzzart Dykes Landscape". In *Environment and History.*

Key Projects

Principal Investigator – Energy Client, Pipeline – NEPA Project – 2019-2021
Principal investigator conducting a Class III (Phase I) intensive cultural resource inventory of a 60 mile proposed pipeline through North Dakota under the jurisdiction of the FERC. Key tasks include survey coordination, leading Phase I surveys, consultation with the SHSND and coordination with Tribal stakeholders.

Section 106 Support – Energy Client, Offshore Wind Energy Project – NEPA Project –2021
Cultural resource specialist supporting the Bureau of Ocean Energy Management navigate the Section 106 consultation process for a wind project off the east coast of the United States.

Principal Investigator – Energy Client Pipeline – NEPA Project 2021
Principal investigator conducting a Phase II archaeological investigation on a prehistoric site in Minnesota within a proposed Pipeline corridor. Assessed the NRHP eligibility of the site within the Project APE.

Section 106 Support – Energy Client, Pipeline – NEPA – 2020-2021Project
Cultural Resource Specialist in charge of writing Resource Report 4 for a three mile pipeline project in Illinois. Other tasks include planning and budgeting fieldwork, coordinating field crews, health and safety compliance, and report writing.

Section 106 Support – Energy Client, Offshore Wind Energy Project – NEPA Project – 2020-2021
Cultural resource specialist supporting the Bureau of Ocean Energy Management navigate the Section 106 consultation process for a wind project in Massachusetts. Key tasks include creating guidance documents for mitigation proposals, producing PowerPoint slides for consultation meetings, compiling meeting summaries, contributing to the Revised Finding of Adverse Effect (FoAE) document, the Supplement to the FoAE, and the Memorandum of Agreement.

Principal Investigator – Energy Client, Pipeline – NEPA Project – 2019-2021
Principal investigator conducting a Class III (Phase I) intensive cultural resource inventory and archaeological testing (Phase II) of key sites on 100 miles of proposed pipeline through North Dakota under the jurisdiction of the FERC. Key tasks included: intensive background research, data management and analysis using ArcGIS, conducting consultations with Tribal stakeholders, coordinating field crews, leading Phase I surveys and Phase II testing, creating site test plans, authoring the project Environmental Assessment for cultural resources, co-authoring Resource Report 4, serving as lead author for three major technical reports detailing the findings of the 2019 and 2020 fieldwork, and coordinating with the USFS, USACOE, and SHPO. A cultural avoidance and monitoring plan (treatment plan) was also developed as part of this work.

Principal Investigator – Energy Client, Pipeline – NEPA Project – 2019
Principal investigator for a feasibility study that examined the archaeological resources within the corridor of a 300-mile proposed pipeline route across North Dakota and Minnesota. Assessed the potential difficulties pertaining to cultural resources the project was likely to encounter were they to move forward with the proposed route.

Principal Investigator – Energy Client, Pipeline – NEPA – 2019
Principal investigator conducting Class I literature search, and Class III (Phase I) intensive cultural resource inventory on approximately 80 miles of proposed pipeline in North Dakota. Key tasks included serving as crew chief for the field crew and conducting pedestrian and shovel test surveys.

Archaeologist – Energy Client, Pipeline – NEPA Project – 2019
Cultural resource specialist assisting with management of daily Phase I field data and technical report writing on a 93-mile proposed pipeline through Kansas and Oklahoma under the jurisdiction of the FERC. Key tasks included daily QA/QC review of incoming field data and writing the environmental background and prehistoric cultural context for Oklahoma and Kansas.

Archaeologist – Energy Client, Pipeline – NEPA Project – 2018-2019
Cultural resource specialist in charge of Phase I survey shovel test data management from approximately 520 miles of pipeline through Texas and Oklahoma under the jurisdiction of the USACE. Managed tens of thousands of shovel test entries in Microsoft Excel and reporting on archaeological sites identified through the Phase I work. Key tasks included data management and data QA/QC, figure and table preparation, authoring site descriptions of new archaeological sites encountered, and managing the reports of three additional report writers.

Archaeologist – Energy Client, Pipeline – NEPA Project – 2019
Cultural resource specialist working on the production of a Phase I Archaeological Survey Addendum Report on approximately 164 miles of pipeline through West Virginia under the jurisdiction of the FERC. Key tasks included conducting a review of areas associated with all FERC Level 3 Variances to assess any existing or potentially present cultural resources.

Key International Projects

Scientific Recovery Expert - SNA-International/Defense Pow/MIA Accounting Agency – Mission 18-3VN – Kham Duc, Vietnam Recovery Operation – 2018
Scientific Recovery Expert (SRE), assigned to a case involving a MIA soldier in Kham Duc, Vietnam. Key tasks included background research on associated incident, creation of the Phase III project design, daily organization of archaeological tools and materials, daily on-site management of 14 U.S. military personnel and 57 local workers, supervision of all excavation and scientific recovery operation and decision-making, analysis of cultural and human-remains related evidence, daily progress reporting, maintenance of a legally binding field notebook, transportation of all culturally and biologically significant materials from Vietnam to Hawaii, and final report writing of mission outcomes.

Visiting Researcher – University of Wyoming – Alm Rock Shelter Project – Laramie, Wyoming – 2018
Visiting researcher conducting faunal analysis on archaeological material collected from the Alm Rock Shelter in the Bighorn Mountains over the course of 5 months. Key tasks included data management, detailed analysis of 20,000+ animal bones, and database construction.

Archaeological Consultant – Canyon Creek Archaeological Project – Tensleep Wyoming – 2017
Archaeological consultant on a Phase I/II investigation and testing of rock shelters in the Canyon Creek area of the Bighorn Mountains. Key tasks included managing and supervising excavation blocks, archaeological reporting, and instruction of undergraduate students in proper archaeological methodologies.

Archaeological Consultant/Co-director – The Big Dig – Chancefield Trenches conducted by the Living Lomonds Landscape Partnership, Falkland Scotland, UK – 2016
Archaeological consultant/co-site director of all on-site excavations. This Phase III project focused on a landscape anomaly located within the grounds of Falkland Palace, and incorporated both prehistoric and historic components. Key tasks included instruction of archaeological methodologies to public

volunteers, collection and management of collected cultural materials, and site recording.

Project Director/Principal Investigator – Medieval Scottish Park Project – Scotland, UK – 2010-2015
Principal Investigator studying park landscapes across Scotland. Field work for this project focused primarily on the Phase II testing and Phase III excavations of three sites across eastern Scotland. In addition, it involved background research into 80+ Scottish sites and 3000+ English sites of similar style, form and age. Key tasks included project design, site investigation and survey, archival and background research, grant writing, site-direction, all archaeological analysis and interpretation, and reporting.

Teaching Assistant – University of Wyoming - Yanaorco Archaeological Field School – Cajamarca, Peru – 2012
Teaching assistant for the Phase III Yanaorco Peruvian Field School, operated by the University of Wyoming. Yanaorco was a Late Intermediate Period, high elevation village. Key tasks included directing multiple excavation blocks, and supervising and instructing undergraduate students in archaeological methodologies.

Archaeological Field Technician –Mining Client – LTA – Riverton, Wyoming – 2011
Conducted Phase I archaeological surveys on a former Uranium mine. Key tasks included identification of archaeological materials and delineation and recording of archaeological sites.

Archaeological Field Technician –Cement Client – LTA – Laramie, Wyoming – 2010
Conducted Phase I archaeological surveys in the Laramie Range for a planned quarry. Key tasks included identification of archaeological materials and delineation and recording of archaeological sites.

Archaeological Volunteer – Discovery Programme – Tulsk, Co. Roscommon, Ireland – 2007, 2009
Worked with the Discovery Programme's Medieval Rural Settlement Project on the Phase III archaeological excavation of a multi-component site that spanned the Mesolithic period through the early modern.

Other Relevant Work

Corporate Trainer Epic Systems Inc. 2014-2015
Trained medical clients in the safe and proper use of a pharmaceutical software in a clinical setting. This work included training large groups of clients simultaneously, creating PowerPoint presentations, and producing training materials.

Classes Taught

Instructor – Cultural Anthropology – Gogebic Community College – Ironwood, Michigan – 2018

Teaching Assistant – Ethnographic Methods – University of Wyoming – Laramie Wyoming - 2014

Instructor – World Archaeology – University of Wyoming – Laramie, Wyoming – 2013

Teaching Assistant – Bioarchaeology – University of Wyoming – Laramie, Wyoming – 2013

Teaching Assistant – Introduction to Archaeology – University of Wyoming – Laramie, Wyoming – 2012

Teaching Assistant – University of Wyoming, Yanaorco Field School – Cajamarca Peru – 2012

Teaching Assistant – North American Archaeology – University of Wyoming – 2011

Dominique Segura

Cultural Resource Specialist

Dominique meets the Federal qualifications [36 CFR61] for Architectural Historian. She has professional experience in architectural survey, research, writing and compiling cultural resource reports for submission to federal and state agencies. She also has experience documenting and assessing historic buildings, researching historic documents (primary and secondary resources), conducting architectural reconnaissance surveys for historic resource inventories. Her own research interests includes nineteenth and early twentieth century's industrial buildings in France and the Midwest.

Experience: two years of experience in the field of Cultural Resource Management
LinkedIn: https://www.linkedin.com/in/dominiquesegura
Email: dominique.segura@erm.com

Professional Affiliations & Registrations

- American Institute of Architects

Fields of Competence

- Architectural drafting
- Building Imaging Modeling
- Architectural surveys and evaluations
- Archival research
- National Register of Historic Places eligibility evaluation and assessments for historic resources
- Historic Structure Reports
- Cultural Resource Survey and Reporting for the Federal Agency FCC

Education

- M A. Historic Preservation, Savannah College of Art and Design, U.S, 2018
- Bachelor of Architecture, Philadelphia University, U.S, 2016

Honors and Awards

- Philadelphia University Merit Award 2013-2016
- Kansas City AIA Lynda Erwin Young Scholarship 2012

Languages

- English, native speaker
- French, native speaker
- Spanish, working knowledge

Key Industry Sectors

- Telecommunications

Key Projects

Telecommunications Client, Nationwide (2019-Present)

Lead Architectural Historian for a nation-wide NEPA Compliance Program for a Telecommunications Client. Conducted research, field survey and cultural resource reports in compliance with state, and federal regulations.

Energy Client, Virginia, U.S.A., 2021

Conducted architectural history field surveys and assessed previously-listed and unlisted historic structures within the transmission line project's area of potential effect. Evaluated the viewshed of historic structures toward the proposed project. Determined the project's impact on the historic resources, their eligibility for inclusion in the National Register of Historic Places. Worked on historic structure reports for cultural resources to mitigate project effects.

Projects Prior to Joining ERM

M.A project, Grand Avenue Garage
Kansas City, MO 2017
Field surveyed and researched historic documents to evaluate a historic building with potential for rehabilitation. Developed a feasibility study and redevelopment proposal for the historic resource supported by a market study, cost estimations and pro analysis forma.

M.A project, Old Imperial Brewery
Kansas City, MO 2017
Field surveyed a historic industrial building and researched historic documents to develop a nomination form for listing on the National Register of Historic Places.

M.A project, Historic Perfumeries of Grasse
Grasse, France 2018
Extensively surveyed, mapped, researched, documented and assessed the conditions of forty plus historic industrial buildings in the city of Grasse in the Provence region of France.

Matthew Robinson

Principal Consultant | Visual Assessment

As a visual assessment expert, Matthew has authored Visual Impact Assessments for a variety of projects including but not limited to, Renewable Energy (wind, solar, hydro), Transmission (reliability, renewable energy, above ground and below ground, substation), Miscellaneous (renewable energy battery storage, port infrastructure, highway and bridge reconstruction, and multi-use paths). This included, open houses, public information meetings, additional outreach. He has also provided testimony on both projects that he authored and projects that he participated as a reviewer.
Matthew also has a great depth of knowledge and participates in the design, permitting and construction of various mitigation measures focusing on the installation of native, environmentally beneficial vegetation.

Experience: 15 years' experience in Visual Assessment, mitigation design, visual simulation production, renewable permitting and public outreach.

Email: Matthew.Robinson@erm.com

LinkedIn:
https://www.linkedin.com/in/matthewrobinsonerm

- Master. Landscape Architecture, Cornell University, USA, 2010
- BA. Political Science, University of Vermont, USA 2005

Languages

- English, native speaker

Fields of Competence

- Visual assessment
- Renewable permitting
- Vegetative mitigation design for,
  - Solar projects
  - Transmission corridors
  - Substation construction and,
  - Battery storage
- Public Outreach
- Expert testimony

Key Industry Sectors

- Renewables
- Transmission
- Mitigation
- Transportation

Key Projects

Quitman II Solar Energy Project, GA
Provided a vegetative mitigation design in response to local requirements leading to bid document review for a 150 MW solar project located in Brooks County, Georgia.

Chesapeake Solar Project, VA
Provided a vegetative mitigation review and design in response to local requirements for a 118 MW solar project located in the City of Chesapeake, Virginia.

Key Projects Prior to Joining ERM

Mohawk Solar Project, NY
Provided written testimony, participated in multiple public outreach and town board presentations, responsible for development of VIA and designed conceptual mitigation plans all in accordance with New York State Article 10 law, of the proposed 90 MW solar project located in Montgomery County, New York.

Flint Mine Solar Project, NY
Provided written testimony, participated in multiple public outreach and town board presentations, responsible for development of VIA and designed conceptual mitigation plans for the proposed 100 MW solar project located in Greene County, New York.

Horseshoe Solar Energy Center, NY
Participated in multiple public outreach and town board presentations, responsible for development of VIA and designed conceptual mitigation plans for the proposed 180 MW solar project located in Livingston and Monroe, Counties, New York.

Morris Ridge Solar Energy Center, NY
Participated in multiple public outreach and town board presentations, responsible for development of VIA and designed conceptual mitigation plans for the proposed 180 MW solar project and 83 MW of battery storage, located in Livingston County, New York.

South Ripley Solar and Storage Project, NY
Participated in multiple public outreach and town board presentations, responsible for development of VIA and designed conceptual mitigation plans for the proposed 270 MW solar project and 20 MW of battery storage, located in Livingston County, New York.

Hemlock Ridge Solar Project, NY
Participated in public outreach, responsible for development of VIA and designed conceptual mitigation plans for the proposed 200 MW solar project, located in Orleans County, New York.

Baron Winds Project, NY
Responsible for development of a VIA in accordance with New York State Article 10 Law. Participated in public outreach, for the proposed 69-turbine wind power facility, located in Steuben County, New York.

Canisteo Wind Farm, NY
Responsible for development of a VIA in accordance with New York State Article 10 Law. Participated in public outreach, for the proposed up-to 120-turbine wind power facility, located in Steuben County, New York.

Bluestone Wind Farm, NY
Responsible for development of a VIA in accordance with New York State Article 10 Law for the proposed up-to 40-turbine wind power facility, located in Broome County, New York.

Alle-Catt Wind Farm, NY
Responsible for development of a VIA in accordance with New York State Article 10 Law for the proposed up-to 117-turbine wind power facility, located in Allegany, Cattaraugus and Wyoming Counties, New York.

High Bridge Wind Farm, NY
Responsible for development of a VIA in accordance with New York State Article 10 Law for the proposed

up-to 25-turbine wind power facility, located in Chenango County, New York.

Heritage Wind Farm, NY
Responsible for development of a VIA in accordance with New York State 94c Law for the proposed up-to 185 MW wind power facility, located in Orleans County, New York.

Alamo Solar Farm, OH
Provided expert witness testimony to the Ohio Public Utility Commission and was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 69.9 MW solar power facility located in the Preble County, Ohio.

Angelina Solar Farm, OH
Provided expert witness testimony to the Ohio Public Utility Commission and was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 80 MW solar power facility located in Preble County, Ohio.

Hillcrest Solar Farm, OH
Responsible for development of a VIA in accordance with Ohio Power Siting Board law, community outreach, field photography and preparation of visual simulations for a proposed 200 MW solar power facility located in Brown County, Ohio.

Willowbrook Solar Farm, OH
Responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, identification of visual sensitive resources, community outreach, field photography, preparation of visual simulations and testimony for a proposed 150 MW solar power facility located in Brown and Highland Counties, Ohio.

Arche Solar Farm, OH
Provided expert witness testimony to the Ohio Public Utility Commission and was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 107 MW solar power facility located in Fulton County, Ohio.

Juliet Solar Farm, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 101 MW solar power facility located in Fulton County, Ohio.

Wheatsborough Solar, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 125 MW solar power facility located in Erie County, Ohio.

Powell Creek Solar, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 150 MW solar power facility located in Putnam County, Ohio.

Tymochtee Solar, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 120 MW solar power facility located in Wyandot County, Ohio.

Sycamore Creek Solar, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 117 MW solar power facility located in Crawford County, Ohio.

Clearview Solar, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a

proposed 144 MW solar power facility located in Champaign County, Ohio.

Union Ridge Solar, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 107.7 MW solar power facility located in Licking County, Ohio.

Madison Solar, OH
Provided expert witness testimony to the Ohio Public Utility Commission and was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 196 MW solar power facility located in Madison County, Ohio.

Yellowbud Solar, OH
Provided expert witness testimony to the Ohio Public Utility Commission and was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 274 MW solar power facility located in Ross and Pickaway Counties, Ohio.

Ross County Solar, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, including, design of a conceptual mitigation plan for a proposed 120 MW solar power facility located in Ross County, Ohio.

Timber Road IV Wind Farm, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, for an up-to 54-turbine wind power facility, located in Paulding County, Ohio .

Republic Wind Farm, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, for an up-to 80-turbine wind power facility, located in Seneca and Sandusky Counties.

Emerson Creek Wind Farm, OH
Was responsible for development of a VIA in accordance with Ohio Power Siting Board law, for an up-to 87-turbine wind power facility, located in Erie and Huron Counties, Ohio.

Otter Creek I & II Solar Projects, VT
Working as an expert witness representing the State of Vermont, provided a peer review of developer's visual assessment of the 4.9 and 2.2 MW projects located in Rutland County, Vermont.

Ryegate GLC Solar, VT
As an expert witness representing the State of Vermont, provided a peer review of developer's visual assessment of the and proposed mitigation measures, including testimony of a developer's visual assessment of a 500 kW solar array, located in Caledonia County, Vermont.

Battle Creek 1 Solar Project, VT
As an expert witness representing the State of Vermont, provided a peer review of developer's visual assessment of the 2.2 MW project located in Bennington County, Vermont.

Warner Solar Project, VT
As an expert witness representing the State of Vermont, provided a peer review of developer's visual assessment of the 2.2 MW project located in Bennington County, Vermont.

Richville Road Project, VT
As an expert witness representing the State of Vermont, provided a peer review of developer's visual assessment of the and proposed mitigation measures, including testimony of a developer's visual assessment of a 500 kW solar array, located in Bennington County, Vermont.

Nichomaus Run Solar Farm, NJ
Provided review of proposed project mitigation and acted as an expert witness during public and town

meetings for a dual 150 MW solar project and sheep farm located in Salem County, New Jersey.

Buckshutem Solar I, NJ
Provided review of proposed project mitigation and acted as an expert witness during public and town meetings for a 60 MW solar project located in Cumberland County, New Jersey.

Harmony Plains Solar, NJ
Provided review of proposed project mitigation and acted as an expert witness for the developer in regard to a 70 MW solar project located in Warren County, New Jersey.

Ben Sussman

Technical Director

Ben manages and provides subject matter expertise for third-party NEPA (and state equivalent) evaluations of major capital projects in the renewable and conventional energy sector and the oil and gas industry, as well as impact assessment projects for public infrastructure and mining projects worldwide. He has special expertise in socioeconomics, land use, recreation, transportation, and visual impact assessment, including application of BOEM, BLM, and USFS visual impact assessment methodologies. He also oversees large public comment management processes. As one of ERM's lead transportation planners, Ben regularly evaluates vehicular, rail, and waterborne transportation impacts and prepares related management plans. As a land use planner, he has prepared comprehensive land use plans and community plans for small and large cities and unincorporated communities.

Experience: 20 years' experience managing and providing subject matter expertise for EIS/EA projects in renewables, public infrastructure, oil and gas, and mining worldwide.

Email: ben.sussman@erm.com

LinkedIn: https://www.linkedin.com/in/bwsussman

Education

- MCRP (City and Regional Planning), Georgia Tech, USA, 2002.
- B.S., Science, Technology, and Society, Stanford University, USA, 1998.

Languages

- English, native speaker
- French, proficient
- Spanish, basic

Fields of Competence

- NEPA environmental impact statements and environmental assessments, and, state equivalents
- FERC applications and third-party NEPA documents
- IFC-compliant Environmental and Social Impact Assessments
- Transportation planning
- Socioeconomics
- Visual impact assessment
- Public Scoping and public information management

Key Industry Sectors

- Power/Renewables
- Transportation
- Government/Infrastructure
- Mining
- Oil & Gas

Key Projects: ESIA and Related Efforts

Confidential Project ESHIA, Guyana
Onshore and marine transportation subject matter expert for an IFC-compliant ESHIA evaluating proposed development of a subsea oil field offshore of Guyana. Evaluated the impacts of the oil field exploration and development on roads, port, and harbor facilities in and around Georgetown, Guyana's capital.

Confidential Project ESHIA, Vietnam
Onshore and marine transportation subject matter expert for an IFC-compliant ESHIA evaluating proposed development of a natural gas project that involves offshore extraction and onshore processing and export, in Vietnam.

INZAG: ESIA for Expansion of N2 Motorway, Ghana
Transportation planner evaluating the traffic and safety impacts of dualization of a segment of the existing N2 motorway between Tema and Atimpoku on the Volta River, as part of an IFC-compliant ESIA for the project.

Confidential Client: Traffic data collection and Best Practice Study for Proposed Mine, Serbia
Designed and supervised traffic data collection and analyzed baseline traffic data for the Jadar lithium-boron mine in western Serbia. Prepared a best-practice study, summarizing management and mitigation measures for transport of industrial non-hazardous waste from the mine to using public roads.

Various Clients: Transportation Impact Analysis for Proposed Wind Farms, Argentina
Prepared transportation analyses for three separate proposed wind farms in southern and central Argentina. The analyses were part of a Supplemental Lender Information Package submitted to secure project funding from the U.S. Overseas Private Investment Corporation (OPIC).

Confidential Client: ESIA for Proposed Oil Refinery, Kazakhstan
Transportation subject matter expert for an ESIA for a proposed oil refinery in northwestern Kazakhstan. Evaluated vehicle and rail traffic associated with project construction and operation.

Confidential Client: ESHIA for Power Plant Upgrades, Kosovo
Prepared a transportation analysis as part of an IFC-compliant ESHIA for proposed upgrades to an existing power plant near Prishtina. Researched existing traffic conditions and evaluated traffic function and safety impacts throughout Kosovo, and the surrounding region (Albania, Serbia, and Macedonia).

Confidential Client: ESHIA for Oil and Gas Exploration Project, Albania
Responsible for development of a traffic study (incorporated into an IFC-compliant ESIA) documenting existing and likely future traffic and transport safety conditions associated with construction and development of a proposed petroleum field in the central portion of Albania.

Confidential Client: Traffic Management Plan Review, Nigeria
Reviewed the Traffic and Safety Management Plan—a component of the Master Environmental and Social Management Plan for a proposed container port in Nigeria. Ensured that the plan met lender standards and adhered to international best practice for traffic operations and transportation safety practices.

Interamerican Development Bank: ESIA for Geothermal Energy Projects, Island of Nevis and Island of St. Vincent
Transportation subject matter expert for two IFC-compliant supplemental ESIAs, each evaluating the construction and operation of a proposed geothermal energy development. The Nevis project would include geothermal production on the slopes of Nevis Island's Nevis Peak volcano, while the St. Vincent

project evaluated the exploratory drilling phase of proposed geothermal energy development on the slopes of St. Vincent Island's La Soufrière volcano. Tasks included evaluating impacts from drilling and other construction activity, as well as operations, including vessel-delivered materials and heavy truck activity on the limited road network of each island.

Confidential Client: Traffic Management Plan Review, Egypt
Reviewed and provided comment on traffic management plans for construction of three new combined-cycle power plants in Egypt. The review evaluated the applicant's overall methodology, with special focus on the management of abnormal loads, including waterborne and road transport.

Confidential Client: Transportation Study for proposed Ferro-Nickel Mine, Dominican Republic
Developed a traffic study (incorporated into an IFC-compliant supplement to an existing ESIA) for a proposed ferro-nickel mine in the central Dominican Republic. The document updated baseline conditions from a 2012 ESIA, and identified and analyzed transportation alternatives. Conducted an in-country evaluation of the haul route, and interviewed internal stakeholders.

IDB: ESIA for Lima Metro Expansion, Peru
Reviewed the ESIA for an expansion of the Lima metro (mass transit) system (construction of Lines 2 and 4), to identify potential gaps related to traffic, transportation, and safety. Provided recommendations for additional analysis and mitigation measures.

Confidential Client: ESIA for Natural Gas Field Expansion, Kazakhstan
Transportation Planner/subject matter expert for an ESIA for a proposed major expansion of a large natural gas field in Kazakhstan. Responsible for compilation of baseline data and information, and analysis of all transportation impacts of the project, which would involve road construction, and extensive vessel and rail deliveries of construction equipment, project components, and construction materials.

Confidential Client: Transportation Study for Proposed Iron Mine, Sierra Leone
Responsible for development of a traffic study (incorporated into an IFC-compliant ESIA) documenting existing and likely future traffic conditions associated with a proposed iron mine in Sierra Leone. The study evaluated the impact of the project's 45 km haul road, barge port, and barge traffic on transportation facilities and activities. Developed traffic study procedures and supervised traffic data collection and analysis.

Suralco: ESIA for Bauxite Mine, Suriname
Author of land use, transportation, and visual resources sections of IFC-compliant ESIAs (including baseline conditions, impacts, mitigation, and design of data collection procedures) for the Nassau Plateau, an aluminum mine in bauxite ore, and Para and Kankantrie bauxite mines. Designed traffic data collection methodology and incorporated findings into EIA chapters.

Confidential Client: Draft ESHIA for Proposed Resort Development, Bahamas
Evaluated transportation impacts of a planned resort on New Providence Island. Designed and managed traffic data collection and analysis for the existing and future road network. Prepared the ESIA section documenting level of service, safety concerns, and other transportation impacts. Conducted face-to-face consultations with public agencies.

Confidential Client: ESHIA for Natural Gas Development Program, CO
As the land use and transportation subject matter expert, evaluated the land use, transportation, public infrastructure, including water and sewer service, and local services impacts of a large-scale natural gas development project in the western United States. Conducted in-person consultation with local and

state government officials as well as stakeholders from nearby towns.

Confidential Client: ESIA for Proposed Gold Mine, Suriname
Task Manager for development of the land use and transportation sections an ESIA for a gold mine in Suriname. Developed traffic study procedures and supervised traffic data collection and analysis.

Barrick: Traffic Rapid Assessment for Pascua-Lama Mine, Chile and Argentina
Prepared a comprehensive evaluation of background transportation and traffic conditions affecting haul routes to and from the mine, existing and anticipated mine-related traffic, and recommended strategies to minimize and avoid delays and safety concerns for mine traffic. Conducted an in-country evaluation of the haul route, and interviewed internal stakeholders.

EBRD: Social Impact Assessment, Mongolia
As the project's socioeconomic subject matter expert, identified and quantified the socioeconomic impacts of a major coal development project in the south Gobi desert, including direct and indirect revenues (taxes, concession fees, and other revenue streams), jobs, and income for residents of the region and the nation. The Social Impact Assessment helped to justify EBRD investment in the project.

Various Clients, ESIA Transportation Analyses
Specialist responsible for analysis of transportation impacts for IFC-compliant Environmental and Social Impact Assessments (ESIAs) and related transportation management plans for projects worldwide. Notable projects include:

- New port and access road, Trinidad and Tobago (ongoing)
- Copper mine expansion, Serbia (ongoing)
- Tamale airport expansion, Ghana (2018)
- Wind farm, Djibouti (2018)
- Power plant, Benin (2018)
- Hydropower project (separate ESIAs for two phases), Sierra Leone (2014, 2016)
- Iron mine, including 45km haul road and barge traffic, Sierra Leone (2014)

Key Projects: NEPA and Equivalent (USA)

FERC: Alaska LNG EIS
Senior subject lead responsible for analysis of impacts on land use, visual impacts, recreation, and terrestrial and marine transportation for the proposed Alaska LNG project. The project included a Gas Treatment Plant and associated facilities in Prudhoe Bay and a LNG export terminal on the Kenai Peninsula, connected by a 806-mile, 42" diameter buried natural gas pipeline that transects the state. The visual impact assessment reflected BLM's Visual Resources Management (VRM) methodology, as well as emerging National Park Service visual impact assessment guidance. The project was the largest and most complex EIS in FERC history.

Confidential Client, WA: SEPA Vessel and Rail Transportation Study
Prepared a vessel and rail transportation analysis in support of a SEPA application for a renewable fuels project in the Puget Sound Region. The analysis evaluated three transportation scenarios for both feedstock and refined products, using both vessels and railroads.

Montana Department of Environmental Quality: Black Butte Copper EIS, Meagher County, MT
Transportation subject matter expert for a third party EIS for the proposed Black Butte Copper project in Meagher County Montana. Responsibilities included writing the transportation section of the EIS. Facilitated two of the Project's public scoping meetings and comment sessions in November 2017.

Skagit County, WA: Tesoro Clean Products Upgrade Project EIS
Subject matter expert responsible for transportation and visual impact assessment sections of a third-party State of Washington EIS for the proposed Clean Products Upgrade Project at Tesoro's

Anacortes refinery in Skagit County, WA. The EIS included a detailed assessment of marine transportation, as well as marine spill modeling.

U.S. Coast Guard: EIS for Northeast Gateway Energy Bridge, MA
Wrote and researched EIS sections pertaining to Land Use, Ocean Use, Transportation, Recreation, and Visual Resources, for a then-proposed (now permitted and operational) offshore LNG terminal in Massachusetts Bay.

U.S. Department of State: Keystone XL EIS
Supervisor of the public comment response process for the scoping, Draft Supplemental EIS, and National Interest Determination (NID) phases of this highly controversial third-party EIS. Federal and state agencies, tribes, and individuals around the world provided more than 400,000 comments during the scoping period, more than 1.5 million comments on the Draft Supplemental EIS, and more than 3 million comments for the NID. Also served as author of the Land Use, Recreation, Visual Resources, and Transportation sections of the Supplemental EIS.

Key Projects: Applicant Support

Dominion Virginia Power: Idylwood to Tysons Transmission Line Upgrade Application, VA
Prepared a visual impact assessment (VIA) and a transportation impact assessment as part of an application to the State Corporation Commission (SCC) of Virginia, for a proposed new 230 kV transmission line in the Tysons Corner area of Fairfax County. The SCC application was approved in December 2017.

Confidential Client: Impact Assessment for Ethane Cracker Facility, PA
Deputy project manager for preparation of a full Impact Assessment document, evaluating the environmental, social, and transportation impacts of construction and operation of a proposed ethane cracker facility. Responsible for overall document preparation, management of budget and deliverable schedule. Also served as Transportation and visual impact subject matter expert.

Confidential Clients: Regional Social Impact Assessments, Marcellus Shale Region, US
Lead author for one study and transportation subject matter expert for a separate evaluation of the social impacts of regional unconventional natural gas extraction programs for two separate major oil and gas companies. Responsible for collection and analysis of traffic data, development of future transportation scenarios, description of anticipated impacts, and recommended mitigation measures. and issues related to Native American tribes.

Confidential Client: Wind Farm Transportation Study, WY
Prepared a Transportation Study in support of an application to the Wyoming Industrial Siting Division, evaluating the impacts of a proposed 300 MW wind farm on the road, rail, and air transportation network in a two-county area in southeastern Wyoming. Evaluated peak hour levels of service (LOS) and broader safety concerns related to the movement of wind turbine components on public roads.

Curriculum Vitae (CV)

Proposed Position: Civil Engineer/ Transportation Planner

Name of Firm: CEMCO Inc.

Name of Staff: **Edward Gonsalves**

Nationality: Guyanese

EDUCATION

INSTITUTION	DEGREE/ DIPLOMA/ CERTIFICATES	YEAR
Purdue University	Masters of Science in Transportation	1978
Oklahoma State University	Degree in Civil Engineering	1968

Period	Employing organization & your title/ position. Contact info for references.	Country	Summary of activities performed relevant to the Assignment
July 2014 To present	EXP Services Inc. in association with CEMCO Inc. **Team Leader** Client: Ministry of Public Works For references: Name: Geoffrey Vaughn Tel: +592 223 0905 ext. 340 Email: wsg@publicinfrastructure.gov.gy	Guyana	**Project A. West Bank and Canal's polders Roads, IDB project.** Activities performed; This was a design project funded by the IDB. The key activities performed on this project include Project management and Planning, Coordinating of activities, survey of the project roads (RTK), traffic counts, axel load study, drainage analysis, roughness of the existing roads, subsurface investigation, by DCP and Benkelman Beam, etc. The design including widening the existing roads to include bicycle lanes, lengthening culverts, relocation of utilities, laying geotextile fabric for soil strengthening, embankment fill etc. Costing the various alternatives and preparation of contract documents was also included in the project.
Dec 2012 to August 2013	Marcel Gaskin and Associates **Position:** Design Engineer Client: Ministry of Public Works	Guyana	**Project B Feasibility Study and Design for widening the East Coast Road from Better Hope to Bell Field to four lanes** Activities performed: Design of the East Coast Road. Funded by the Kuwait Fund. Estimate cost for the road improvement US 75M

	For references: Name: Geoffrey Vaughn Tel: +592 223 0905 ext. 340 Email: wsg@publicinfrastructure.gov.gy		Submit five alignments for consideration by the client. Propose widening the existing road to four lanes. This includes all structures, a full median with turning and storage lanes, street lighting throughout, concrete drains, guardrails and traffic signals where necessary. Widening existing road to four lanes including bridges and culverts, Bill of Quantities and preparation of contract documents were included Traffic counts, subsurface investigations were required.
May 2011 to Sept 2011	Simpson Oil Company Independent Consultant Client: Simpson Oil Company For reference Bob Kirby Tel: +246 262 0641 E mail rkirby@rskirby com	Guyana	**Project C Economic analysis of a 11,000 farm (Santa Fe) by preparing estimates for roads within the development as well as roads from the development to Lethem. on the Brazilian border.** Activities performed; - Designing approximately 110 Km of internal farm to market roads including specifications - Prepare BOQ and contract documents for these roads including specifications - Prepare estimates to upgrade 54km of laterite roads from the site at Santa Fe to Lethem. Location of material was required. Worked with a team of Agricultural economists to investigate the best crops that could be grown at Santa Fe and determine the feasibility of growing such crops prior to designing and costing the above mentioned roads. Specifications bill of quantities and contract documents. Also located road building material.
June 2010 to March 2011	SRKN'gineering **Position:** Team Leader Client: Ministry of Public Works For references: Name: Geoffrey Vaughn Tel: +592 223 0905 ext. 340 Email: wsg@publicinfrastructure.gov.gy	Guyana	**Project D Construction Supervision of the East and West Canje Roads Region 6 Guyana. Funded by the IDB- 8.6 M.** Activities performed; Reconstruction of approximately 19Km of town and village roads, 4.6 Km in West Canje and 14 in East Canje Construction of Eight (8) bridges using pre stressed components Construction of Twenty-One (21) culverts using pre cast elements. Eight HDPE (8) culverts.Supervised a staff of three engineers, an environmental specialist, a survey crew, and supporting staff to ensure the works were carried out in accordance with the design and specifications
March 2010 to June 2010	Synergy Holdings **Position:** Project Manager	Guyana	**Project E. Location of Sections 1 through 6 of the access road to the Amalia Falls Dam site** Activities performed; Determine from maps

	Client: Ministry of Public Works For references: Name: Geoffrey Vaughn Tel: +592 223 0905 ext. 340 Email: wsg@publicinfrastructure.gov.gy		the most suitable alignments for the various sections of the road to The Amalia Falls hydro power site. With a staff of four located the alignment on the ground making suitable adjustments based on the field conditions. Prepared estimates and bill of quantities
Sept 2009 to Feb 2010	First Bauxite Corp- **Position:** Project Engineer Name: Hilbert Shields Tel: +592 226 8153 Email: hshields@firstbauxite.com	Guyana	**Project F. Consultant for the design of a mining road from the Bonasika mining site to Sand Hills on the Demerara River, Region 3 Guyana** This project consists of;- Designing 23.5 Km of laterite surfaced road to International Mining Road Standards. Twelve meter top width 510 mm Structural thickness One short bridge structure over the Waratila Creek. Supervised a staff of one field Engineer a surveyor, and ten line men who gathered information in the heavily forested area. Two CAD office staff processed the field information into a preliminary then final design. Prepared project selection report, Draft Design Report,Final report, BOQ, specifications and contract documents. Also located road building material.
March 2007- Feb 2008	ND Lea Inc- **Position:** Resident Engineer Client: Ministry of Public Works For references: Name: Geoffrey Vaughn Tel: +592 223 0905 ext. 340 Email: wsg@publicinfrastructure.gov.gy	Guyana	**Project G. Construction Supervision of the Approach Roads to the Berbice River Bridge (urban environment) in Region 5 & 6 Guyana.** This project consisted of:- - Building approach roads measuring .6 km and 3.1 km respectively to the Western and Eastern ends of the bridge. - Geotextile used the entire length of the approach roads, Wick (PVD's) drains installed for 1.4 Km in very soft clay. - Soil strengthening using 6" diameter piles 12 m long for a length of 50 m at each abutment. - Twenty- Two (22) culverts. Work performed: - Supervised a staff of four engineers, an environmental specialist, a survey crew, and supporting staff to ensure the works were carried out in accordance

Oct 2006 – Feb 2007	Freelance Engineer **Position:** Team leader Client: LEAP(Linden Economic Advancement Program) For references: Name: Kathleen Whalen Tel: +592 600 2145 Email: kathleenwhalen2010@yahoo.com	Guyana	**Project H. Study to determine the cost of improving the road between Linden and Kwakwani.** This project consisted of:- - Surface thickness investigation by coring the road at 1Km intervals. In all over 100 holes investigated. - Walk through investigation to determine the condition of the road and measuring its width at many locations. - Traffic Analysis. Entailed a 12 hour traffic count at the intersection of the Ituni Rd and Montgomery mine road. - Location of road building materials along the road.. - Meeting with residents of Kwakwani to determine what are their priorities regarding road improvements. - Determine what volumes of base course and surface material required for reconstruction of the road - Improvement costs for the various sections of the road. - Prepare a report Work performed: - Supervised a staff of six technicians who carried out the works in accordance with my instructions
July 2003 to January 2004	**Louis Berger Inc** **Position:** Resident Engineer Client: APSH Highway Dept For references: Name: Jim Mc Clung Tel:202 331 7775 Email: jmoclung@louisberger.com	India	**Project I. Upgrading of 133 Km of State Highway, Package APSH-10, in Andhra Pradesh India.** This project consisted of: - Rebuilding 133 Km of existing 2 lane highway approximately 4.3 Km being increased to four lanes, 83.9 Km two lanes with paved shoulders and the remaining 44.8 Km without paved shoulders. The majority of the alignment went through towns and villages - Five major road bridges over a busy railway ROW. - Fifty multi span bridges using pre stressed deck girders - Two hundred and ninety culverts Works performed: - Supervised a staff of eleven engineers to ensure the works were carried out in accordance with the design and specifications.
October 2002 to	**Employer**: Louis Berger Inc	India	**Project J. Upgrading of approximately 2300 Km of Rural Roads in Andhra**

June 2003	**Position:** Senior Quality and Material Engineer Client: APSH Highway Dept For references: Name: Jim Mc Clung Tel: 202 331 7775 Email: jmoclung@louisberger.com		**Pradesh India. Funded by the World Bank. Value US $ 50.1 M.** Activities performed; - Supervised a staff of forty-three quality control engineers and three central laboratories. Work involved selection, testing and approval of materials prior to construction and field monitoring to ensure materials that were brought and used at site conform to the specifications.
October 1999 – May 2000	Employer: Wilbur Smith Associates **Position:** Highway Engineer Client: Ministry of Transport PMU 18, Hanoi Viet Nam For references: Name: Brian Stanley Tel: 803 758 4500 Email: bstanley@wilbursmith.com	Viet Nam	**Project K. Development of Road and Bridge Standards, Hanoi, Vietnam. Funded by the World Bank (IDA). ICB Value U.S. $ 1.1M.** Activities performed; - Responsible for the preparation of Highway Design Standards using "A Policy on Geometric Design of Highways and Streets 1994" AASHTO that was suitably modified to fit Vietnamese Conditions.
July 1994 - July 1999	Employer: Chas. H. Sells, Inc **Position:** Team Leader Client: Ministry of Public Works For references: Name: Geoffrey Vaughn Tel: +592 223 0905 ext. 340 Email: wsg@publicinfrastructure.gov.gy	Guyana	**Project L Reconstruction of the Essequibo Coast Road, Guyana, South America which consists of 37 miles of highway through towns and villages. Funded by the World Bank (IDA). ICB Value US $ 14.2M.** Activities performed; - Supervised a staff of three engineers, five inspectors and seven soil technicians to ensure the works were carried out in accordance with the design and specifications. - Assisted the client clear the R.O.W. - Rebuilding 37 miles of highway using both sand asphalt and granular base and bituminous concrete surfacing. - Reconstructing 16-timber multi span bridge superstructures and decks. - Placing 60 new concrete box culverts. - Rehabilitating the decks and wearing surfaces of 14 single span bridges.

Membership in Professional Societies: GAPE Guyana Association of Professional Engineers

Languages:

Language	Reading	Speaking	Writing
English	Excellent	Excellent	Excellent

Adequacy for the Assignment:-

Detailed Tasks Assigned on Consultant's Team of Experts	**Reference to Prior work/ Assignments that best illustrates capability to handle the Assigned Tasks**
Assisting in the preparation of the ➢ Inception Report ➢ Preliminary Access Report ➢ Project Selection Report ➢ Draft Design Report ➢ Final Report ➢ Prepare contract documents ➢ Preparation of Bill of quantities ➢ Prepare estimate ➢ Sub-surface investigation ➢ Traffic counts ➢ Location of road building material ➢ Specifications	Assignment 1 Name of Assignment: East Bank Road Widening from Diamond to Providence Year: December 2012 – December 2013 Location: Region 4 Guyana Client: Government of Guyana Main Project features: - Widening the East Bank Road from two to four lanes - Concrete drains in urban areas - Construction of six bridges using pre cast elements - Construction of four culverts - Relocation of utilities Positions held: Project management engineer Activities performed: - Assisted two contractors, (GEICO and BK International) manage their projects with special emphasis on scheduling the purchase of elements for the bridges.
	Assignment 2 Name of Assignment: Full feasibility Study and Design for widening the West Coast Rd from Parika to Vreed-en-Hoop Year: June 2012 - November 2012 Location: Region 3 Guyana Client: Government of Guyana Main Project features: - Add cycle lanes and street lighting throughout - Sidewalks, revetments and guardrails in some areas - Concrete drains in urban areas - Relocation of utilities Positions held: Team Leader/Design Engineer Activities performed: - Full feasibility study including social, environmental and drainage impacts. Design and costs for various alternatives

	included - Prepared specifications
	Assignment 3
	Name of Assignment: Feasibility Study and Design for widening the East Coast Rd from Better Hope to Belfield into four lanes Year: December 2011 - August 2013 Location: Region 4 Guyana Client: Government of Guyana Main Project features: - Widening existing road to four lanes. This includes all structures, a full median with turning and storage lanes, street lighting throughout, concrete drains, guardrails and traffic signals where necessary. Positions held: Design Engineer Activities performed: - Submit five alignments for consideration by the client. Full geometric design of preferred alignment. - Prepare specifications
	Assignment 4
	Name of Assignment: Feasibility Study and economic analysis for The Santa Fe farm (11,000 acres) Year: May 2011 - September 2011 Location: Region 9 Guyana Client: Simpson Oil Company Main Project features: - Worked with a team of Agricultural economists to investigate the best crops that could be grown at Santa Fe and determine the feasibility of growing such crops prior to designing and costing the above mentioned roads Positions held: Design Engineer Activities performed: - Designing 110 Km of internal farm to market roads - Prepared BOQ and bid documents for these roads - Prepared estimate to upgrade 54Km of the existing road from Santa Fe to Lethem Prepare specifications
	Assignment 5
	Name of Assignment: Construction Supervision of the East and West Canje Roads

Year: June 2010 - March 2011

Location: Region 6 Guyana

Client: GOG

Main Project features:

- Reconstruction of approximately 19 Km of town and village roads, 4.6 Km in West Canje and 14 in East Canje
- Construction of Eight (8) bridges using pre stressed components
- Construction of Twenty one (21) culverts using pre cast elements.
- Eight HDPE (8) culverts.

Positions held: Resident Engineer

Activities performed:
Redesign in several areas both layer thicknesses and geometric design of the project Supervised a staff of three engineers, an environmental specialist, a survey crew, and supporting staff to ensure the works were carried out in accordance with the design and specifications

Assignment 6

Name of Assignment: Design a mining road from the Bonasika mining site to Sand Hills on the Demerara River

Year: Sept 2009 - Feb 2010

Location: Region 3 Guyana

Client: First Bauxite Corp

Main Project features:

- 23.5 Km of laterite surfaced road to International Mining Road Standards.
- Twelve meter top width
- 510 mm Structural thickness
- One short bridge structure over the Waratila Creek.

Positions held: Design Engineer

Activities performed:

- Designing 23.5 Km of laterite surfaced road to International Mining Road Standards.
- Supervised a staff of one field Engineer a surveyor, and ten line men who gathered information in the heavily forested area. Two CAD office staff processed the field information into a preliminary then final design.

Assignment 7

Name of Assignment: Construction Inspection of the Ankang/Maboa

Expressway,

Year: March 2008 - March 2009

Location: Shaanxi Province China.

Client: Shaanxi Province.

Main Project features:

- Building approximately 86 Km of four lane expressway through the mountains in the Southern border region of Shaanxi Province.
- The entire project includes 1.1.M cum of Sub Grade Earthwork
- Ninety six bridges and viaducts with a total length of 39.4 km
- Seventeen tunnels with a total length of 23.9 km.
- Six interchanges, three service areas and three parking areas

Positions held: Team Leader

Activities performed:

- Supervising a staff of two engineers and supporting staff who prepared monthly, quarterly and annual progress reports for the World Bank

Assignment 8

Name of Assignment: Construction Supervision of the Approach roads to the Berbice Bridge

Year: March 2007 - Feb 2008

Location: Region 5 and 6 Guyana

Client: GOG

Main Project features:

- Building approach roads measuring 6 Km and 3.1 Km respectively to the Western and Eastern ends of the bridge
- Redesign the entire structural design of the road as well as the geometric design of the intersections with the East Coast Road and the Corentyne highway
- Geotextile installed the entire length of the road
- Wick drains installed for 1.4 Km in very soft clay through Crab Island.
- Twenty two culverts.

Positions held: Resident Engineer

Activities performed:

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Supervised a staff of four engineers, an environmental specialist, a survey crew, and supporting staff to ensure the works were carried out in accordance with the design and specifications.

	Assignment 9
	Name of Assignment: Construction Supervision for the widening and strengthening of existing 2 lane stretches KM 0+00 to KM 7+200 (Construction Package 48-1) KM 0+00 to KM 20+300 (Construction Package 48-2) and KM 35+400 to KM 58+700 (Construction Package 48-3) Year: March 2006- Sept 2006 Location: Nghe An and Thai Hoa Provinces, Vietnam Client: Government of Vietnam Main Project features: - Rebuilding 51Km of existing 2 lane highway in towns and villages and widening two lanes to 3.5 m and building varying widths of shoulders. - Fifteen minor bridges - One hundred and fifteen pipe culverts. Positions held: Resident Engineer Activities performed: Supervised a staff of four engineers, an environmental specialist, a survey crew, and supporting staff to ensure the works were carried out in accordance with the design and specifications
	Assignment 10
	Name of Assignment: Construction supervision for widening to four lanes and strengthening of existing two lane stretches from Km 180 to Km240 (Construction Package V-A) and Km 320 to Km 399 (Construction Package V-C)of National Highway 2 Year: February 2004 to March 2006 Location: Bihar and Jharkhand, States India Client: National Highway Authority of India Main Project features - Rebuilding 60 Kms of existing 2 lane highway through towns and villages into four lanes using rigid pavement. - Rebuilding 80 Kms of existing 2 lane highway into four lanes using flexible pavement. Most of the alignment was through urban areas - Five major bridges. One bridge over electrified railway tracks. - Five underpasses / overpasses - Thirty six bridges using pre stressed deck girders - One hundred and forty slab culverts - One hundred and ninety five pipe culverts Positions held: Team Leader

Activities performed:

The two packages were located eighty Km distance from each other. Total professional and sub- professional staff amounted to forty eight. Was in charge of project supervision for both construction packages. Acted as "Engineer". Superintendence over the Resident Engineers and other experts. Intimate liaison with the Client. Assisting the Client at Dispute Review Board hearings, financial control, approval of payments to the Contractor, preparation of variations, assessment of extension of time and associated costs.

Assignment 11

Name of Assignment: Upgrading of 133 Km of State Highway, Package APSH-10,

Year: July 2003 to January 2004

Location: Andhra Pradesh India

Client State of Andhra Pradesh India

Main Project features

- Rebuilding 133 Km of existing 2 lane highway approximately 4.3 Km being increased to four lanes, 83.9 Km two lanes with paved shoulders and the remaining 44.8 Km without paved shoulders. The majority of the alignment went through towns and villages
- Five major road bridges over a busy railway ROW.
- Fifty multi span bridges using pre stressed deck girders
- Two hundred and ninety culverts

Positions held: Resident Engineer

Activities performed:

- Supervised a staff of eleven engineers to ensure the works were carried out in accordance with the design and specifications

Assignment 12

Name of Assignment: Upgrading of approximately 2300 Km of Rural Roads

Year: October 2002 to June 2003:

Location: Andhra Pradesh India

Client State of Andhra Pradesh India

Main Project features

- Upgrading 252 single lane Rural Roads with a length of 2358 Km on their existing alignment. As much as 700Km of these roads were

village streets
- Building 75 bridges with a total length of 3885 m
- Constructing 1505 pipe culverts

Positions held: Senior Quality and Materials Engineer

Activities performed:
- Supervised a staff of forty three quality control engineers and three central laboratories. Work involved selection, testing and approval of materials prior to construction and field monitoring to ensure materials that were brought and used at site conform to the specifications.

Assignment 13

Name of Assignment: Reconstruction of Section R2/R3 Hwy. No.10 Vietnam

Year: July 2000 – May 2002

Location: Vietnam

Client: Government of Vietnam

Main project features:
- Rebuilding 65km of existing 2 lane highway approximately 15km being increased to 4 lanes with shoulders and sidewalks, the remaining two lanes with shoulders.
- Eleven single span and five multi span bridges founded on 50m poured concrete piles with pre stressed deck girders.
- Twenty box culverts.
- Seventy-two pipe culverts.
- Soft soil treatment including placing thousands of meters of Prefabricated Vertical Drains and monitoring the surcharge for settlement.

Position held: Resident Engineer

Activities performed:
- Supervised a staff of five engineers and five inspectors to ensure the works were carried out in accordance with the design and specifications

Assignment 14

Name of Assignment: Development of Road and Bridge Standards

Year: October 1999 – May 2000

Location: Vietnam

Client: Government of Vietnam

Main project features:

- Preparing Bridge Design Standards based on AASHTO

- Preparing Pavement Design Standards based on AASHTO
- Preparing Highway Design Standards based on AASHTO
- Preparing Construction Inspection Standards based on AASHTO

Position held: Highway Engineer

Activities performed:
- Responsible for the preparation of Highway Design Standards using "A Policy on Geometric Design of Highways and Streets 1994" AASHTO that was suitably modified to fit Vietnamese Conditions.

Assignment 15

Name of Assignment: Reconstruction of the Essequibo Coast Road

Year: July 1994 - July 1999

Location: Region 2 Guyana

Client: GOG

Main project features:
- Rebuilding 37 miles of highway using granular base and bituminous concrete surfacing.
- Was required to redesign many sections of the road
- Reconstructing 16-timber multi span bridge superstructures and decks.
- Placing 60 new concrete box culverts.
- Rehabilitating the decks and wearing surfaces of 14 single span bridges.

Position held: Team Leader

Activities performed
- Supervised a staff of three engineers, five inspectors and seven soil technicians to ensure the works were carried out in accordance with the design and specifications.
- Assisted the client clear the R.O.W.

Assignment 16

Name of Assignment: Design for the reconstruction of 2.3 miles of oodbury Road

Year: November 1991 - July 1994

Location: Nassau County

Client: Nassau County DOT NY

Main project features:

- Widen Woodbury Road North of Jericho Turnpike.

Position held: Project Manager for design

Activities performed
- Main design feature was the "Y" intersection of Woodbury Road and Syosset Road where several hundred feet of 20' high retaining wall was included in the design.
- Established capacity calculations for an existing retention basin to determine its ability to accommodate the additional storm flow resulting from the widening.

Assignment 17

Name of Assignment: Design for the rehabilitation of Bedford road

Year: June 1990 - March 1992

Location: Westchester County

Client: Westchester County DOPW NY

Main project features:
- Involved cutting back a rock slope to improve horizontal sight distance.

Position held: Project Manager for design

Activities performed
- Designed removal of a rock slope to improve horizontal sight distance.
- Prepared a report which analyzed the alternate methods of rock removal and
- recommended the preferred method.
- Provided liaison and coordination with the Client

Assignment 18

Name of Assignment: Design of signalized intersection improvements

Year: January 1990 – November 1991

Location: Putnam County

Client: Department of Highways and Facilities, Putnam County NY

Main project features:
- Signalized Intersection Improvements

Position held: Project Manager for design

Activities performed
- The first phase of this project entailed a traffic study and report for

the redesign of three Intersections

- The report involved the investigation of accident reports and roadway configurations. Upon acceptance of the recommended solution, the design and documents were prepared by Mr. Gonsalves.

Assignment 19

Name of Assignment: Design for the widening of Ruland Rd

Year: February 1987 – June 1991

Location: Suffolk County

Client: Department of Highways, Suffolk County NY

Main project features:

- New road realignment.
- Extensive R.O.W. with over five acres of takings.
- Utility relocation

Position held: Design Engineer

Activities performed

- Entailed writing the design report and preparing the design for widening 1.6 miles of two- lane roadway into four lanes.
- New road realignment.
- Extensive R.O.W. with over five acres of takings.
- Design of two retention basins.

Assignment 20

Name of Assignment: Design for Route 1 (Boston Post Road) over the tro North railway

Year: January 1984 – March 1987

Location: Westchester County NY

Client: New York State DOT

Main project features:

- Entailed widening the Boston Post Road from two lanes to four
- Redesign of several intersections and driveways.
- Extensive relocation of utilities

Position held: Design Engineer

Activities performed

- Redesign the Boston Post Road from two lanes to four
- Grade changes resulted in the redesign of several intersections and driveways.

	- Drainage study.
	Assignment 21
	Name of Assignment: Design for the widening of Route 304 Year: March 1984 – July 1986 Location: Orange County NY Client: New York State DOT Main project features: - Widening of Route 304 from two to four lanes. - The design entailed two separate lanes, a 16 ft. medium, several signalized intersections, and acceleration, deceleration, and turning lanes associated with the intersections. Position held: Design Engineer Activities performed - Designed the widening of Route 304 from two to four lanes. - The design entailed two separate lanes. - Included an in-depth drainage study

Lacey Williams Transportation Engineer, M.Eng, MITE, MAPETT, R.Eng

11 Moreno Circle, Golden View II, El Dorado, Trinidad and Tobago

Daytime Phone: 868.299.8920 Email: lacey.williams@caritransltd.com

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SUMMARY OF EXPERIENCE

Mr. Williams has been a practicing civil engineer in Trinidad and Tobago from June 2000. Mr. Williams, through the completion of his masters' degree in transportation engineering at Howard University, specialized in traffic safety and operations, and as such brings a wealth of knowledge on best practice in this field. He has conducted several studies across the Caribbean region related to urban transportation planning, traffic engineering, data collection and road safety. His project experience in Guyana dates to 2014 from whence he has conducted a series of data collection, traffic impact assessment, road project appraisals and safety studies for public and private agencies.

EDUCATION AND TRAINING

B.Sc., Civil Engineering, University of the West Indies, St. Augustine, Trinidad and Tobago, 2000

M.Eng., Civil Engineering, Howard University, 2011

THESIS – "Development of a Cycle-Based Red-Light Violation Index for Signalized Intersections", Publisher: ProQuest

Courses – Traffic Engineering II, Advanced Traffic Engineering, Regional Transportation Planning, Traffic Flow Theory, Cost/Benefit Analysis, Graduate Statistics I & II, Transportation Engineering Research.

PhD., Civil Engineering, University of the West Indies, St. Augustine, Trinidad and Tobago, 2018-present

PROFESSIONAL EXPERIENCE

CARITRANS Company Limited **April 2012 – Present**

Managing Director

Data Collection and Analysis

Supervised, reviewed and conducted a number of traffic data collection projects, including the analysis in macro and microsimulation analysis. Notable projects include:

1. Exxon Mobile Liza TIA –Responsible for data collection, trip generation analysis, microscopic model development and reporting on the traffic impact of the development of Exxon's various shore-based facilities on traffic in Guyana.

2. Soesdyke-Linden Highway, Guyana – Responsible for undertaking traffic survey and analysis work for the rehabilitation of a 72 km highway in Guyana. ADT surveys, axle load surveys, IRI testing and Deflectometric testing was conducted. Also responsible for undertaking the economic analysis using Highways Development Module Version 4 (HDM-4), World Bank Economic Analysis standard.

Citywide Studies

Lead traffic consultant for a number of city/town level studies that included analysis of parking, traffic flows, congestion and the resolution of issues related to same. Masterplan development studies were also conducted:

1. Scarborough and Crown Point Parking Studies - The Division of Infrastructure, Quarries and the Environment (DIQE) of the Tobago House of Assembly (THA) commissioned parking studies for the two towns. Responsible for developing parking inventory, managing parking surveys and analysis, and undertook traffic data collection and analysis. Provided recommendations for addressing related issues.

2. Port of Spain Masterplan - The Urban Development Corporation of Trinidad and Tobago (UDECOTT) was desirous of developing an implementation strategy for the masterplan undertaken by GENIVAR in 2007. A qualitative review of the initial masterplan was conducted and included provisions for updates to critical areas.

Road Safety

Researched at the Masters' Level and continuing with the Doctoral dissertation, red-light-running and its effects. Additional work includes the collection of speed data along the main roadways in Trinidad, in

conjunction with the TTPS to understand driver behaviour and to develop strategies for affecting change.

1. Development of a Cycle Based Red-Light-Violation Index for Signalized Intersections – Masters' Thesis and conference papers on determining the prevalence of red light running in urban areas. Continued work at the doctoral level, specifically in the Caribbean region, with Trinidad and Tobago as a test case.

2. Priority Bus Route Speed Study – Analysis of speed data over a one-month period during the COVID-19 restrictions imposed by government. A database of speeds by time of day, day of the week and weekday vs weekend was developed.

3. Road Safety Audits – Conducted Road Safety Audits (Stages 1, 2 and 3 [conceptual, detailed design and post construction]) for the Sir Solomon Hochoy Highway Extension from San Fernando to Pt Fortin, as well as the recently constructed Curepe interchange.

Economic Analysis

Certified by the Instituto de Concreto y Hormigon, Chile in the World Bank's Economic Analysis procedure and software, a number of road project appraisal studies were undertaken across the Caribbean.

1. Parika to Goshen Highway Economic Analysis, Guyana - The Government of Guyana (GOG) commissioned a design consultancy to upgrade the Del Conte road (56km) along the east coast of the Essequibo River. An economic feasibility analysis using HDM-4 was required prior to approaching respective lending agencies for project funding and was completed on the government's behalf.

2. George Price Highway Rehabilitation Project, Belize - The Government of Belize, through an IDB loan programme, undertook the rehabilitation of the George Price Highway from Belmopan, the capital city, to Benque Viejo on the eastern border of Guatemala, a total distance of 31.9 miles. An HDM-4 analysis of the proposed rehabilitation options was conducted.

3. Ronald Mapp Highway Extension, Economic Analysis - The Government of Barbados, through the Caribbean Development Bank (CDB), intended to extend the Ronald Mapp Highway by approximately 2 km from its current terminus at Mile and a Quarter to the St Lucy parish church. An HDM-4 analysis of the proposed rehabilitation options was conducted.

PROFESSIONAL TRAINING

Curso de Aplicación y Manejo del HDM-4 Versión 2, Nivel Avanzado; Santiago, Chile (2016)

Introduction to Road Safety Audit, TMS; Coventry, England (2014)

VISUM and VISSIM elearning modules; Online (2012)

Leadership Development Series, Boston University; e TecK, Trinidad and Tobago (2008)

Project Management Professional (PMP); e TecK, Trinidad and Tobago (2007)

Certificate in Value Engineering; e TecK, Trinidad and Tobago (2004)

Highway Development Manual version 4 (HDM-4); UWI; Trinidad and Tobago (2001)

PROFESSIONL AFFILIATIONS

Member of the Association of Professional Engineers of Trinidad and Tobago (APETT)

Member of the Institute of Transportation Engineers (ITE)

Registered Engineer, Board of Engineering of Trinidad and Tobago (BOETT)

LANGUAGES

English – Fluent
Spanish – Intermediate
French – Basic

CURRICULUM VITAE
DEENA DASS

PROFESSION: Senior Transportation Engineer

TIME WITH FIRM: 1 Year

NATIONALITY: Trinidadian

PROFESSIONAL EXPERIENCE

Ms. Dass joined Caribbean Transportation Consultancy Services (CARITRANS) Company Ltd. as a Senior Transportation Engineer in May 2021. Ms. Dass is set to graduate with a mark of distinction in MSc in Civil Engineering in 2022 and holds a BSc. in Civil Engineering from The University of the West Indies, St. Augustine, Trinidad.

Ms. Dass held the position of Secretary and Marketing Sales Representative/ Assistant Manager at Dass Enterprises during vacation periods between 2010 and 2013. Aspiring to be a diverse engineer, Ms. Dass held an engineering position at CEP Limited from 2014 to 2017, diversifying her skills in Construction/Project Management, Civil Engineering and Structural Engineering sectors of the company. Upon completing her MSc in Civil Engineering, Ms. Dass developed an interest in the transportation field, and is presently expanding her experience and knowledge with CARITRANS Co. Ltd.

WORK EXPERIENCE:

May 2021 – Present
CARITRANS Co. Ltd.:
Below provides a full listing of jobs Ms. Dass is/ has been involved in:

- **Engineering Field – <u>Snr. Transportation Engineer</u>**

  Notable Responsibilities:

  - Transportation Engineering surveys/ Field work – Plan, coordinate, supervise and mentor junior field staff for both local and regional projects.
  - Technical Duties:
    - Provide design review of construction drawings and develop traffic models using PTV Vissim and PTV Vistro software. Identifying discrepancies, interpreting the field data, and generating project outputs for technical reports.

- Preparing, reviewing, and analysing the data for reports such as Road Safety Audits, O-D Surveys, Signal Configuration and Timing, and Traffic Impact Reports and Mitigation measures.

- Project Management Duties - Prepare tender documents, project budget and cost proposals, liaise with sub-consultants and delegate duties, meet with client/ stakeholders for pre-tender discussions.

List of Projects:

- *Churchill Roosevelt Highway Extension to Manzanilla Project (CRHEM) (2021-present)*
- *Design-Build of the Traffic Lighting System for Grenada (2021-present)*
- *Gas to Energy Traffic Study Guyana (2021-present)*
- *Grenada Economic Analysis (2021)*
- *Grenada Western Main Road Corridor Road Safety Audit (2022)*
- *Revitalisation of the Scarborough Esplanade (2021)*
- *SWMCOL Landfill OD Survey (2021-2022)*
- *Yellowtail Traffic Modelling (2021)*

July 2014 – 2017

C.E.P. Limited:

Below provides a full listing of jobs Ms. Dass has been involved in:

- **Engineering Field - <u>Construction/Project Management</u>**

Notable Responsibilities:

- Proposals – Preparation of the Proposal Documentation and company Overview of Services Presentation.
- Tender Stage – Tender documentation inclusive of BOQ and conducted and/ attended the Invitation to Tender and Tender Opening.
- Design & Construction Stage – Partook and/ carried out the application to Statutory Approval bodies, Design and Production meeting, Concrete Inspection and Reporting, Site Engineer, Daily to Monthly Reports inclusive of Manpower logs, ensured that the work on site was up to par with the company's goal, Bill of Quantities' Estimate based on designs and Payment Application reports, Construction Bulletin, Document Control, etc.
- Handing Over – Partook and prepared Design Documentation, Closeout Report, Snagging of works, etc.

List of Projects:

- *AMCOL Multi Fuel Service Station, Penal (2016-2017)*
- *Balmain Commercial Complex, Couva (2016-2017)*
- *Commercial Building at Trincity Central Road (2016-2017)*
- *Construction Supervision & PM Services for Barataria Secondary School (2016)*
- *Cunjal GP School ECCE (2015)*
- *Cypress Gardens Primary School - Sup. Services (2015-2016)*
- *Proposal for Design Services for the Upgrading of Pool & Pool Deck at Hilton Trinidad (2016)*
- *Eng. Design & Const. Management Services for San Juan South Secondary School (2016)*
- *HDC Indian Trail Housing Development (2015)*
- *Maracas Beach Facilities Improvement Works Project (2015-2016)*
- *Preysal Government Primary School (2014)*
- *Proposal for Const. of a New Building at Venture Credit Union Co-Operative Society Ltd. (2017)*
- *Proposal for Lady Chancellor Apartment Complex (2016-2017)*
- *Proposal for Townhouse at Aquaview Terrace, The Bouys (2016-2017)*
- *RBL Data Centre, Trincity (2014-2016)*
- *Refurbishment of Lobby Glass & Archer Window, Magdalena Grand Beach Resort, Tobago (2016-2017)*
- *Union Development (Cypress Gardens) ECCEC (2016)*
- *Waterloo SDMS Early Childhood Care Education Centre (ECCE) (2016-2017)*

➢ **Engineering Field – <u>Civil Engineering</u>**

Notable Responsibilities:

- Producing Vertical Profile Diagrams and conceptual design layouts illustrating how the potential site can be developed, Drainage Design, Car Park Layout Design and assisted in preparation of Design Reports.

List of Projects:

- *Maloney Gardens Car Park Refurbishment (2015)*
- *Maracas Beach Facilities Improvement Works Project (2015-2016)*
- *Proposal for Townhouse at Aquaview Terrace, The Bouys (2016-2017)*
- *Proposal for Townhouses at Trincity (2016-2017)*

- **Engineering Field – <u>Structural Engineering</u>**

  Notable Responsibilities:

  - Verified software such as SAP 2000 and ETABS 2013; Customised Excel spreadsheets to output the reinforcements needed and ran aforementioned software in order to cross reference Excel output; Assisted with Structural Design report and attended Concrete Inspection.

  List of Projects:

  - *RBL Data Centre, Trincity (2014-2016)*

December – January & June – August, 2010 – 2013
Dass Enterprises: Secretary and Marketing Sales Representative/ Assistant Manager

- Improved communication skills;
- Developed persuasive business techniques when presenting a product;
- Strategized with clients and manager in order to develop future business endeavours.

EMPLOYMENT SUMMARY:

2021 – Present:
Senior Transportation Engineer, CARITRANS Company Ltd.

2014 – 2017:
Engineer, C.E.P. Limited

2010 – 2013: December – January & June – August (Vacation Periods)
Secretary and Marketing Sales Representative / Assistant Manager at Dass Enterprises

EDUCATION:

2017 – 2022
MSc. in Civil Engineering, The University of the West Indies

2011 – 2015
BSc. in Civil Engineering, The University of the West Indies

2010 - 2011
Physics and Mathematics, Open Campus N1, The University of the West Indies

2008 - 2010
St. Joseph Convent (CAPE 8 Units)

2004 - 2008
Lakshmi Girls Hindu College (CXC & Cambridge)

INFORMATION TECHNOLOGY & ENGINEERING DESIGN SOFTWARE

- PTV Vistro
- PTV Vissim
- AutoCAD
- AutoCAD Civil 3D
- MS Word
- MS Excel
- MS PowerPoint
- Everstress
- FPS 21

PROFESSIONAL DEVELOPMENT:

2020 – 2022: Redefining Curepe Junction Based on User Perception.
MSc. in Civil Engineering – Research Project

2016: PMI Seminar - Leading with Emotional Intelligence: Soft Skills for Project Managers

2016: AutoCAD Civil 3D Training

2014 - 2015: The Applications of Polystyrene Wastes as Gluing Materials.
(BSc. in Civil Engineering - Special Investigative Project)

2014 - 2015: Improvement of road transportation between POS and Chaguaramas.
(BSc. in Civil Engineering - Civil Engineering Design Project)

2014: Assisted PURE with field testing on The Rehabilitation of the Beetham Highway Westbound Carriageway.
(BSc. in Civil Engineering - Pavement Design and Management)

LEADERSHIP AND ACCOMPLISHMENTS:

- Represented CARITRANS Company Ltd. at the 2021 ITS World Congress, meeting with potential international clients and business partners.
- Represented Dass Enterprises in the 2010, 2012, 2014 Shot Show at the Sands Expo and Convention Centre in Las Vegas, NV, United States.
- President of the Interactive Club of St. Joseph's Convent, St. Joseph (2008 - 2009), where the organisation of fundraisers and awareness of humanitarian acts were the criteria.
- Attended Rotary Youth Leadership Awards (RYLA) Conference in December, 2008.

LANGUAGES English – Excellent in Speaking, Reading and Writing.

Signed:

DEENA DASS

Date: 6th April, 2022

ADRIAN RENNIE

8 Hart Street, Navet Village, Mon Repos, San Fernando.

Daytime Contact: 868-384-5856.

email: arennie@caritransltd.com

Summary

Mr. Adrian Rennie is Mechanical Engineering Technician at Caribbean Transportation Consultancy Services (CARITRANS) Company Limited as of July 2019. Since then, he has worked along with highly skilled and professional colleagues whereby gathering and profound experience and ongoing knowledge in this department. In addition to his knowledge in the science field of Geomatics Engineering, he provides a broad extent of knowledge into his practice.

Professional Experience

CARITRANS Company Limited, **-August 2019 to Present.**
5B Trincity Industrial Estate

Projects

License Plate Survey Grenada.
Tasks:

- Assist in the design and development an Origin to Destination Matrix for the St. George's Network and Paddock Network, Grenada.
- Record all the turning movement counts (TMCs) for the St. George and Paddock Networks, Grenada.
- Assist in the preparation of tools and equipment required for the project.
- Maintain the accuracy of all statistical records of equipment and project operations as desired by the company.

NIDCO Traffic Management Plan & Design
Tasks:

- Assist in the preparation of tools and equipment for each landslip assessment.
- Performing twenty-four-hour reconnaissance and evaluation of six study sites.
- Generating a Traffic Management Plan for the Cumuto Main Road Landslip inclusive of Traffic Control Signs, Traffic Control Devices, and other considerations.
- Generating a Traffic Management Plan for the Bon Air Main Road Landslip inclusive of Traffic Control Signs, Traffic Control Devices, and other considerations.
- Generating and writeup of a Traffic Management Plan for the Tabaquite Rio Claro Road Landslip inclusive of Traffic Control Signs, Traffic Control Devices, and other considerations.
- Generating and writeup of a local Traffic Management Plan for Papourie Road landslip for both landslip locations; inclusive of Traffic Control Signs, Traffic Control Devices, and other considerations.
- Outlining and developing a Public Information Plan and Night Work Implementation Plan for all the landslip locations.

Economic Analysis Report, Grenada.

Tasks:

- Conduct meetings and safety briefings with the Ministry of Infrastructure Development, Public Utilities, Energy, Transport & Implementation staff.
- Consulting with local law enforcement in the to facilitate escorts and supervisors for survey operations.
- Ensure a high degree of accuracy of the recorded data captured for each project.
- Ensuring the proper functioning, installation and configuration off all equipment required to execute each respective sub-task of project.
- Prepare, plan and project managed and three-day, 12-hour heavy axle load survey at the Beausejour Junction.
- Produce and calculate the ESALs for each respective day of the heavy axle load surveys.
- Perform a two-day, 40-hour IRI field study of all major roadways in the Grenada mainland.
- Design and produce interactive, visual contextual IRI Map of the roadways studied.
- Two-week average daily traffic assessment along the Western Main Road, Grenada.
- Spearhead an eight-day, Deflectometric testing of the Western Main Road (northbound and southbound).
- Produce and submit Traffic Data Collection Reports, inclusive of all assessments, tests and data collected of the Western Main Road.

SWMCOL Origin-Destination Comparative Report.

Tasks:

- Processing and review of existing raw data within the 2021 study period.
- Design, reduce and tabulate findings in a Comparative Report outlining the changes/similarities of both 2020 and 2021 study periods.

SWMCOL Origin-Destination and Heavy Axle Load Survey, Trinidad.

Tasks:

- Ensuring the readiness and peak performance of all survey equipment needed for the assignment.
- Producing and designing long-term automated live forms for survey team.

SWMCOL Origin-Destination and Heavy Axle Load Survey, Trinidad.

CARITRANS had been contracted by the waste management corporation SWMCOL to conduct an Origin - Destination survey during proverbial high activity seasons; Christmas, Easter etc.

Tasks:

- Inspection and confirming readiness of weighbridge for testing.
- Origin Destination Survey: conducting short interviews for data acquisition (12-hr field assessment @Beetham, Forres Park & Guanapo Commercial Landfills).
- Volume map illustrating distribution of traffic from common areas.

Sir Solomon Hochoy Highway, Heavy Axle Load Survey, Trinidad.

CARITRANS Company Limited has been engaged by the Trinidad and Tobago Police Service to conduct an exercise to determine the loads of commuting trucks via the southbound Uriah Butler and Sir Solomon Hochoy Highway.

Tasks:

- Inspect and confirm the readiness of equipment for surveying.
- Evaluate and report the load distribution of vehicles weighed i.e. – Gross Vehicle Weight, Tare, MGW etc.
- Prepare a VDF/ESAL report and peak hour assessment.

SWMCOL Origin-Destination and Heavy Axle Load Survey, Trinidad.

The environmental waste management corporation, SWMCOL, requested the services of CARITRANS for solutions into the upgrade in efficiency of their services. Our twelve (12) hour field assessment was conducted at the major commercial landfills in Trinidad; Forres Park, Guanapo, Beetham.

Tasks:

- Origin Destination Survey: interviews were done for each commute where records of area of origin, cargo, area of destination where documented.
- Weighbridge for axle weighing was inspected and approved for testing.
- Generating GIS Volume maps illustrating raw data recorded.

Corridor Study, University of the West Indies, St. Augustine.

The University of the West Indies had untaken a traffic study of the East-West Corridor stemming from the Capital of Port-Of-Spain to the Borough of Arima.

Tasks:

- GIS map representations.

Toco/Valencia Heavy Axle Load Survey, PURE Engineering, Trinidad.

The Ministry of Works and Transport, through PURE Engineering, sought to upgrade the existing carriageway to highway standard from the town of Valencia directly to the Toco Main Road junction. As major quarries are situated along this route,
Tasks:

- Applying preventative maintenance measures to weighbridge for seventy-two (72) hour Origin Destination Survey
- Seventy-two (72) hour Origin Destination Survey: interviews were done for each commute where records of area of origin, cargo, area of destination where documented.
- Road Network Modelling through GIS software.

PURE Engineering, Trinidad: Curepe Interchange to Macoya.

The Ministry of Works and Transport, through PURE Engineering, is at present undergoing remodelling works to the Churchill Roosevelt Highway. CARITRANS has inherited a percentage of the role of this redesign.

Tasks:

- GIS Modelling: A pair of maps were generated illustrating the efficiency of traffic volume flow of our proposed design.

Design & Build Proposal Grenada.
Tasks:

-

SWMCOL Origin Destination Survey, Trinidad.

This survey was conducted in effort to determine the volume of vehicles that visit SWMCOL's major landfills at their peak periods.

Tasks:

- Origin Destination Survey: twelve (12) hour field assessments @ Beetham, Forres Park and Guanapo Landfills.
- GIS volume modelling: weighted visual representations of Origin Destination stations.

Speed Study, Priority Bus Route, Trinidad and Tobago Police Service, Trinidad.

The Trinidad and Tobago Police Service has requested CARITRANS to take measure and compute the average speed percentiles of vehicles traversing between the capital Port-Of-Spain to the borough of Arima.

Tasks:

- Generating of GIS maps w/ illustrative data-frame.
- Traffic Radar & Volume data collection.

Cheddi-Jagan International Airport, Guyana.

The Airport Authority of Guyana required a feasibility study of the pavement structure in preparation for upcoming reconstruction and redesign.

Tasks:

- Perform Heavy Weight Deflectometric Testing of Primary Runway & Extensions, Primary Taxiway Charlie 'c',Taxiway Alpha 'A', Taxiway Bravo 'B', Taxiway Delta 'D', Taxiway Golf 'G', Taxiway Juliet 'J', Taxiway Kilo 'K'.
- Application of preventive maintenance procedures to deflectometric unit: load cell inspection, guide raillubrication, hydraulic psi monitoring, air bag psi monitoring, engine servicing.
- Prepare and develop Final Report.

Network/Speed Study, PURE Engineering Division, Trinidad.

The Ministry of Works and Transport, via PURE, called for a road network and speed study of the Churchill Roosevelt Highway and artery roadways which gave aid to the construction of the Sande Grande Hospital.

Tasks:

- Assess the Max-Speed alterations and apply edits to the Churchill Roosevelt Highway spatial data.

San Fernando Waterfront Project, Ministry of Works & Transport, PURE Engineering Division, Trinidad.

PURE, subcontracted by the Ministry of Works and Transport of Trinidad and Tobago, aimed to relive and mitigate long queue times for commuting traffic along the Rienzi Kirton Highway, Independence & Lady Hailes Avenues and the San Fernando Bypass, south Trinidad.

Tasks:

- Origin Destination Surveys: twelve (12) hour surveys conducted on three consecutive days along major access and departure networks: Gulf View Link Road, Todd Street, Cipero Road.
- GIS Mapping: Illustrating weighted volume data, Points of Origin and Destinations.

Ministry of Works & Public Infrastructure, Guyana.

The Ministry of Public Works & Infrastructure of Guyana requested a factual report and assessmentof the integrity and feasibility of major roadways.

Tasks:

- Daily preventative maintenance measures applied to mechanical deflectometric unit.
- Deflectometric testing of Soesdyke to Linden Highway:
  Fourteen (14) hour daily consecutive testing over a total approximate distance of one hundred and forty-four (144) kilometres from the Soesdyke village to the city of Linden (both directions)
- Deflectometric testing of East Bank Demerara Road:
  Fifteen (15) hour daily consecutive testing over a total approximate distance of seventy-two (72) kilometres from the Cheddi-Jagan International Airport to the capital of Georgetown (Both directions)
- Deflectometric testing of the Rupert Craig Highway:
  Fifteen (15) hour daily consecutive testing over a total approximate distance of one hundred and ninety (190) kilometres from the capital of Georgetown to the Berbice River Bridge (both directions).

CARITRANS IRI Data Collection & Indexing, Trinidad.

CARITRANS has undertaken the role of assessing the pavement roughness index of all major roads and highways in Trinidad and Tobago.

Tasks:

- Pavement roughness capturing of major Highways –

  Churchill Roosevelt Highway (WB& EB), Audrey Jeffers Highway (WB & EB), Beetham Highway (WB & EB), Diego Martin Highway (NB & SB), Uriah Butler Highway & Sir Solomon Hochoy Highway (NB & SB), Rienzi Kirton Highway (WB & EB)
- Pavement roughness capturing of all Main Roads –

  Abercrombry Street(NB & SB), Antigua Road(NB & SB), Aranguez Main Road(NB & SB), Ariapita Avenue (EB & WB), Arima Old Road (EB & WB), Aripo Road (NB & SB), Barbuda Road (EB & WB), BWIA Blvd(NB & SB), Cacandee Road (NB & SB), Carapo Brasso Valley Road (NB & SB), Carapo Road (EB &WB), CarliBay Road (EB &WB), Caroni Arena Road (EB & WB), Caroni North Bank Road (EB & WB), Caroni Savannah Road (EB & WB), Caroni South Bank Road (EB & WB), Caura Road (NB & SB), Chaguanas Main Road (EB & WB), Chin-Chin Road (EB & WB), Cipero Road (EB), Circular Road, Coffee Street (EB & WB), Couva Main Road (EB & WB), Crown Trace (EB & WB), Cumuto Road (NB), Diego Martin Main Road (NB & SB), Demerara Road (NB & SB), Dyette Street (EB & WB), Eastern Main Road (EB & WB), Edinburg Blvd(EB & WB), El Socorro Main Road (NB & SB), Endeavour Road (NB & SB), Esperanza Road(NB & SB), Factory Road (NB & SB), Fishing Pond Road (NB & SB), Golden Grove Road(NB & SB), Guaico Tamana Road (NB & SB), Jerningham Railway Road (NB & SB), Lady Young Road (WB), Las Lomas Road #1(NB & SB), Little Coora Road (EB & WB), Longdenville Local Road (NB & SB), Lopinot Road (NB & SB), Madras Road, Maracas Royal Road (NB & SB), Mausica Road(NB & SB), Montrose Bypass Road (NB & SB), Morne Coco Road (NB & SB), Munroe Road (EB & WB), North Post Road (NB & SB), Omeara Road North (NB & SB), Omera Road South(NB & SB), Orange Field Road (EB & WB), Orange Gove Road (SB), Oropouche Road (EB & WB), Park Street (EB), Pierre Road (EB & WB), Pinto Road (NB & SB), Prince Street (NB & SB), Railway Road (NB & SB), Ramsaran Street (EB & WB), Rivulet Road (EB & WB), Rodney Road (EB & WB), Ryan Street (NB & SB), Saddle Road (NB & SB), Santa Cruz Old Road (NB & SB), Sierra Leone Road (EB & WB), South Trunk Road (NB & SB), Southern Main Road, St. Lucien Road (NB & SB), St. Croix Road (NB & SB), St. Helena Bypass Road (NB & SB), Tamana Road (EB & WB), Toco Main Road (NB & SB), Todds Station Road (EB & WB), Tragarete Road (EB & WB), Tucker Valley Road(NB & SB), Tumpuna Road (NB & SB), Valencia Main Road (EB & WB), Wendy Fitzwilliam Blvd(EB & WB), Western Main Road (EB & WB), Westland Avenue (NB & SB), Wrightson Road (EB & WB).

Beston Consulting Pavement Feasibility Testing, Trinidad.

Beston Consultancy, through CARITRANS Company Limited, was assigned to determine and assess the feasibility of Trinidad's major highway systems:

Tasks:

- Deflectometric Testing Churchill Roosevelt Highway (WB & EB):
  Six (6) hour-long, daily consecutive night testing over a total approximate distance of forty-four (44) kilometres.
- Deflectometric Testing of the Uriah Butler & Sir Solomon Hochoy Highway (SB & NB):
- Eight (8) hour-long, daily consecutive night testing over a total approximate distance of ninety-four (94) kilometres.

Trinidad & Tobago Civil Aviation Authority, **-July 2015.**

Piarco. Volunteer

Tasks:

- Two (2) week, eight-hour shift.
- Develop and create assignments for classroom and assistants.
- Aiding in the smooth running of organization activities.
- Provide knowledge of aviation/science systems and basic mechanics to classroom; turbines, flight systems etc.

Yara Trinidad Limited, **- August 2014.**
Savonetta Park, Point Lisas.

Mechanical Engineering Technician [Tringen1]

Tasks:

- Preventative maintenance on plant equipment, machinery and related facilities. i.e –
  i. Plant Turbine Cooling Fans
  ii. Boilers
  iii. Fire Arrester Valves
  iv. Nautilus & TEREX Mobile cranes etc.
- Identifying maintenance and inspection needs of equipment
- Performing routine mechanical/machining activities on equipment; lubrication, inspection, replacement parts: Ingersoll Rand pneumatic pumps and Hydraulic Winches.
- Conduct performance test of plant equipment using pressure gauges, flowmeter, tachometers: Conducted at PCS Nitrogen facility.
- Troubleshoot, diagnose and repair malfunctioning plant equipment; pipefitting (hydraulic and water pipe systems).
- Committing to safe work practices; logout/tag out and confined space rules and regulations

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Mechanical Services Limited, **August 2011 & August 2014.**
1-9 Dick Street, San Fernando.

Mechanical Engineering Technician.

- Diagnostic, maintenance and repair of mobile and/or stationary hydraulic and pneumatic cranes i.e.

  Delta, Kenson 40T and Peltco, Schlumberger (Static cranes).
- Lubrication and repairing of crane, hoist and auxiliary components.
- Overhauling and/or repair of hydraulic and pneumatic winches.
- Aiding other mechanics in repairing and installing work along with other related activities.
- Scheduled inspection of wire ropes, gauges, mechanical parts, slings.
- Daily typed reports of job completion/work in progress.
- Office documentation and logging.

Academic Qualifications

Jaric Environment, Safety and Health Services Ltd.

Certificate – Heavy Equipment Operator.

SYNERGY TRAINNING INSTITUTE

Certificate – Project Management.

The University of The West Indies, St. Augustine

Geomatics Engineering.

Courses:

Engineering Mathematics I, Global Navigation Satellite Systems (GLONASS), Surveying I & II, Database Design and Management, Photogrammetry, Feature Extraction, Geodesy, Engineering Mathematics I & II, Fundamentals of GIS, Digital Photogrammetry, Spatial Analysis, Cartography, Remote Sensing, Geodetic Surveying.

Advanced Solutions Technical Institute [ASTI].

Certificate in Fibre Optics.

St. George's Academy [S.A.T.]Courses:

Mathematics, English.

Score 1: 1330

Score 2: 1300

The University of Trinidad and Tobago.

Certificate: Applied Engineering. [CAE]

Courses:

Chemistry, Physics, Mechanical Workshop, Mathematics 1, Electrical, Communication Studies.

Southern Community College.

A' Level.

Subjects:

Physics, Geography, Pure Mathematics, Caribbean Studies.

St. Stephen's College.

O' Level. Subjects:

Mathematics, English A, English B, Geography, Information Technology, History, General/Integrated Science, Spanish, Principles of Business.

Accolades

Commendation of Appreciation – Trinidad and Tobago Civil Aviation Authority

Commendation: Most Improved – St. Stephen's College.

Commendation: Steady Application – St. Stephen's College.

Commendation: Team Captain – Club Tsunami, St. Michael's Pool, San Fernando.

Leisure Pursuits

Swimming – Club Tsunami, St. Michael's Pool, San Fernando.

Barbering – Boom Champions, Princes Town

Football - St. Stephen's College & Southern Community College.

Cricket- St. Stephens College.

PC Repairs – Software + Hardware.

Automotive/ Mechanical Tune-Ups & Repairs.

License

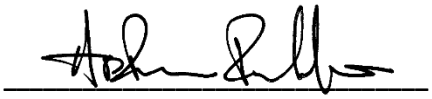
Trinidad & Tobago License Class 3: Light Motor Vehicles. (2011 – Present)

Languages

English – Fluent
Spanish – Basic.

Software Proficiency

- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint
- Microsoft Projects
- GlobalMapper
- QGIS
- ESRI ArcGIS Pro

Signed: 

ADRIAN RENNIE

Date: 6th April, 2022

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Position Title and No.	Social specialist
Name of Expert:	Kareem Brown
Country of Citizenship/Resident:	Guyana

Education:

BSc of Science in Tourism Management

Employment Record relevant to the Assignment:

Period	Client and position	Country	Summary of Activities preformed relevant to the assignment
2021-2021	**Topgolf — Chicago, IL (Remote)** **Senior Recruiter (2021-2021)**	*Guyana*	• Responsible for full-lifecycle recruiting of Culinary, Operations, and Sales Candidates for a multi-million-dollar gaming establishment. • Experienced in building comprehensive Boolean strings to identify qualified candidates to meet company needs. • Adapt at searching and identifying qualified candidates from job boards such as; LinkedIn, Monster, Dice, Career Builder, Glassdoor, Indeed, and ZipRecruiter.
2019-2021	**Technologies LLC-Rolling Meadows, IL 60008(Remote)** **Business Development Executive**	*Guyana*	• Identified new sales leads. • Pitched company services. • Maintained fruitful relationships with existing customers. • Researched organizations and individuals online (especially on social media) to identify new leads and potential new markets. • Researched the needs of other companies and learning who makes decisions about purchasing. • Contacted potential clients via email or phone to establish rapport and set up meetings. • Planned and oversaw new marketing initiatives

2018-2019	**Apidel Technologies LLC- Rolling Meadows, IL 60008** **Technical Recruiter**	*Guyana*	• Evaluating healthcare professionals, strengths and skills and comparing them with clients' requirements. • Placing professionals in daily, local contracts, contract-to-hire, and direct hire positions • Negotiating schedules, wage rates, and other terms and conditions of employment. • Working with Accounts Manager to identify top accounts, target skill sets, key market segments, assess client staffing requirements • Had an annual recurring conversion rate of 75% with more than 300+ candidates placed.
2018-2019	**JSL International Guyana Inc. - 36 Delhi Street, Prashad Nagar, Georgetown.** **Crew Coordinator**	*Guyana*	• Assisted in travel arrangement of the mobilization and de-mobilization of the crewing staff, including visa application. • Crew berthing allocation for all departments and key control. • Maintained filing for all crew signing on for tickets, receipts for travel, STCW95 certificates and company medical forms. • Liaise with Noble Bob Douglas and Tom Madden agents for crew sign off.
2018-2018	**TechLink Systems Inc. - San Francisco, CA 94104** **Technical Recruiter**	*San Francisco*	• Recruited technical employees for clients seeking full-time and contract staff primarily in the areas of Information Technology, Pharmaceutical Product testing and Validation, and Clinical Programming/Biostatistics.

			• Recruiting activities were full-cycle including; sourcing, qualifying, negotiation of wages and benefits, interviewing, background investigations, retention upon offer acceptance and onboarding. • Well-versed in candidate management through all stages of process, not just the identification of qualified individuals. • Hand-On experience working in ATS systems such as; iCIMS, Smart Recruiters, Bullhorn, and Workable. • Ensured that corporate recruiting activities reflected the organizational goals of the client as well as a compliance with the laws and regulations related to the attraction and retention of highly-skilled technical talent.
2013-2018	**Princess Casino** **Security Analyst/**Interim Supervisor	*Guyana*	• Acted as oversight and security agent for management and customers. • Observed casino or casino hotel operation for irregular activities such as cheating or theft by either employees or patrons. • Secured premises and personnel by patrolling property; monitoring surveillance equipment; inspecting buildings, equipment, and access points; permitting entry. • Obtained help by sounding alarms. • Controlled traffic by directing drivers. • Completed reports by recording observations, information, occurrences, and surveillance activities; interviewing witnesses; obtaining signatures.

			• Maintained environment by monitoring and setting building and equipment controls. • Maintained organization's stability and reputation by complying with legal requirements.
2017-2017	**Texila American University** **Assistant Administrative Officer**	*Guyana*	• Provided general administrative and clerical support including mailing, scanning, faxing and copying to management • Maintained electronic and hard copy filing system. • Performed data entry and scanned documents. • Managed calendar for Admin Manager. • Assisted in resolving any administrative issues. • Prepared and modified documents including correspondence, reports, drafts, memos and emails. • Scheduled and coordinated meetings, appointments and travel arrangements for Managers. • Maintained office supplies for department. • Composed and typed routine correspondence and prepared materials for special events such as invitations, guest lists, RSVPs, programs, etc. • Directed preparation and filing of legal documents with government agencies. • Worked with word processing, spreadsheet and database software to complete administrative tasks.

			• Handled sensitive and extensive confidential information. • Prepared memorandums outlining and explaining administrative procedures and policies to supervisory workers.
2013-2016	**GDKN** **Recruiter**	*Guyana*	• Established recruiting requirements by studying organization plans and objectives; meeting with managers to discuss needs. • Built applicant sources by researching and contacting community services, colleges, employment agencies, recruiters, media, and internet sites; providing organization information, opportunities, and benefits; making presentations; maintaining rapport. • Determined applicant requirements by studying job description and job qualifications. • Attracted applicants by placing job advertisements; contacting recruiters, using newsgroups and job sites. • Determined applicant qualifications by interviewing applicants; analyzing responses; verifying references; comparing qualifications to job requirements. • Arranged management interviews by coordinating schedules; arranges travel, lodging, and meals; escorting applicant to interviews; arranging community tours. • Evaluated applicants by discussing job requirements and applicant qualifications with managers; interviewing applicants on consistent set of qualifications. • Managed new employee relocation by determining new employee requirements; negotiating with movers; arranging temporary housing; providing community introductions.

			• Improved organization attractiveness by recommending new policies and practices; monitoring job offers and compensation practices; emphasizing benefits and perks.
2010-2012	**Qualfon** **Customer Service Representative**	*Guyana*	• Provided customers with technical support to fix any issues that they were having with their hand sets. • Answered inquiries by clarifying desired information; researching, locating, and providing information. • Resolved problems by clarifying issues; researching and exploring answers and alternative solutions; implementing solutions; escalating unresolved problems. • Sold additional services by recognizing opportunities to up-sell accounts; explaining new features. • Maintained call center database by entering information. • Kept equipment operational by following established procedures; reporting malfunctions. • Updated job knowledge by participating in educational opportunities. • Enhanced organization reputation by accepting ownership for accomplishing new and different requests; exploring opportunities to add value to job accomplishments.
2010-2011	**Cara Lodge Guyana** **Receptionist**	*Guyana*	Attend to visitors and dealt with inquiries on the phone and face to face. Supplied information regarding the organization to the general public, clients and customers. Welcomed visitors by greeting them, in person or on the telephone; answering or referring inquiries.

			Directed visitors by maintaining employee and department directories; giving instructions. Maintained security by following procedures; monitoring log book; issuing visitor badges. Maintained telecommunication system by following manufacturer's instructions for house phone and console operation. Maintained safe and clean reception area by complying with procedures, rules, and regulations. Maintained continuity among work teams by documenting and communicating actions, irregularities, and continuing needs. Contributed to team effort by accomplishing related results as needed.

Curriculum Vitae (CV FOR PROPOSED PROFESSIONAL STAFF)

Position Title and No.	**Social Support**
Name of Expert:	Kelly-Ann Latchman
Country of Citizenship/Resident:	Guyana

Education:

- University of Guyana – B.A. in Tourism – 2016 – 2020.

Employment Record relevant to the Assignment:

Period	**Employing organization and title/position. Contact information for references**	**Country**	**Summary of activities performed relevant to the Assignment**
September 2019- December 2019	Organization: Apidel Technologies Position: Technical Recruiter	Guyana	• Identifying future hiring needs and developing job descriptions • Collaborating with department managers to compile a consistent list of requirements. • Attracting suitable candidates through databases, online employment forums, social media, etc. • Conducting interviews and sorting through applicants to fill open positions. • Assessing applicants' knowledge, skills, and experience to best suit open positions. • Completing paperwork for new hires. • Promoting the company's reputation and attractiveness as a good employment opportunity. • Keeping up-to-date on current employment legislation and regulations and enforcing them

			within the company and overall working environment. • Completing and providing recruitment reports to team managers.
May 2019	Organization: NIL Position: Research Assistant	Guyana	• Assisted researcher in conducting study • Distributed and conducted survey within necessary communities • Conducted interviews for further research data • Analyzed Data
July 2018-August 2019	Organization: Guyana Tourism Authority Georgetown, Guyana Position: Paid Internship	Guyana	• Increase Operational efficiencies and Organizational effectiveness • Update Tourism Regulations • Establish partnership with the tourism private sectors • Increase alignment with necessary ministries and agencies • Support product development based on market demands • Strengthen data collections • Optimize Nationwide Socio-economic and Conservation Outcomes from Tourism • Assist in creating Policy and Regulations Forms for Tourism Affiliated Businesses • Assist in sharing survey forms for internal studies being conducted on Guyana's Tourism Product
November, 2015 – September, 2016	Organization: Zoon Online Shopping Position: Customer Service Representative	Guyana	• Call and inform customers on their order statuses/issues. • Call and inform customers when orders are out for delivery and pickup • Re-order/cancel items if required • Serve customers by providing

	Reference: Jason Singh Managing Director Contact: 231 9760		product and service information and resolving product and service problems. • Contact third party sellers for required information and updates if necessary • Attract potential customers by answering product and service questions and suggesting information about other products and services via social media platforms and in person interaction. • Call customers to enquire their satisfaction level on the services offered • Maintain customer records by updating account information and accessing their needs and wants. • Resolve product or service problems by clarifying the customer's complaint, determining the cause of the problem, selecting and explaining the best solution to solve the problem, expediting correction or adjustment, and following up to ensure resolution. • Maintain financial accounts by processing customer adjustments if required • Recommending potential products or services to management by collecting customer data records and analysing customer needs. • Prepare product and service reports on daily tasks. Analyze customer feedback forms to better understand how to serve current and future clientele.
July 2015-	Organization:	Guyana	• Receive and deliver production

October 2015	Edward B. Beharry & Co. Limited <u>Position:</u> Bond Clerk <u>Reference:</u> Keith Rahat Custom Broker Contact: 227-0632		ingredients to specific facilities • Receive and deliver final production for sale orders • Receive local vehicles and load merchandise • Receive containers and load merchandise for international sales • Stack merchandise on racks • Stock warehouse with necessary supplies and stationary • Ensure machinery is serviced and functional • Check in merchandise and affix labels • Match purchase orders to sales orders and distribute to sales associates for processing • Fulfil customer orders • Delegate and overlook porters to remove materials off racks and package for shipments • Fill requisitions, work orders, or requests for materials, tools, or other stock items • Follow all safety codes • Delegate and lead porters to place merchandise on pallets or shelves for distribution • Record amounts of materials or items received • Perform facilities maintenance • Sort production according to size, type, style, colour, or product code • Carry out tasks as assigned by the warehouse supervisor / manager • Identify damage, loss, or surplus of goods and materials stored in the warehouse • Compile inventory balances and price lists

			• Maintain records of all activities and processes pertaining to the warehouse • Supervise porters • Delegate duties as necessary.
June 2014- July 2015	Organization: Guyana Mangrove Restoration Program - Georgetown, Guyana Position: Volunteer		• Accumulated and shared information with villagers on the importance of Mangroves • Analyzed feedback information • Assisted in painting and cleaning the research centre
September 2014- May 2015	Organization: Staples Inc. Maryland, USA Position: Sales Representative and Cashier (Part Time)	USA	**Sales Representative** • Present, promote and sell products/services to existing and prospective • customers • Establish, develop and maintain positive business and customer relationships • Coordinate sales effort with team members and other departments • Help maintain and resolve customer queries and issues • Continuously improve through customer relation feedback forms **Cashier** • Manage transactions • Issue receipts, refunds, change or tickets • Cross-sell products and introduce new ones • Resolve customer complaints, guide them and provide relevant information • Track transactions on

			balance sheets and report any discrepancies
September 2013- August 2014	Organization: Associated Industries Limited (AINLIM) Position: Brand Promoter (Part Time)	Guyana	• Greeted and informed customers about company products and promotion deals • Assisted customers upon further company inquiries if needed • Disseminate product samples, brochures, flyers etc. • Engage with customer and discover their wants and needs • Submit customer relation feedback forms • Increase overall brand awareness

Membership in Professional Associations and Publication:

- N/A

Language Skills:

- Excellent in speaking, reading and writing English

Adequacy of the Assignment:

Detailed Tasks Assigned on Consultant's Team Experts:	**Reference to Prior Works/Assignments that Best illustrates Capacity to handle the Assigned Tasks.**
• Provide social awareness of the project and conduct stakeholder meetings/consultations. • Data collection for Socioeconomic Baseline/Household Study. • Data Entry for Socioeconomic Baseline/Household Study. • Community Liaison and Engagement.	**Apidel Technologies** **Technical Recruiter** • Completing and providing recruitment reports to team managers. • Collaborating with department managers to compile a consistent list of requirements. • Attracting suitable candidates through databases, online employment forums, social media, etc. • Conducting interviews and sorting through applicants to fill open positions.

	• Assessing applicants' knowledge, skills, and experience to best suit open positions. **Zoon Online Shopping** **Customer Service Representative** • Call and inform customers on their order statuses/issues. • Attract potential customers by answering product and service questions and suggesting information about other products and services. • Call customers to enquire their satisfaction level on the services offered • Maintain customer records by updating account information. • Resolve product or service problems by clarifying the customer's complaint, determining the cause of the problem, selecting and explaining the best solution to solve the problem, expediting correction or adjustment, and following up to ensure resolution. • Prepare product and service reports on daily tasks • Contribute to team effort by accomplishing work duties as needed. **Staples Inc.** **Sales Representative** • Present, promote and sell products/services to existing and prospective customers • Establish, develop and maintain positive business and customer relationships • Coordinate sales effort with team members and other departments • Keep abreast of best practices and promotional trends • Help maintain and resolve customer queries and issues • Continuously improve through feedback

	AINLIM **Brand Promoter** • Greeted and informed customers about the company's products and promotion deals • Assisted customers upon further company inquiries if needed • Disseminate product samples, brochures, flyers etc. • Engage with customer and discover their wants and needs • Submit feedback • Consistently seek new product knowledge to act as an expert for the customer

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Position Title and No.	Social Specialist
Name of Expert:	Mark July
Country of Citizenship/Resident:	Guyana

Education:

-2017: University Of Guyana - Environmental Studies B.Sc – (Completed 2021)

-2015-2017: Caribbean Advanced Proficiency Examination (CAPE) – Associate Degree Tourism

-2015: Caribbean Secondary Education Certificate (CSEC) – Twelve subjects (inclusive of Mathematics and English A): six grade ones, four grade twos, two grade threes one grade four.

Employment Record relevant to the Assignment:

Period	Client and position	Country	Summary of Activities preformed relevant to the assignment
February 2021	**Small Business Bureau, Ministry of Tourism, Industry & Commerce** Temporary Filing Clerk	*Guyana*	• Check and organise client information in files and folders manually and digitally. • Complete checklists in Microsoft excel indicating which client information is missing, incomplete or needs revision.
2018-present	**Demerara Associates** Multimedia Technician	*Guyana*	• Setting up, using, and maintaining audio-visual and computer media equipment; set up sound and • lighting equipment; responsible for audio recordings, and broadcast, edit recordings and deal with • signals to broadcast content on internet; provides training in equipment operations to staff and clients;

			• schedules and maintains various audio-visual equipment. • • Support functions such as video production and editing and/or coordination of instructional/in-house • broadcasts. Assists in development and/or prepares presentation materials. Performs a range of • administrative support and clerical functions as appropriate to the needs of the work organization.
2018	**Solomon Group (USAID Juvenile Justice Project Guyana)** Records Review, Inventory and Scanning Agent	*Guyana*	• Participate in training activities for Records Review, Inventory and Scanning Agents; • Schedule and execute visits to government offices where target records and files are stored; • Complete metadata questionnaires with staff at each data source; • Complete Inventory Form; • Visually inspect each paper record to ensure that data for all required variables are included in the paper records; • Obtain digital copies of all electronic records and store such records on encrypted hard drives; • Create high-resolution digital images (at least 300 dpi) for all paper records and save images on encrypted, password-protected storage drives; • Confirm probation reports and clearly differentiate between juveniles who are offenders, status offenders (where the offense is only illegal because of the individual's age), and juveniles on supervision (care and protection or abuse and neglect cases). • Clarify key identifying information from records in order to clearly identify a person and differentiate that person from similarly named individuals (e.g., name, DOB, home location, etc.);

			• Liaise with data managers to identify which individuals in a dataset are juveniles, when this is not clearly or consistently indicated by the data; • Ensure data security through encryption of all files; • Upload validated files onto web-based storage platform; • Produce assignment status updates required of agents; • Participate in regular update meetings with TSG representatives.

Membership in Professional Associations and Publication:

• January 2019: Guyana Lands and Survey Commission - Committee for the Review of the Implementation of the Convention (CRIC 17) of the United Nations Convention to Combat Desertification (UNCCD) – Volunteer
− Facilitated arrival and departure arrangements for dignitaries;
− Responded to queries from dignitaries;
− Assisted with production of conference documents and related correspondence.

• Coastal Clean-up activities as well as hosting and participating in webinars and seminars with The Eco-trust Society (University of Guyana).

• Manage various social media platforms of The Eco-trust Society.

• Assisted The Civil Defence Commission in Monitoring Communication channels (email, WhatsApp, phone calls, etc.), creating reports and coordinating aid distribution and collection during natural disaster emergencies in different regions of Guyana.

• Makes regular blood donations at the National Blood Transfusion Service Guyana.

Language Skills:

- Excellent in speaking, reading and writing English.

Curriculum Vitae (CV FOR PROPOSED PROFESSIONAL STAFF)

Position Title and No.	**Social Liaison Officer**
Name of Expert:	Roydon Croal
Country of Citizenship/Resident:	Guyana

Education:

- University of Guyana, B.Sc. in Public Management, 2016
- University of Guyana, Diploma in Public Management, 2011.

Employment Record relevant to the Assignment:

Period	Employing organization and title/position. Contact information for references.	Country	Summary of activities performed relevant to the Assignment
2020	**E&A Consultants Inc.** *(Ministry of Public Infrastructure)* Social Specialist Anasha Ally Executive Director (592) 227-7538	*Guyana*	**Consultancy Services for Conducting Cadastral Surveys, Geotechnical Studies and Preliminary Designs for Restoring the Caneview Avenue Alignment from the Houston Bypass Road to the Proposed Road Alignment from Ruimveldt to Eccles** • Stakeholder consultation with Ministries, Government Agencies and utility companies • Data collection from site visits (study of social infrastructure) and national records for social impact assessment • Provided solutions for squatters relocation • Community Liaison and Engagement
July 2017 – 2021	**E&A Consultants Inc.** *(Ministry of Public Infrastructure)*	*Guyana*	**East Coast Demerara Road Widening and Improvement Project (Betterhope to Belfield)**

	Social Specialist Anasha Ally Executive Director (592) 227-7538		• Conducted routine inspection of construction site and staging area for compliance with the ESMP. • Prepared daily, weekly, monthly and quarterly inspections report. • Prepared non-compliance and made suggestions for corrective action. • Liaised with the EPA and other agencies with environmental interest. • Provided social awareness of the project and conduct stakeholder meetings. • Accepted and process stakeholder complaints.
2013-present	**Ministry of Labour, Human Services and Social Security** Labour Occupational Safety and Health Officer (592) 225 - 7302	*Guyana*	• Conducted routine inspection of business, construction sites, factories and any work place to ensure compliance with the Labour Act, Occupational Safety and Health Act, Shops Act and other legislations. • Investigated complaints from employees against employers to determine compliance with contractual arrangements and /or labour legislation and the Occupational Safety and Health Act and Regulations. • Monitored the industrial relations climate in all industries through regular visits and participatory discussions between managers, supervisors and union officials. • Prepared commencement and close of crops memo, time sheet summary for overtime, and leave rosters for cane scale supervisors. To give advice generally to employers, employees, trade unions and employers organisation on all issues related to labour & Occupational health legislations

			and industrial relations practices.
2011 – 2013	**Ministry of Public Infrastructure** <u>Environmental Inspector/Project Community Liaison Officer(AG)</u> (592) 225 - 7420	*Guyana*	• Conduced routine inspection of construction activities and staging area for compliance with the ESMP. • Prepared daily, weekly, monthly and quarterly inspections report. • Prepared non-compliance and made suggestions for corrective actions. • Liaised with the EPA and other agencies with environmental interest.
2010 - 2011	**E&A Consultants Inc.** *(Ministry of Public Infrastructure)* <u>Social Specialist</u> Anasha Ally Executive Director (592) 227-7538	*Guyana*	**Transport Infrastructure Rehabilitation Project** • Conduced routine inspection of construction activities and staging area for compliance with the ESMP. • Prepared daily, weekly, monthly and quarterly inspections report. • Prepared non-compliance and made suggestions for corrective actions. • Liaised with the EPA and other agencies with environmental interest. • Reported to the MPWC Environmental Engineer and Project Manager. • Posted construction inspection and reporting. Served as point person for community members and NDC to interface with on the project on environmental aspects.
2003 - 2009	**Mayor and Town Council ,Linden**	*Guyana*	Inspected building and construction projects to ensure they

	Building Inspector		were in accordance with building codes.

Membership in Professional Associations and Publication:

N/A

Language Skills:

- Excellent in speaking, reading and writing English

Adequacy of the Assignment:

Detailed Tasks Assigned on Consultant's Team Experts:	**Reference to Prior Works/Assignments that Best illustrates Capacity to handle the Assigned Tasks.**
	1. Environmental and Regulatory Management Services: Fiber Optic Enablement Project 2. Consultancy Services for Conducting Cadastral Surveys, Geotechnical Studies and Preliminary Designs for Restoring the Caneview Avenue Alignment from the Houston Bypass Road to the Proposed Road Alignment from Ruimveldt to Eccles 3. East Coast Demerara Road Widening and Improvement Project (Betterhope to Belfield) 4. Transport Infrastructure Rehabilitation Project

Rowena Cerro

Senior Project Manager

Rowena is a Senior Project Manager and Environmental Consultant with ERM, she is part of the Sustainable Finance team and reports to the Washington DC office. Rowena has experience with international standards and best practices (IFC Performance Standards, WBG EHS Guidelines, IDB, and Equator Principles). She has conducted environmental and social due diligences (ESDD), and environmental and social (E&S) monitoring on behalf of Development Finance Institutions (including IFC, IDB), Equator Principles Finance Institutions, and private investors. Rowena has lead and participated in biological baseline studies, ESIAs, cumulative impact assessments (CIA), and monitoring programs for mining and energy projects. She is also experienced with Title V air permits, NESHAP, PC-MACT, alternative fuels, state and federal reporting (air emissions, GHG, audits), CEMS, and permitting (NEPA).

Experience: 12 years, sectors of experience include mining, manufacturing (cement), energy, and infrastructure. Worked in projects in Peru, Panama, Dominican Republic, Chile, Colombia, Guyana and USA.

Email: rowena.cerro@erm.com

LinkedIn: www.linkedin.com/in/rowena-cerro-752835b

Education

- M.A. in Biological Sciences, University of Texas at Austin, US, 2008
- B.Sc. in Biology, Universidad Peruana Cayetano Heredia, Peru, 2005

Professional Affiliations and Registrations

- International Association for Impact Assessment (IAIA # 10453760)

Languages

- Spanish (native)
- English (proficient)

Fields of Competence

- Environmental impact assessment
- Cumulative impact assessment
- Project finance environmental and social due diligence and monitoring
- Biology and conservation planning
- Air quality
- Continuous Emissions Monitoring Systems

Key Industry Sectors

- Energy
- Finance
- Infrastructure
- Mining
- Manufacturing

Honors and Awards

- Research Fellowship - Ecology, Evolution & Behavior Program Department of Integrative Biology - University of Texas at Austin –2008

Publications

- Zafra-Calvo, N., Cerro, R., Fuller, T., Lobo, J.M., Rodríguez, M.A., Sarkar, S. 2010. “Prioritizing areas for conservation and vegetation restoration in post-agricultural landscapes: a Biosphere Reserve plan for Bioko, Equatorial Guinea.” *Biological Conservation*, 143 (3): 787 – 794.

Key Projects

Review of Banco de Desarrollo de America Latina (CAF)'s E&S Safeguards – KfW Development Bank – 2018
KfW is evaluating starting several lines of credit with CAF as a FI. Carried out a gap analysis of CAF's new E&S Safeguards to determine its alignment with IFC performance standards. Reviewed two projects were CAF has applied its new Safeguards to evaluate its implementation.

ESG's ESMS Manual – IDB Invest – 2018
ERM provided support to IDB Invest's (former IIC) Environmental, Social, and Governance (ESG) Division in the development of its internal and external (for public disclosure) ESMS manuals, describing the bank's environmental and social risk management system part of the financial cycle. Updated the IDB Invest ESMS external manual.

ESIA for the New Combined Cycle LNG Power ITABO Plant, Dominican Republic – AES Corporation – 2017-2018
ERM is developing the ESIA for the Project to national requirements and IFC Performance Standards. Developed the cumulative impact assessment in alignment with IFC Performance Standards and calculated the GHG emissions for the construction and operations phase.

ESDD of the Red Vial Nº4 Toll Road Project and the Chimbote Bypass, Peru, Banco de Credito del Peru (BCP) and Sumimoto Mitsui Banking Corporation (SMBC) – 2017
The Red Vial Nº4 Toll Road Project, located in northern Peru, is comprised of the widening of 285-km of the Pan-American Highway and its supplemental works. Now they are adding one more bypass (40 kms). ERM conducted an ESDD on behalf of the Lenders to assess the Project's alignment with the Equator Principles (EP), IFC Performance Standards, and Peruvian regulations. Acted as deputy project manager. Coordinated a team of six specialists to prepare the ESDD.

E&S Monitoring of the Cerro Pabellón Geothermal Project – IIC – 2017
Enel Green Power is developing a 100-MW geothermal project in northern Chile, the first geothermal project in South America. After completing the ESDD on behalf of the IIC, ERM is providing support on carrying out the review of project compliance with ESAP requirements and IFC Performance Standards. Carried out desktop review of environmental aspects to produce the project's first monitoring report.

E&S Monitoring of the Costa Norte LNG Project, Panama – International Finance Corporation (IFC), Central American Bank for Economic Integration (CABEI), Bancolombia, Banistmo, Banco General, and Global Bank - 2015 – 2018
AES is developing the Costa Norte LNG Project, comprised of an LNG terminal, a regasification plant, and a thermal plant (360 MW) located near Colon. ERM provides E&S support services on behalf of the Lenders and reviews Project compliance of ESAP requirements and IFC Performance Standards. Participate in site visits and conduct quarterly desktop reviews of environmental aspects of project construction to produce quarterly monitoring reports.

E&S Monitoring of the TCBuen Port, Colombia – IFC, CAMIF and CIFI – 2016 - 2018
The project comprises the operation of a terminal marine port with a 650,000 TU capacity in the bay of Buenaventura, Colombia. ERM provides E&S support services on behalf of the Lenders and reviews Project compliance of ESAP requirements and alignment with IFC Performance Standards. Carry out desktop review of environmental aspects to produce semiannual monitoring reports.

E&S Monitoring of the Red Vial Nº4 Toll Road Project, Peru, Credit Agricole-CIB, CAF and Banco de Credito del Peru (BCP) - 2015 - 2018
The project, located in northern Peru, is comprised of the widening of 285-km of the Pan-American Highway and its supplemental works. ERM carries out the E&S supervision monitoring on behalf of the Lenders to assess the Project's alignment with the

applicable standards (EP, IFC, CAF, and Peruvian regulations), as well as the project's ESAP requirements. Participate in site visits and conduct quarterly desktop reviews of project's management systems and environmental aspects to produce quarterly monitoring reports.

Key Projects Prior to Joining ERM

Alternative Fuels Pilot Test – Drake Cement – 2016-2017
Drake Cement is a Portland cement plant in Northern Arizona. As the Environmental Manager, lead the pilot test for alternative and engineered fuels. Obtained permit from Arizona Department of Environmental Quality (ADEQ). Coordinated with external consultants and fuel suppliers (forest service, private ranchers, etc.), and with production, quality and engineering departments to carry out the tests. Analyzed test emissions data and prepared report for Drake's top management and for ADEQ.

Title V Permit Modification – 10% production increase - Drake Cement – 2016-2017
Drake Cement in Northern Arizona has a Title V Air Permit. Corporate decided to request ADEQ for an increase in their clinker production limit. As Environmental Manager, lead the permit modification effort by coordinating the permitting strategy with an external consultant, meetings and correspondence with ADEQ, coordination with plant managers. Participation in the public hearing. Follow up until approved.

Environmental Assessment (EA) for the Expansion of Drake Cement's Limestone Quarry – 2015-2017
Drake Cement in Northern Arizona has an adjacent limestone quarry. They requested the Forest Service for an expansion of its footprint to use as storage of overburden. As Environmental Manager, lead the EA effort (NEPA process), meetings and correspondence with authorities and stakeholders, coordinated with external consultants, participated in preparation of final EA report. Follow up with authorities until approved.

1st Amendment to the ESIA of the Las Bambas Mining Project, Peru – Glencore-Las Bambas – 2013-2014
Las Bambas is a Greenfield copper concentrator project in Apurimac, Peru. Acted as deputy project manager. Coordinated a team of 20+ specialists for fieldwork, project deliverables and progress presentations to the client. Developed the terrestrial fauna and protected areas impact assessment.

IFC Performance Standards Checklist for Prefeasibility Study (PFS) of the Mina Justa Mining Project, Peru – MARCOBRE S.A.C. – 2013-2014
Mina Justa is an open pit copper mine project in Ica, Peru. During the PFS stage of the project, MARCOBRE requested support to achieve alignment with IFC standards so they could seek financing opportunities from Equator Principle Finance Institutions (EPFI) for future stages of the project. Carried out a detailed review of IFC standards and developed a checklist with the compliance requirements and project gaps.

Review of the 2013 Baseline Study for the Mina Justa Mining Project, Peru – MARCOBRE S.A.C. – 2013
Mina Justa is an open pit copper mine project in Ica, Peru. MARCOBRE hired an independent consultant to review the biological baseline. Conducted the review of terrestrial fauna and marine biology baselines.

Environmental Monitoring for the Semi-Detailed EIA (EIAsd) of the Haquira Mining Project, Peru – First Quantum Minerals – 2012-2014
Haquira is one of the world's major copper deposits. Located in Apurimac, Peru. Coordinated fieldwork for the quarterly environmental monitoring program, conducted desktop review of information and prepared monitoring reports.

Baseline Study Update for the Pampas de Pongo Mining Project, Peru – Jinzhao Mining Peru – 2012-2013
The Pampa de Pongo iron ore project consists of a block of adjoining mining concessions and mining claims. Located on the southern coastal plain of Arequipa, Peru. Coordinated fieldwork, reviewed reports from field teams and prepared the updated baseline for terrestrial and marine fauna.

ESIA of the Pukaqaqa Mining Project, Peru – Compañía Minera Milpo Peru – 2012-2013
The Pukaqaqa copper-gold project is located in the department of Huancavelica in Peru. Developed the terrestrial fauna impact assessment.

Baseline Study for the Sulfuros Chapi Mine Desalintion Plant Project, Peru - Compañía Minera Milpo Peru – 2012-2013
Sulfuros Chapi, located in Arequipa-Peru, needed to install a desalination plant in the coast. Coordinated fieldwork, reviewed reports from field teams and prepared the baseline reports for terrestrial and marine fauna. Presented results to local stakeholder groups during public consultation meetings.

Noam Raffel

GIS, Spatial Analysis, and Remote Sensing Lead

Noam has 8 years of experience in the field of GIS. With a technical geospatial background, Noam focusses in the energy sector, including gas facilities, power generation and remission, and renewable energies. He has prepared environmental, social, and cultural impact assessment plans for numerous exploration and development projects in North America, South America, Africa, and the Middle East. Noam has worked with ExxonMobil for multiple projects while at ERM, including a project using 3D Lidar modeling of sites in Texas; developing an online dashboard for geospatial environmental data for ExxonMobil Qatar; and various projects for EEPGL in Guyana. He has been a part of ERM's support to EEPGL in Guyana since 2017, focusing on mangrove health monitoring, coastal sensitivity modeling, overseeing the ecosystem services, coastal bird, offshore bird, and mangroves.

Experience: 8 years of experience in GIS and remote sensing

Email: noam.raffel@erm.com

Education

- Master of Arts in Geographic Information Systems, Clark University, Worcester, MA, 2014
- Bachelor of the Arts in Geography, Clark University, Worcester, MA, 2013

Languages

- English, native speaker
- Hebrew, fluent

Fields of Competence

- GIS Modeling/Remote Sensing/WebGIS
- Social, Health and Environmental Impact Assessment
- Field Survey and Reconnaissance Techniques
- ArcGIS Desktop, ArcGIS Collector, ArcGIS Online, Survey123, IDRISI TerrSet, ESA SNAP, QGIS, IDRISI, GRASS, ENVI, SPSS, Adobe, Path Finder, Excel, Python, MS Access

Key Industry Sectors

- US Government
- Oil & Gas
- Mining
- Linear Infrastructure
- Climate Change
- Health & Communicable Disease Modeling

Key Projects

Social and Environmental Geothermal Site Selection, Mexico
Noam led the GIS team in creating a site selection tool for geothermal projects across 29 sites in Mexico. This project included collecting, developing and managing geospatial data for block areas across the country, as well as landcover modeling for all areas. He created biodiversity, environmental, social and cultural heritage sensitivity models for all sites. Noam developed a user-friendly online tool using these sensitivity models to rank and identify areas for geothermal site selection.

Transportation Project Oversight, Benin and Ivory Coast
Noam develops an online tool to manage large-scale transportations projects in two countries.
This work includes managing massive imagery databases and uploading them to the cloud. Additionally, Noam oversees survey management and creation, and project progress and management.

Offshore Development – Guyana
Noam assists the geospatial team for a large offshore development project. He leads the geospatial approaches to biodiversity and ecosystem services data collection and modeling, along with environmental and technical siting of potential on-shore infrastructure. He participates in the shoreline and mangrove field surveys. Noam uses a variety of software platforms for this work, including mobile digital data collection and secure web-hosted GIS.

Climate Change Shoreline Analysis, Tobago
Noam led the GIS team in a climate change analysis project for an international financial institution, using satellite imagery over multiple dates to measure coastline changes. He developed landcover models to analyze how and why the landscape changed over time. Additionally, he mapped local coral reefs and created a “bathtub” model to measure how rising sea levels are expected to change the local shoreline.

Modeling for Major Energy Company
Noam modeled all forest and agricultural plots in a five-mile buffer of the 600-mile pipeline using Sentinel 2 10 meter resolution imagery. He also assisted with the culture heritage team to create viewshed and 3D models of potential disturbances created by the project.

Impact Assessment, Mozambique
ERM conducted an ESIA report for the potential impacts of a GTL plant on the Afungi Peninsula in Mozambique. Noam led the geospatial team to assist with the biodiversity, social, and marine teams. This included creating a landcover module from Worldview 2 and 3 imagery, creating social and biodiversity sensitivity and constraint models as well as identifying near shore coral reefs.

Climate Change and Urban Development Plan, Emerging and Sustainable Cities Imitative
Noam was tasked with classifying and analyzing landcover change over a 30-year period using Landsat Satellite Imagery. He used the Landsat results to predict urban growth over the next 50 years. For this project, he also used high-resolution Worldview 2 satellite imagery and field verification to develop a land use map of the entire city. Noam also, developed a tool to model the factors that determine future development demand.

E&S Screening (Transmission-Line) and GAP Analysis (Hydro)
Noam classified the landcover of three different transmission routes using Sentinel 2 satellite imagery. He used the classification results as well as other variables to determine the most optimal route for the transmission line.

Impact Assessment, Nicaragua
Assisted in assessing the impact of a potential canal through Nicaragua. Noam was responsible for managing the archeology and built heritage database that may be potentially affected by the canal. He assisted in the development of a sensitivity model to

assess high risk location of archeology. Noam modeled and mapped the cumulative impact assessment of the project.

Cultural Heritage, Guinea
Assisted in finding potential cultural heritage sites in the location of a potential mine in Guinea. Noam created a sensitivity model from LIDAR imagery to assess where potential sites are located. The model was tested against known sites and proved to be highly accurate.

Cultural Heritage for Manufacturing Plant
Noam was responsible for reviewing LIDAR data and satellite imagery to inspect for potential cultural heritage finds. He collects data in the field to assist with both archeology and built heritage for a plan on building a manufacturing plant in rural West Virginia.

Development of Decision Support Protocols and Procedures to Strengthen Health Sector Response to Severe Weather Risks and Climate Change, Mozambique
Noam was a GIS specialist on this project, which included countrywide modelling of risks to human health from climate change and severe weather events. Activities performed include:

- Generating country-wide landcover & land use model (including remote detection of agricultural areas from imagery analysis)
- Collecting GIS data on human health issues
- Generating precipitation and temperature prediction models
- Running a geographically weighted regression analysis to link certain types of weather events and climate change to downturns in human health
- Using current patterns project which areas in Mozambique are at highest risk for human health issues in the future.

Windfarm Cumulative Impact Assessment, Pakistan
Provided a cumulative impact assessment of over 20 windfarms in Sindh Pakistan. Noam was in charge of providing all the figures and modeling. This includes a visual impact assessment, a land cover model, and auditory modeling.

ERM Foundation and Foundation for Africa, West Africa
Noam built a method to test forest fragmentation and its relation to past and present Ebola outbreaks using advanced statistics and remote sensing.

Screening Assessment, Ethiopia & Djibouti
Noam was a GIS specialist for an aligned screening assessment of a proposed pipeline running from the port of Djibouti to Awash in Ethiopia. He was responsible for generating landcover/land use models that included the classification of agricultural land and generating resource constraint models that were used to site the pipeline using a least cost routing analysis in order to avoid major impacts to the society and the environment.

Samuel Guffey, PMP, Certified Fisheries Professional

Consultant II, Scientist

Samuel helps risk-averse clients deliver complex projects that involve water resources. A broadly trained environmental scientist and biologist, Samuel has over 9 years' experience in aquatic and marine science, toxicology, chemistry, ecology, and impact assessment, and 3 years' experience in project management and wetland delineation. He provides assessments and solutions related to wetlands, streams, rivers, lakes, oceans, endangered species, ecological risk, and environmental impact. He has worked in the Caribbean, Florida, British Columbia, the Great Lakes basin, the Ohio River basin, and offshore Massachusetts. He has performed wetland delineations for over 12 separate projects in Michigan, Indiana, and Ohio.

Experience: 9 years' experience in natural resources and water sciences

Email: samuel.guffey@erm.com

LinkedIn: https://www.linkedin.com/in/samuelguffey

Education

- MSc. Biological Sciences, University of Alberta, Canada, 2013
- BS. Marine and Atmospheric Sciences and Biology, University of Miami, 2011
- Wetland Delineation. Midwest Biodiversity Institute, April 2019
- Advanced Wetland Delineation. Michigan Wetlands Association, September 2019

Professional Affiliations and Registrations

- Certified Fisheries Professional (AFS) #3675
- Project Management Professional (PMI) #2033989
- Member of the Society of Environmental Toxicology and Chemistry
- HAZWOPER supervisor certified

Languages

- English, native speaker
- Spanish, rudimentary

Fields of Competence

- Marine and freshwater ecology
- Clean Water Act permitting
- Endangered Species Act consultation
- National Environmental Policy Act compliance
- Technical writing
- Fish studies
- Stream and river studies
- Designing stream crossings for aquatic organism passage
- Water quality
- Scientific diving
- Wetland delineation
- Ecotoxicology
- Offshore wind
- Capital project delivery

Key Industry Sectors

- Power
- Oil & gas
- Chemical

Key Projects

Environmental Impact Assessment for an Offshore Oil & Gas Development Project, Guyana
Expedited development of this Environmental Impact Assessment by serving as Assistant Project Manager and coordinating a team of over 20 internal and client experts to meet aggressive deadlines.

Environmental Impact Statement for an Offshore Wind Power Project, Massachusetts
Analyzed potential effects of the first major commercial-scale offshore wind facility in the USA. Samuel was a key biologist assessing coastal habitats, terrestrial fauna, benthic resources, fish, and other marine resources.

Environmental Assessment for an Endangered Species Habitat Conservation Plan, US Fish and Wildlife Service
Analyzed the potential impacts of approving a Habitat Conservation Plan and permitting the incidental take of an endangered species in the course of pipeline and power line construction.

Wetland Delineations, Indiana, Michigan
Conducted wetland delineations in Indiana and Michigan to support capital projects for 10 different projects for four clients in the Power, Oil & Gas, and Manufacturing sectors.

Stream Surveys and Permitting for a New Manufacturing Facility, Indiana
Delineated streams and evaluated stream habitat quality in support of stream crossings for a rail line to serve a new manufacturing facility. (§ 404, 401; § 10)

Permitting for Power Transmission Projects, Indiana, Michigan
Assisted a Power Sector client with designing and permitting three transmission line rebuild projects near wetlands and waterbodies, including traditional navigable waterways (CWA § 404, Rivers and Harbors Act § 10).

Environmental Assessment for a River Restoration, Michigan
Supported a public-private effort to restore rapids habitat in downtown Grand Rapids, Michigan. Analyzed potential impacts and benefits to wetlands, terrestrial flora and fauna, and aquatic resources.

Biological Assessment and Environmental Impact Statement for a Pipeline and Power Transmission Project, USA
Analyzed potential effects on endangered species and other environmental impacts of a proposed multi-state pipeline and power line project. Coordinated with multiple federal agencies to assess potential impacts of proposed new power transmission infrastructure and pipeline. Analyzed potential effects on endangered species, fish, birds, bats, other terrestrial fauna and flora, and water resources.

Biological Assessment and Environmental Assessment for a Utility Line River Crossing, Nebraska and Iowa
Evaluated the potential effects of boring under the Missouri River on endangered fish and wildlife, surface water, groundwater, and other resources.

Aquatic Ecosystem Management at a Contaminated Site, Iowa
Evaluating ecosystem function at a contaminated fish pond for a global client in the Chemical Sector. Monthly visits to sample water, sediment, biota, and other parameters allowed us to assess recovery over time and help the client decide on appropriate restoration actions to facilitate site closure. Samuel is a key contact for the client, helping to bridge the environmental chemistry, toxicology, and fish biology fields.

Bat Surveys for Power Sector Clients, Indiana and Pennsylvania
Surveyed for endangered bats using mist netting techniques. Documenting bats but no rare species allows clients to cut trees during the April—September moratorium.

Bat Habitat Survey, Indiana
Surveyed for potential bat habitat and marked potential roost trees in order to facilitate selective clearing before the April—September moratorium.

Biota Sampling at Superfund Site, Indiana
Collected aquatic invertebrates and vegetation in a 28-acre inundated wetland to support a remedial investigation for a Manufacturing Sector Client.

Fish Sampling at a Remediation Site, New York
Collected fish, aquatic invertebrates and vegetation in a river to support an ecological risk assessment for a Chemical Sector Client.

Construction Biomonitoring in Endangered Species Habitat, West Virginia
Monitored for endangered salamanders during active construction of a new pipeline.

Pipeline Integrity Management, Illinois, Indiana, Michigan
Assist an O&G global key client in reducing risk by designing and permitting pipeline excavations for ongoing maintenance work near wetlands and waterbodies (CWA § 404) and protected species. Provide environmental inspection services, including soil erosion and sedimentation control plans and inspections, during the work and restorations.

Environmental Risk Assessment in the Marine Environment, Thailand
Supported the development of an environmental risk assessment for an O&G global client studying mercury in marine fishes for liability management purposes.

Benthic Macroinvertebrate Study in the Columbia River, Washington state and Canada
Analyzed aquatic benthic macroinvertebrate communities in the Columbia River to support an environmental risk assessment for a Mining Sector client.

Environmental Impact Assessment for an Offshore Oil & Gas Development Project, Guyana
Samuel expedited development of this EIA by coordinating a team of over 20 ERM and client experts to meet aggressive deadlines.

Aquaculture Waste Study for New Product Development, Canada and Norway
Samuel interviewed fish hatchery managers in Canada and Norway to determine current practices for waste management. He used this information to assess the potential effects of a new medicated fish feed and find ways to minimize the amount of active ingredient released to the environment. This information will help the client obtain access to new markets.

Key Projects Prior to Joining ERM

How much PFAS pollution is injurious to amphibians?
Samuel served as the Project Manager for this 5-year, $2.7M study. Perfluoroalkyl substances, or PFASs, in water are a health concern. These chemicals are thought to affect the thyroid gland, which controls metabolism, growth and development. We determined the levels of PFAS pollution that harm amphibians, so that decision makers can set appropriate maximum contaminant level standards.

Physiological studies of dogfish sharks and hagfish, Vancouver Island, Canada
Samuel led field sampling and laboratory studies of marine fishes in the northeast Pacific, resulting in the publication of four peer-reviewed articles on how fish adjust their bodies to deal with stressful environments.

Large lake ecology and food web studies, Lake Michigan, USA
Samuel sampled fish tissues, fish communities, plankton and benthos for various studies of food webs and the ecology of Lake Michigan. He participated in a weeklong offshore sampling cruise

on Lake Michigan. He also taught four weeklong field courses on limnology & fisheries techniques, and aquatic ecosystem health.

Studies on coral reefs and nearshore and coastal communities, Florida, USA, and Bimini, the Bahamas

Samuel assisted with various studies of coral reef ecology, logging 34 working dives, and taught two weeklong field courses on marine biology.

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APPENDIX B

EIA Scoping Process Comments

Resubmitted without changes

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APPENDIX B: EIA SCOPING PROCESS COMMENTS

Relevant comments received during the scoping process were formally documented by the EPA and are summarized in Table B-1, along with an explanation of how the comment was addressed, as applicable, within the EIA. For some comments, the EPA provided a response during the meeting, and the table summarizes the EPA's response. Table B-1 does not list every individual comment received; rather, comments addressing a similar issue are grouped, and the generalized comment is presented in the table (in some cases, a comment in the table represents a single individual comment). The generalized comments are organized by theme (e.g., Project Description, Oil Spill Response, etc.). Comments and questions that are not relevant to the Project EIA scoping process (e.g., employment opportunities, regulator actions) are not included.

Table B-1: Thematic Summary of Comments Received from Public Scoping Consultation Meetings

Comments (Consolidated)	Consideration in EIA
Project Design and Operation	
General concern expressed about the lack of information on the Project. What is the overall concept and what are the inputs required? (2)	As explained in Chapter 5, Project Description, he foundational concept of this project is taking the natural gas that already exists in the reservoir and, instead of reinjecting it all back in, we bring it onshore. With that gas, Guyana will be able to power generators and provide energy to the country. It's a practice that has been used in many different places to provide efficient, cleaner, and cheaper energy.
If the GTE project is in Region 3, what are the plans for the gas to be distributed to other regions? (5) Will there be gas storage at the terminal in Wales to prevent a shortfall or onshore? (3) (5) Will gas be sold to third parties? (4) (V)	The Natural Gas Liquids (NGLs) will be sold to a third party who will distribute the NGLs, as the Project does not include additional pipelines for gas transportation to other regions. Moreover, the gas will not be stored.
Do you employ the same standards [for design and construction] as you do in the USA? (3)	We operate in 145 countries and our standards are the same for each. Our Operations Integrity Management System (OIMS) program includes management and leadership, risk assessment, operations, procedures, training, change management, management of third parties, community engagement, and incident investigation. Building off of these elements, we conduct an OIMS assessment to gauge activities and ensure processes were conducted in accordance with our standards.
Biggest concern is that the EIA will address what gets impacted during construction, but if you make a mistake with the design you have to do it again. Is the 50 mmscfd/12-inch pipeline big enough? Is the size of the plant at 40 acres enough? (4) (V)	EEPGL: We are working with the government closely on their current and future needs and the size now is conceptual; we are years away from operations and still in the concept phase. Pressure and composition will be shared with the public when it is known. The EPA will record that you are challenging size and scalability to ensure that we are investing in this the right way and we need to be able to answer this at the end of this process.
How do you ensure reliable power? Are there contingencies? (4)	As described in Chapter 5, Project Description, the project will involve capturing gas produced from crude oil production and transporting it via subsea and onshore pipelines to a natural gas processing plant and treating the gas to remove natural gas liquids for sale to third parties. A power plant will be owned and operated by a third party and is being proposed by a separate proponent under a separate Environmental Authorization process. As such, the power plant and the reliability of its power is outside the scope of this EIA.
Who owns the pipeline between construction and operation? Who is responsible for the pipeline from the source to where it comes out? (4) (V)	EEPGL: The pipeline and NGL facility are part of the Project EEPGL is moving forward with. The operation, similar to Destiny, will be operated by the co-venturers, and that is how the pipeline will be managed through maintenance

Comments (Consolidated)	Consideration in EIA
	and monitoring. Regulatory authorities have monitoring as part of their remit. (V1) Section 5.1, Project Location and Land Requirements, describes that EEPGL is not responsible for the Power Plant, rather their responsibilities include EEPGL's portion of the project – the pipeline for moving the gas produced from crude oil production to the NGL Plant.
Flaring	
Will there be flaring? (V1) When full operation of the Project begins, will the flaring stop? (5) We are concerned about this project causing an increase in flaring. (2)	Chapter 5, Project Description, discusses the Project description, including how flaring of associated gas is not planned as part of normal operations and temporary, non-routine flaring will occur during start-up and shutdown, equipment maintenance, process upsets, and emergency pressure-relieving scenarios. Chapter 5, Project Description, describes the measures incorporated into the Project design (e.g., equipment sparing) to reduce the frequency and duration of non-routine flaring events. Section 7.6, Air Quality, Climate, and Climate Change, discusses potential impacts on air quality, climate, and climate change, inclusive of a description of flaring controls. EEPGL will develop a flaring minimization plan for the Yellowtail Development Project.
Will flaring at the gas plant emit GHGs? Is this a project a major contributor of GHGs? (1)	
How would the GTE project affect the need to flare from other offshore projects? (1)	There are no plans for routine flaring at the GTE Project, but there will be a ground pilot at the site for non-routine purposes.
Will the project link up with other projects besides Liza Phase 1 and Phase 2? (1)	The Liza field has enough gas to fully supply the project for its entire expected 25-year operational life, so there are no plans or anticipated need to connect to other projects at this time.
Project Location	
Why this location? In 2019, EEPGL, through its consultant ERM, ruled out the Wales site on issues of land ownership and populated area. What studies have been done since then to alleviate these concerns? What additional information on the original seven sites can be shared with the public? (4) (V)	EEPGL: We conduct offshore and onshore studies as part of the EIA for the pipeline and NGL facility area, as well as ongoing geotechnical work. In partnership with the Government of Guyana, this location was chosen after the assessments and consideration of what be the most strategic and provide the most benefits. Chapter 4, Alternatives, and Section 5.1, Project Location and Land Requirements, describes details about the Project location. EPA:. We are satisfied; prior to submitting the application, there were numerous meetings and questions asked, and if we were not satisfied, we would not have accepted the application and proceeded. Alternatives will be captured in the EIA study to be conducted and based on the evaluation of those alternatives; the
How do you evaluate the alternative locations for the pipeline and Project, including the No Project alternative? (V) Is the EPA satisfied that the alternatives considered in accordance with	

Comments (Consolidated)	Consideration in EIA
section 11(5) have been identified (e.g., solar farms) and their treatment will be adequate in the conduct of the EIA? (V)	most feasible location will be selected. The EIA will capture all the details of the baseline studies, assessment of alternatives and reasons for the selection of the location (V2)
Where will the pipelines pass exactly? Where is the power plant location and what is the distance from Patentia? How did the GoG come up with this location? Can a map be provided? (3) (V)	EEPGL: We are doing the studies to determine the best locations with support of the GoG, who is responsible for routing. MNR: The pipeline will be from the Wales Estate to the farmlands, designated as the Wales Development Zone. All of the industrial areas will be within that zone and the gas power plant will be 11 to 12 kilometers inland from Patentia (3b). EPA: While the location was decided by an initial feasibility assessment, the EIA explores alternative options, so the assessment will determine which option would be most appropriate.
Is the GTE project in the same area as Yellowtail? (1)	Section 5.1.1, Project Location, the offshore component of the project includes approximately 220 kilometers of a subsea pipeline extending from new subsea tie-ins at the Destiny and Unity FPSOs in the Stabroek Block. Though the project will take gas from the same general area as Yellowtail, there are currently no plans to connect the two projects (V1)
Request for the power plant to be treated and evaluated as an associated facility. (V)	EEPGL: As it relates to associated facilities that may develop – that's outside of the project scope and it goes into the commercial aspects. We are looking at potentially impacted receptors of that project; so you may ask how can I look at these without understanding the follow-up actions – notes will be taken to make sure the EIA captures those as it goes through the process.
Will the EIA consider pollution and cumulative impacts, such as offshore and traffic. (V)	EPA: Chapter 11, Cumulative Impacts, of the EIA assesses potential cumulative impacts of the project, including all existing conditions and potential future outcomes.
Has there been any modeling done for more traffic on the river; silting which is a big issue; any new activity having some hydrological effects; same applies to traffic; anything at all leads to congestion. (4)	EEPGL: River sediment is part of the study work; the temporary MOF will have river traffic, but once the facility is built, it will be less. The right-of-way (RoW) is just to ensure safe operation; construction will take 30 months. Biological impacts are assessed in Chapter 8.
Concerns expressed about the road conditions and whether the temporary MOF will handle all heavy equipment delivery or if some will need to come by road. (3)	Section 5.5.6.1, Construction Stage (Traffic Generation) - Outside of the crossing of the West Bank Road, heavy haul travel between the temporary MOF and the NGL Plant will occur on a private road. The temporary MOF is being used to avoid using other roads for equipment delivery.

Comments (Consolidated)	Consideration in EIA
Pipeline Design and Construction	
Is there a possibility of going further onshore to shorten the length of the pipeline? How many kilometers does the pipeline come from offshore? (4)	Section 5.1.1, Project Location, – the Government of Guyana was a key decision maker for the Plant's location, so we established the 27 kilometer pipeline to accommodate that choice.
What is the durability of the pipeline? (5)	EEPGL: The pipeline is designed for 30 years.
Is it a double or single pipeline? (4)	EEPGL: Single.
What is the current scope in terms of how many FPSOs will supply the gas? (4)	Section 5.3.1, New Connections to FPSOs, – the current scope is Liza Phase 1 and Liza Phase 2 - the Destiny and Unity FPSOs - will supply gas, but we do have plans for a third and fourth to ensure long-term power.
How will the 50 mmscfd of gas come through the pipeline (e.g., compressor stations) and what will be done to ensure lower probability of releasing poisonous gas? (6)	Section 5.3.1.3, Proposed Changes to Existing FPSO Facilities to Support GTE Project, - The existing flowmeters onboard the Destiny and Unity FPSOs were sized for higher gas export ranges than that proposed for the Project (i.e., 30 to 145 MMscfd [0.85 to 4.1 MMsm^3/d]). Hence, the required accuracies of the existing meters are lower for the nominal range of gas export flow rates for the Project (10 to 50 MMscfd [0.28 to 1.4 MMsm3/d]) and new flowmeters will thus need to be installed. Recommendations will be finalized in the FEED phase to upgrade the metering on both FPSOs to meet the needs for leak detection and pipeline balancing.
What happens to the pipeline at decommissioning? (6)	Section 5.4.3, Decommissioning Stage, - A Preliminary Decommissioning Plan is included in Volume III of the EIA. As the time of decommissioning approaches, EEPGL will develop a more detailed decommissioning plan, in consultation with appropriate Guyanese regulators. EEPGL will perform inspections, surveys, and testing to assess the then-current facility conditions, which will provide the basis and required information to prepare a more detailed decommissioning plan.
There is concern over anchoring of the pipeline to protect sea life. (6a)	Section 5.3.1.4, Subsea, Umbilicals, Risers, and Flowlines - Two gas export steel lazy-wave risers with a total length of approximately 8.2 kilometers, including both suspended length and estimated required anchoring length on seabed
How will burying the pipeline be considered over time? Why is it buried at such shallow depth, especially given the damage to GPL cables in the estuary of the Demerara River? (6) (3) (V)	EEPGL: Our engineering analysis will take into account surveys of ocean conditions and locations of onshore buried infrastructure to ensure that there are no impacts over time. (6b). The onshore pipeline will be underground and installed with mostly open trenching, but for canals and roadways, installation

Comments (Consolidated)	Consideration in EIA
Will and how will the onshore pipeline be buried? Is it safe? 1.2 meters is not much depth—what surveillance will you have in place? (4) (3)	will use drilling techniques. We have worked collaboratively with the government to select the pipeline route. (4a) Usually, pipelines are installed at least 1.2m, and sometimes deeper – so depending on conditions of the area, sometimes we may go deeper, but at least 1.2m. Design is based on industry standards, but complementing that, we add best practices developed over the 140 years that we have been laying pipelines all over the world. We bring those learnings into how we design and properly maintain our pipelines and facilities. (3a) Pipeline monitoring is done automatically between the ship and the gas plant; if any difference is detected, lines are shut in and the volume is controlled. We always employ a surveillance program; the type depends on the design and the facilities we end up installing. We have seen this done many ways, including weekly drive-bys or annual aerial fly-overs, so it depends on the location, the facility, and protection system, which have not been decided yet. (3a) We think ahead. This is a pipeline that we will install in 2023–2024, but we are already thinking ahead about design standards, methodology, metallurgy, wall thickness to make sure that it lasts more than 25 years, including coating and the type of testing that we are going to do. (3a) We base this design on industry standards and best practice experience over the years of laying thousands and thousands of miles of pipelines for more than a hundred years. This design depth would be the minimum desirable depth to lay a pipeline. (V2)
At what pressure will the gas be transmitted through the pipeline? (4) What are the design parameters for pipeline pressure? (V) Would the size of the pipeline be sufficient for the amount of gas that will be produced for the two FPSOs? If you have other FPSOs in the future, will more pipelines be needed? (2)	Section 5.3.1.3, Proposed Changes to Existing FPSO Facilities to Support GTE Project, - The existing flowmeters onboard the Destiny and Unity FPSOs were sized for higher gas export ranges than that proposed for the Project (i.e., 30 to 145 MMscfd [0.85 to 4.1 MMsm^3/d]). Hence, the required accuracies of the existing meters are lower for the nominal range of gas export flow rates for the Project (10 to 50 MMscfd [0.28 to 1.4 MMsm^3/d]) and new flowmeters will thus need to be installed. Recommendations will be finalized in the FEED phase to upgrade the metering on both FPSOs to meet the needs for leak detection and pipeline balancing. EEPGL: The inlet to the pipe would be about 2,800 psi at the start; the receivable line would be about 1,800 psi in the pipeline. The pipeline will be

Comments (Consolidated)	Consideration in EIA
	designed for that and more (overdesigned) ranging from 20 to 35% higher than the maximum working pressure of the system.
Is the pipeline protected from earthquakes? Will any seismic work be performed? (4) (V)	Section 7.1.2.5, Seismic Activity, of the EIA explores seismic activity in Guyana and finds the probability of an earthquake to be low. Specifically, the country has a less than two percent chance of experiencing a potentially-damaging earthquake in the next 50 years.
What is the pipeline made of, and how do you protect pipelines from corrosion? (4) (3)	EEPGL: The type of material is not yet determined, but it will be designed to never break. We will have a comprehensive O&M program with the ability to inspect inside pipes before and during operations. Section 5.3.2, Offshore Pipeline, explains that the offshore pipeline and risers will have corrosion-resistant coating of either fusion-bonded epoxy or three-layer polyethylene / polypropylene. For the shore-crossing segment, where the pipeline may be installed by HDD, a fusion-bonded epoxy with an abrasion resistant overcoat may be used. Similarly, the onshore pipeline will be protected from corrosion using an impressed current system.
How will EEPGL assess the potential for the pipeline to break/fail? What types of monitoring and servicing will be conducted? (1)	EEPGL: We assess/manage potential for pipeline failure in two ways: (1) we build a safety factor into our designs; and (2) we “pig” our lines to assess wall thickness and identify any weaknesses. We also x-ray each weld before the pipe is installed to ensure there are no voids and the welds are competent. In addition, Section 5.4, Project Stages, describes that EEPGL will also periodically monitor and inspect the cathodic protection systems to provide adequate corrosion protection of the facilities. Supervisory Control and Data Acquisition systems will be employed to monitor operations. The offshore pipeline will be equipped with automatic and manual shutdown systems that will be activated in the event of a pipeline leak or equipment failure. In addition, there will be Atmos Pipe leak detection system technology integrated with the onshore instrumentation, control, and safety systems by monitoring pipeline flow and pressure measurements across the offshore and onshore facilities to indicate leaks along the pipeline.
How frequently are pipelines generally pigged? (1)	EEPGL: It depends on the facility and the safety factors that are built into the design, though, as described in Section 5.4.2.1, Pipeline Operations and Maintenance, maintenance pigging and intelligent pigging will be conducted for the pipeline for both corrosion control and flow assurance. The gas will be dehydrated at the FPSOs to prevent hydrate formation and corrosion. Formation water is thus not expected to be present in the gas stream. In normal operations, no hydrate blockage, corrosion, or scale deposition is expected. As a result, maintenance pigging of the main export line will likely be conducted

Comments (Consolidated)	Consideration in EIA
	once per year to confirm piggability. Maintenance pigging of the minor branches (Unity FPSO to subsea PLET or Destiny FPSO to subsea PLET) will be conducted in the instance where an operational upset resulting in water drop-out occurs.
Request for full chemical analysis of the gas from both wells - GC-TCD in particular in order to aid in a complete economic assessment. (V)	No direct response.
EIA Process and Procedures	
Is the EPA holding EEPGL to international standards with the environmental guidelines? (6) (V)	EPA: Our job is to ensure resources are used in a manner with the least impact on human health and the environment. Guyana has signed on to a number of conventions related to environment (including Sustainable Development Goals) to ensure the responsible use of resources. The EPA does not use outdated guidelines to evaluate the EIA. We have been continuously upgrading our capacity. We are collaborating with the Inter-American Development Bank (IDB), the World Bank (WB), and the Netherlands Commission for Environmental Impact Assessments in our review of EIAs. These guidelines guide the independent consultant in key areas. Finally, EPA: The government depends solely on the Act for conducting the EIA. The Terms and Scope is for determining the scope of the EIA and is what really matters. It will be developed by EPA and the consultant to ensure that the EIA addresses all the key issues, and it will consider public input. (V2) EEPGL: EM has a number of global standards that we apply in addition to following local regulations and working with EPA and the Ministry of Natural Resources.
What guidelines will the EPA be using? The newer guidelines included information that addressed O&G, but it appears that the EPA has reverted back to the 2000 guidelines. (4) (V)	
How does the EPA consider all the environmental risks? (3)	EPA: This will be considered in the T&S; EPA officers will meet with the team of independent consultants to develop a T&S to address your concerns and these concerns will be analyzed and placed in categories to inform the T&S.
Will the EPA make these hearings available for the public record so that society can evaluate to which extent the concerns of the public have been considered in the ESIA? What platform exists to share this information? How will the comments be published? (V) (3)	EPA: We will work with IT and hearings are being recorded. We will assess the best means to make it available.
What is the duration of the EIA for this type of project and when does it start? (V) (3)	EPA: There is no statutory timeline for conducting an EIA identified in the Act. It could take 6 months to a year, but there is no requirement for how long the process should take.

Comments (Consolidated)	Consideration in EIA
If a permit is granted, what is the monitoring plan and how long does the permit last? (1)	If a permit is granted, what is the monitoring plan and how long does the permit last? (1b)
Stakeholder Engagement and Consultation	
Request for more public involvement and engagement related to the genesis of the Project, economic viability, process, and especially with communities in the vicinity. (V)	EPA: We desire public involvement. This forum and process provides the opportunity for the developer to share pertinent information and hear from the public. When the T&S are submitted, the Stakeholder Engagement Plan will have to include specific consultations, so the scope of engagement varies based on the project stage. You may refer to Chapter 6, Stakeholder Engagement, for specifics about engagement methods, engagement to date, stakeholder identification, EIA scoping, public meetings, disclosure meetings, etc. EEPGL will ensure that the public's comments and recommendations were captured and incorporated, and that the EIA shows that. We will be compiling all of your comments and contributions and sharing those with team of consultants that will conduct the EIA. The EPA does not conduct the EIA, the independent consultant does EEPGL: We are not going to progress this project until we have an approved EIA; we expect to continue working with EPA through the middle of next year before we see an approved EIA; during that period, we expect that near 1Q 2022 you will have a 60-day period to review the results of these studies and comment on them. After we get approval of that, we actually start execution.
Question on timing of scoping phase compared to the next public comment period and issuance of EIA. (3)	
Request assurance that after completion of the EIA, results are shared back with the community, including how comments are addressed in the EIA. (6) (V)	
Consultation should be done with people of Patentia, Wales. (3)	EEPGL: There is a meeting on the 22nd of July at Patentia.
Turnout is lower than expected considering the floods. Also in future please take into consideration that Region 5 is divided into two sub-regions. (5)	EEPGL: Noted. Thank you for the input.
Non-routine, Unplanned Events (e.g., Spills or Releases, Natural Hazard Events)	
In the event of the pipeline getting broken or damaged, how would marine life be affected on the seafloor and what measures would be put in place to fix them? (5)	EEPGL: Chapter 10, Unplanned Events, discusses possible unplanned occurrences and their effects on items including marine and coastal biology. To help lower the likeliness of the pipeline being damaged, it will be buried are areas will be marked where the lines are located.
Will there be a compensation fund set up by the operators or government that will compensate people (e.g., fisherfolk and farmers) in the event of an accident or unplanned event (e.g., oil spill)? (6) (4) (3)	EEPGL: No offshore drilling will occur as part of the Project and any exclusion zones will be evaluated and communicated. Chapter 9, Socioeconomic Impacts, assess the effects on livelihoods (and broader socioeconomics) as part of the EIA. Regarding insurance, ExxonMobil and its co-venturers have a

Comments (Consolidated)	Consideration in EIA
In terms of compensation, we understand insurance does not cover this. Who are the insurers for each aspect of the project? (6) (4) (V)	comprehensive plan. In the event of any incident, we will take our responsibility, full stop; we are conducting this project according to the Stabroek Agreement and working with the GoG in that manner. EPA: The need for a compensation fund will more than likely be assessed as part of the EIA. Per the EP Act, we are required to seek liability for pollutant damage. (4b) For an environmental permit, the Act mandates that the polluter pay for liability [insurance]. (V2)
How safe is the pipeline and if it was to burst, how would it be fixed? (6) (3) (1)	EEPGL: Section 5.4.4, EEPGL Quality Control Process Overview, and Section 5.6, Proposed Best Available Technology and Embedded Controls, describe the quality control processes and the technology and embedded controls of the Project. In these sections, the project description asserts that design integrity assures no loss of containment by conducting testing, welding, and inspection and Emergency Response Procedures were also prepared during design (6a). Additionally, firefighting equipment and gas detection equipment will determine if there is a leak. If detected, the equipment immediately alerts the operators, the plant will be shut down, and the water monitors will turn on to prevent the leak from igniting (3a). Finally, the line is designed in such a way that it is unlikely anything could ever truly cause it to break (3b). We focus on over-engineering the pipeline, ensuring proper metallurgy in the pipe, detailed inspection of welds using x-rays to ensure competence of welds, and periodic inspection with pigs to prevent leaks (1a). By applying design standards that are best practice, we minimize and manage risk as reasonably practicable.
How frequent are explosions, leaks, and damage? (6) (2)	
What happens to people if the pipeline were to burst? (4) What is being considered if there is a gas spill near communities - evacuation plans and insurance for the people, surveillance? (2) (3) (V)	
Will the drilling create earthquakes? (6)	EEPGL: There is no drilling with this Project. But on other projects, we reinject gas or water to maintain pressure so that there are no issues. Additionally, Section 7.1.2.5, Seismic Activity, of the EIA explores seismic activity in Guyana and finds the probability of an earthquake to be low. Specifically, the country has a less than two percent chance of experiencing a potentially-damaging earthquake in the next 50 years.
Environmental Impacts	
What other areas of the environment will be studied aside from those listed? (6)	The EIA assesses the following areas of the environment in the following sections: 7.1 Geology and Sediments 7.2 Soils 7.3 Sediments 7.4 Water Quality

Comments (Consolidated)	Consideration in EIA
	7.5 Sound and Vibration 7.6 Air Quality, Climate, and Climate Change 7.7 Waste Management and Infrastructure Capacity 8.1 Protected Areas 8.2 Marine and Coastal Biodiversity 8.3 Terrestrial Biodiversity 8.4 Freshwater Biodiversity 8.5 Ecological Balance and Ecosystems 8.6 Special Status Species 9.8 Ecosystem Services
Concern over the lack of a proper study on marine resources, especially as it pertains to compensation. (6) (V)	EPA: Our role is to look at the health of the natural environment and human health, so we appreciate your comments.
How is (and will) EPA monitoring fishing industry and quality of fish in terms of pollutants? How do you distinguish impacts to fishing for a natural gas project from what's already happening? (4)	EEPGL: We have an existing monitoring system where we look at pressures and any incidents with fish are reported to EPA. We are not able to address the pollutants question. Additionally, as explained in Section 8.2, Marine Coastal Biodiversity, EEPGL has a series of ongoing surveys targeted at fish in the Stabroek Block and in the area between the Stabroek Block and the Guyana coast.
Onshore facility will pass through mangroves that are an important part of sea defense, so that issue has to be addressed. (3)	EEPGL: The importance of, and any impact on, mangroves is assessed in Chapter 9, Socioeconomic Impacts, of the EIA. We require studies and engagement of relevant authorities in communication if there is a need to remove and restore (3a). We also have a process for mangroves as we have done for the fiber optic project. When the project is executed, we will work with specific agencies such as NAREI and others for their approval and process (3b). In general, we will try to avoid mangroves and, as we will mostly look to use HDD to cross the shore, we will not affect them (3c)
In the design studies, climate is mentioned, but climate change would be appropriate. Are you considering climate change in the study? What impact will it have? (3) (1)	EEPGL: One of the main reasons we are doing this is to reduce the carbon footprint of the current program; methane is cleaner than diesel and heavy fuel oil by 30%. The project will probably reduce Guyana's overall contribution to climate change by reducing the need for heavy fuel oil-fired generation of electricity. (1a) Natural gas-fired electricity produces 30% fewer GHGs than heavy fuel oil-fired generation. So replacing current HFO-based generation in Guyana would reduce overall emissions. (1b)
Will there be a shore crossing study? (3)	EEPGL: Shore crossing is one of the most discussed areas; normally you do horizontal drilling methods. You drill from the sea under the crossing and come out on land, so if there is a seawall you go under it, cover the line in rock, and then make sure the entire route is installed inside a RoW that doesn't affect

Comments (Consolidated)	Consideration in EIA
	residents. The minimum buffer is not decided yet, but the details of the shore crossing can be found in Chapter 5, Project Description.
Will studies be completed to understand impacts to seafloor for this pipeline vis-à-vis the nature of the ocean floor (e.g., noise)? If there is seabed damage and impact to marine life, what measures will be put in place to fix them? (V) (1) (5)	EPA: EIA will study this.
Will the EIA look at the economic evaluation for ecosystems? (V)	EPA: To clarify, there would have been initial feasibility assessment, but EIA also covers alternatives so while there may be proposed locations, the assessment will determine the other options and what may be most appropriate in this regard. Yes, Section 9.8 addresses ecosystem services, including the economic impact of them.
Request for baseline data on Air Quality. (V)	No direct response provided.
Request for baseline data on stormwater management. (V)	No direct response provided.
Request for climate vulnerability study and LiDAR for baseline data to evaluate potential flood risks. (V)	No direct response provided.
Request definitions of level of emissions, from source to facility. (V)	No direct response provided.
What studies have been commissioned on the sediment along the proposed [pipeline] alignment? (V)	EEPGL: The related offshore technical studies will commence in the next few days.
Concerns expressed about cumulative impacts from noise and disturbance of the seabed from this project. (V)	EEPGL: The purpose of the EIA is to analyze these types of impacts. In my personal experience, pipeline projects generally create rather than destroy seafloor habitat.
Concerns expressed about deforestation and impacts to water quality in terms of drinking water and where people fish. Who will monitor water quality? (3)	No direct response provided.
Who would monitor the air and water quality? Which agency? Is it government? Is it the EPA? I think you should consider public safety measures, not just for the people who are working there. Monitoring of traffic and all kind of things, industrial noise, among others. (3)	No direct response provided.
We recommend that local people from Region 1 be involved in any monitoring programs that are required. We have knowledge and while we do think that impacts from this project will be minimal, there will be impacts. (1)	No direct response provided.

Comments (Consolidated)	Consideration in EIA
Will there be cases of oxygen depletion of the plants? How will this impact people in the surrounding communities? (3)	No direct response provided.
How will Guyana's coast being below sea level affect the project? (6)	No direct response provided.
Waste Management	
What are the potential waste products from the Project and disposal methods, if any? (5) (V)	Section 5.5.4, Waste Generation, assesses project waste generation, control, and management procedures. Every project we execute includes a Waste Management Plan, which identifies what wastes (hazardous or non-hazardous) the project will generate in terms of quantity and characteristics at every stage of the operation. The EPA then ensures that the waste is treated safely to their satisfaction in the Waste Management Plan. All wastes will be identified and we will outline the processes of treating them. The plan has to be accepted by the EPA, who draws on regulations and international best practices.
Is there toxic waste, hazardous gases, high sulfates, and how is it disposed of and/or stored? (3) (3) (V)	
How are you going to deal with water pollution, air pollution, etc. during construction and after de-commissioning? (3)	
How will waste be minimized to reduce the impact on the environment? (5)	
What will be the cumulative impacts of the waste? (V)	Chapter 11, Cumulative Impacts, of the EIA contains sections about the cumulative impacts of waste streams for all projects in the Stabroek Block and other areas.
How do you usually dispose of mercury waste and where will it be disposed of in Guyana? Have the other emissions (liquid, solid, vapor) expected as a byproduct of the gas refining and associated processes been identified, and how will these be addressed with respect to mitigation and impact to the human population that is in the proximity of these plants? (3) (V) (2)	EEPGL: Mercury, a hazardous waste, is part of the overall group of wastes for which we will develop a Waste Management Plan to present to EPA for their approval. Section 5.3.4.2, NGL Plant Systems, of the EIA details the mercury removal systems of the NGL Plant.
Does the wastewater (produced water) on floating platform have any impact on the general environment assessment? (V)	Covered in Section 5.5.3, Effluent Discharges, of the EIA, generated wastewater including blackwater, grey water, and hydrotest water will be treated with a combination of digesters, biological treatment, and/or chemical treatment in accordance with regulatory requirements and the specific treatment facilities available. These effluents will be discharged to the sea according to applicable standard international practices (i.e., International Convention for the Prevention of Pollution by Ships, 1973, as modified by the Protocol of 1978 [MARPOL 73/78]).
Health, Safety, and Security	

Comments (Consolidated)	Consideration in EIA
What are the potential dangers to the population in/around the facility (e.g., Wales)? (5)	Section 9.2.3.1, Relevant Project Activities and Potential Impacts, – The EIA assesses public safety concerns, including issues relating to person-to-person interactions, traffic risks, and more.
How will you handle a medical emergency considering you have 300 workers? Will you build a hospital? (3)	Section 9.2.3.1, Relevant Project Activities and Potential Impacts, – The project has a multifaceted approach to medical facilities. First, there will be a medical facility at each camp to treat minor medical issues. In the event of more serious illness or injury that cannot be handled by the camp's medical professionals, patients will be medically evacuated to a healthcare facility in Georgetown and potentially outside of Guyana, depending on the type of medical issue. The Project currently uses a designated local private Guyanese clinic supported by an international medical provider, as well as hospitals in Georgetown, in the event of both work-related and non-work-related medical and health emergencies. However, for the most part, these hospitals will be relied upon only for initial evaluations or, in the case of life-threatening emergencies, stabilization before evacuation of foreign workers out of country to another facility.
What is EEPGL's plan for dealing with an emergency at the GTE facility? (1)	EEPGL: EEPGL takes a four-part approach to managing emergencies that we call the PEAR approach. That stands for People, Environment, Assets, and Reputation, and it means that our priorities in managing an emergency are to take care of our People, be good stewards of the Environment, maintain the value of our Assets, and preserve our Reputation.
Who is responsible for road damage if it occurs? (3)	EEPGL: Section 9.4, Transportation, assesses the baseline conditions and impacts of vessel and vehicular transportation in the communities. In general, our process begins by doing studies to understand the infrastructure needed to support a project like this one, then we work with the government to determine how to upgrade infrastructure. We will fix any roads that we damage.
Employment and Livelihoods	
What impact will the Project have on fisherfolk, their catch and their livelihoods as a result of exclusion zones? How will fisherfolk be compensated for loss of income? (6) (3) (1)	EEPGL: The effects on livelihoods (and broader socioeconomics) is assessed in Chapter 9 of the EIA (Assessment and Mitigation of Potential Impacts from Planned Activities—Socioeconomic Resources). We will coordinate and communicate exclusion zones with fisherfolk. We will also work directly in association with the Ministry of Agriculture, with Chief Fisheries Officer and his Department, and they will typically assign a Fisheries Officer to make sure what is done is satisfactory to the agency. (3a) EPA: The assessment will include engagement with the fishing community.

Comments (Consolidated)	Consideration in EIA
How are the current difficulties that the fishing industry is facing (and impacts on marine life in general) being factored into the GTE EIA? (1)	EEPGL: Impacts on marine life are assessed in Section 8.3.3 through 8.3.5 of the EIA. We don't want to pre-suppose the results of that analysis, but based on experience with similar projects in other regions (Canada in particular), marine pipelines often improve marine habitat quality.
With the life of project at 25 years, what happens in 15 years if there isn't enough gas? What happens to those employed by the Project? (6)	EEPGL: The Stabroek Block has a large quantity of gas and we are designing with reliability to maximize value for Guyana.
How many jobs will be created by the Project and will they be permanent? (3) (6)	EEPGL: The people who will be hired to build the facility will not be permanent. But one thing to look at is that it helps people develop trades. You train welders and electricians, and then they can work in other jobs. Creating an industry.
What benefits will there be for Region 6? (6) How can a place like Mabaruma benefit from this project, at a local level? (1) How can fishing industry benefit? (1)	EEPGL: We have a strong corporate social responsibility program and can incorporate your comments into our planning. (6a) The most obvious benefit to Mabaruma will likely be the lower cost of propane/butane due to increased domestic supply. (1a) The project will increase demand for many local products, including fish.
Will there be training opportunities for youth in Region 6? (6) Region 3 would like to see more training, and not just foreign persons or other regions; if bringing a certain machine, we would definitely want to train someone to turn it on or off. We want to see more training before the project starts. (3) Can you tell us what the business opportunities will be so that we can start to build the businesses? We are new at this and need information and support before it's too late. How can small business compete with the large businesses? (3) For the 25 persons who will be hired in operations, what skills, etc. are needed for those jobs? (3)	EEPGL: The project offers highly skilled technical opportunities for young people, while not many roles during operations, there are 700 during construction and many that lead to opportunities in other industries. EEPGL: We aspire on a daily basis to make sure we increase composition of not only people in the office, but all aspects of our operation. Projects are really new, so we typically would draw on expertise of foreign workers to disseminate their knowledge to local Guyanese who will eventually take their roles; the plan is not to maintain a full expatriate workforce. We should have a goal of 100% Guyanese working for our facilities. EEPGL: We will be doing some supplier outreach in the local communities to the Project. There will be a supplier forum where you can meet the contractors and hear from them what they are needing. Who are they, what are they doing, and what do they need. EEPGL: 700 people will work on construction, so different trades will be needed such as welders, carpenters, cement workers, millworks. When we finish construction, we need about 25 people for operations. We will look for people in the area and give full and fair opportunity to anyone who has those skills, and in some cases will set up training for those skills.

Comments (Consolidated)	Consideration in EIA
What impact will there be on communities and businesses along the pipeline? (3)	Section 9.1.3, Impact Prediction and Assessment (Socioeconomic), explains the positive and negative effects the Project will have on communities and businesses along the pipeline.
Wil there be negative impacts to communities? (1)	Sections 9.1.3–9.1.5, 9.3.3–9.3.5, 9.4.3–9.4.5, and 9.5.3–9.5.5 all assess the impacts of the Project and various social factors in a community, including socioeconomic conditions, community health and wellbeing, social infrastructure and services, transportation, and cultural heritage.
How will the project benefit the community of Santa Rosa? (1)	EEPGL: We anticipate two primary benefits to the community: increased employment opportunities, and lower prices for cooking gas.
How will Region 2 benefit from this project? (2)	EEPGL: The nation will get better energy from this project. EEPGL works in most communities and we want to be able to support programs where we operate so these projects can benefit Guyana as a whole.
Will the natural gas that will be coming onshore be used for domestic purposes like cooking? (2)	Section 5.3, Project Components, describes that the primary use of the project is to feed the power plant, but that there will also be heavier gasses such as propane, butane, and pentane NGLs, that will be sold. The details of the arrangement are still to be determined.
Would there be contractors directly contracted to government? (3)	As outlined in Chapter 5, Project Description, the contractors for the Project will be hired by EEPGL, not the Government of Guyana.
Other Socioeconomic Factors	
Will the socioeconomic study and household survey be completed only in Wales, or broader communities? (6)	The study focuses on several socioeconomic factors, including, but not limited to, economic development, labor, traffic, and impacts on fisherfolk both in Wales and broader communities.
How is human health covered in the EIA? (4)	The socioeconomic part of the study, covered in Section 9.1, Socioeconomic Conditions, of the EIA, encapsulates employment, livelihoods, community services, etc. Additionally, human health is discussed in Section 9.2, Community Health and Wellbeing.
Shipping costs are high and problems with silting become a public impact affecting everyone. (4)	EEPGL: All will be addressed under the studies.
In terms of mention of relocation, are you talking about relocating businesses, relocating people…how is that going to impact the people and the community? What is a minimum safe distance for commercial activities to take place from the pipeline? (3) (V)	As described in Section 5.1.2, Project Land Requirements and Use the onshore route selection process was conducted to reduce routing through existing communities and minimize physical displacement. There will be a process coordinated with the government to determine if this is sufficient. We have every intention of avoiding relocation when possible.
Recommendation to include environmental justice in the EIA. (3)	EEPGL: We will let EPA evaluate.

Comments (Consolidated)	Consideration in EIA
Request for economic assessment looking at all aspects of the NGL sales and long-term economic benefits to the country. (V)	No specific response provided.
How does this Project interact with the Demerara Bridge Project in terms of schedules, amount of marine traffic, and road traffic? (V)	Section 9.4, Transportation, assesses the impacts of the Project on the Demerara Bridge Project 5.5.6.1 – The temporary MOF is intended to mitigate the impact of heavy haul routes, as it mitigates the need to use other roads in the communities. Section 9.4, Transportation, explores the baseline information and impact assessment about the Project's interaction with transportation.
With the temporary landing zone and behind the bridge, what traffic will you generate on the waterway to cause the bridge to open more? It is assumed this will cause more congestion? (3)	
What will be the impact on transportation routes? (1)	
How will marine traffic be considered? (1)	Section 5.5.6, Traffic Generation, of the EIA discusses onshore and offshore traffic generation from the project. To prevent interactions, EEPGL will issue notices to mariners to help avoid interference with marine traffic, and bury the shallow portion of the pipe to minimize the potential for snagging anchors or mooring gear.
Who will benefit from the project from a socioeconomic perspective? What are the benefits for the NDCs? (1) (2) (3)	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities—Socioeconomic Resources, addresses potential socioeconomic impacts including potential positive and adverse economic impacts, measures designed to mitigate adverse impacts, and measures intended to support local benefits. Positive benefits from the project will include increased employment, cheaper power, and enabling of new gas-dependent industries. The regional areas and those concentrated around the site will see the direct benefits. EPA: There are renewable energy projects that are for the inter-land users. For example, there are solar projects in Lagoon or in Regions 7 and 8.
This project will mostly benefit coastlanders. What about the inland areas? Will there be a line to transmit power to them? (3)	
What is the process for informing fisherfolk about the Project? (1)	We have been holding meetings with community members, including fisherfolk, to ensure their concerns are being heard. Our meetings will be documented in the SEP. Additionally, we are conducting an ongoing participatory fish study to help inform the EIA.
Will there be an influx of people to work here? If so, the area may be overpopulated and have an increase in crime, alcohol consumption, etc. How do you plan to deal with that? (3)	EEPGL: Section 9.2.3.1, Relevant Project Activities and Potential Impacts, assesses the impact of the increased population as a result of the project on local communities. The section's findings establish the low and negligible impacts of the project on the local communities, as workers will primarily be isolated in worker camps, despite the population increase it will cause.

Comments (Consolidated)	Consideration in EIA
Can local sports programs benefit from the GTE project? (1)	EEPGL: We can look at that as a part of the socioeconomic assessment in the EIA.

EEPGL = Esso Exploration and Production Guyana Limited; EIA = Environmental Impact Assessment; EM = ExxonMobil; EPA = Guyana Environmental Protection Agency; ERM = Environmental Resources Management; ESIA = Environmental and Social Impact Assessment; FEED = Front-End Engineering Design; FPSO = Floating Production, Storage, and Offloading (vessel); GHG = greenhouse gas; GoG = Government of Guyana; GPL = Guyana Power and Light; GTE = Gas to Energy; HDD = horizontal directional drilling; IDB = Inter-American Development Bank; IT = Information Technology; LiDAR = Light Detection and Ranging; MARPOL = International Convention for the Prevention of Pollution by Ships, 1973, as modified by the Protocol of 1978; MMscfd = million standard cubic feet per day; MMsm^3/d = million standard cubic meters per day; MOF = Material Offloading Facility; NDC = Neighbourhood Democratic Council; NGL = natural gas liquids; O&M = operations and maintenance; OIMS = Operations Integrity Management System; PLET = pipeline end termination; psi = pounds per square inch; RoW = right-of-way; SEP = Stakeholder Engagement Plan; T&S = Terms and Scope; WB = World Bank

Note: The number in parentheses following the comment indicates the regional meeting at which the comment was made (Regions 1 through 6). “V” indicates the comment was made in a virtual meeting. “E” indicates that the comment was included in the summary of verbal and written comments provided by the EPA to EEPGL. “NA” indicates no meeting information was recorded.

APPENDIX C

Water Quality Modeling Report

Submitted with changes

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Esso Exploration and Production Guyana Limited

Water Quality Modeling Report

Gas to Energy Project

November 2022

The business of sustainability

ERM

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ACRONYMS AND ABBREVIATIONS

3D	three dimensional
amsl	above mean sea level
cm/s	centimeters per second
CORMIX	Cornell Mixing Zone Expert System
DEM	Digital Elevation Model
EEPGL	Esso Exploration and Production Guyana Limited
FPSO	Floating Production, Storage, and Offloading (vessel)
GEBCO	General Bathymetric Chart of the Oceans
GEMSS	Generalized Environmental Modeling System for Surfacewaters
GIFT	Generalized Integrated Fate and Transport Model
GLLVHT	Generalized, Longitudinal-Lateral-Vertical Hydrodynamic and Transport
GRFR	Global Reach-Level Flood Reanalysis
GTE	Gas to Energy
HDM	hydrodynamic model
HYCOM	HYbrid Coordinate Ocean Model
IGLD	International Great Lakes Datum
JICA	Japan International Cooperation Agency
LiDAR	Light Detection and Ranging
LSM	Land Surface Model
LULC	Land Use Land Cover
MERIT	Multi-Error-Removed Improved-Terrain
m^2	square meter
m^3	cubic meter
m^3/h	cubic meter per hour
m^3/s	cubic meter per second
mm	millimeter
MOF	Material Offloading Facility
NGL	natural gas liquids
OTPS	Oregon State University Tidal Prediction Software
PLET	pipeline end termination
RAPID	Routing Application for Parallel computation of Discharge
SCS	Soil Conservation Service
TSHD	trailing suction hopper dredger
TSS	total suspended solids
UNEP	United Nations Environmental Programme
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
VIC	Variable Infiltration Capacity
WWTP	Wastewater Treatment Plant

1. INTRODUCTION

1.1. PURPOSE

This Water Quality Modeling Report documents the methodology and results of modeling conducted in support of an Environmental Impact Assessment for the Gas to Energy (GTE) Project (the Project) being proposed by Esso Exploration and Production Guyana Limited (EEPGL). The Project facilities are comprised of the following primary components (Figure 1-1):

- Offshore pipeline—an offshore component that involves approximately 220 kilometers of a subsea pipeline extending from new subsea tie-ins at the Destiny and Unity Floating Production, Storage, and Offloading vessels (FPSOs) in the Stabroek Block to a proposed shore landing, located approximately 3.5 kilometers west of the mouth of the Demerara River;
- Onshore pipeline—an onshore pipeline, which is a continuation of the offshore pipeline, that extends linearly approximately 25 kilometers from the shore landing to a proposed Natural Gas and Natural Gas Liquids (NGL) Processing Plant (NGL Plant); and
- NGL Plant—the NGL Plant and associated infrastructure (e.g., heavy haul road, temporary material offloading facility [MOF], and worker camp) located approximately 23 kilometers upstream from the mouth of the Demerara River on the west bank.

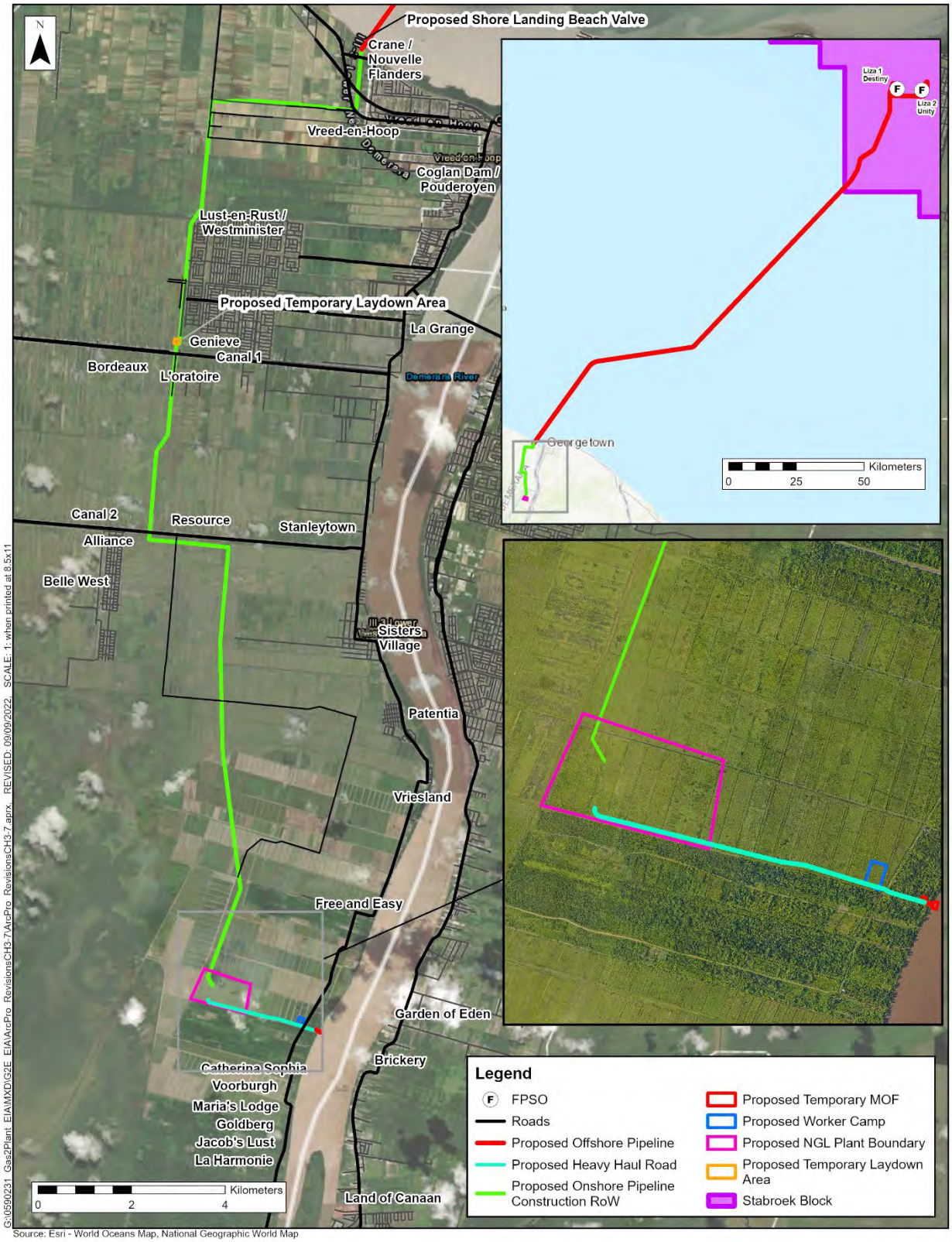


Figure 1-1: Project Location

The Project will include the following key activities that may impact the marine and riverine environment and were the subject of the modeling described herein:

- Offshore Pipeline
  - Trenching/jetting operations to facilitate burial of the offshore pipeline in shallow water segments of the pipeline route
  - Hydrostatic testing of pipeline
- Onshore Pipeline
  - Hydrostatic testing of pipeline
- NGL Plant
  - Planned NGL Plant effluent discharges to the Demerara River
  - Dredging in the Demerara River to facilitate temporary MOF operations

The modeling study considered these activities and included model simulations of sediment disturbance from pipeline trenching; effluent discharges from the NGL Plant operations and from hydrotesting of the onshore and offshore pipelines; and sediment disturbance from Demerara River dredging. Additionally, flood risk modeling was performed to assess the risk of flooding at the proposed NGL Plant.

1.2. SCOPE OF WORK AND REPORT ORGANIZATION

This report describes the modeling study performed to facilitate assessment of the potential impacts from the Project's planned discharges to marine and riverine waters. Section 2 describes modeling performed to establish the hydrological and hydrodynamic setting of the Demerara River. Section 3 describes modeling performed for planned effluent discharges from the NGL Plant. Section 4 describes the modeling performed to assess dredging-related discharges. Section 5 describes the modeling performed to assess the offshore pipeline trenching operation. Section 6 describes the modeling to assess discharges related to hydrotesting of the onshore and offshore pipelines. Section 7 discusses the results of the modeling performed to evaluate risks of flooding at the NGL Plant.

Computational models were used to estimate the fate and transport of Project-related discharges. Input data for the modeling were selected based on review of available Project design information, review of oceanographic data from the vicinity of the seaward end of the offshore pipeline corridor, and use of conservative assumptions where data were not available.

Results of modeling conducted for unplanned spills of hydrocarbons to water are provided under separate cover as an appendix to the latest Oil Spill Response Plan prepared in support of EEPGL's activities in Guyana.

2. HYDRODYNAMIC AND HYDROLOGICAL SETTING

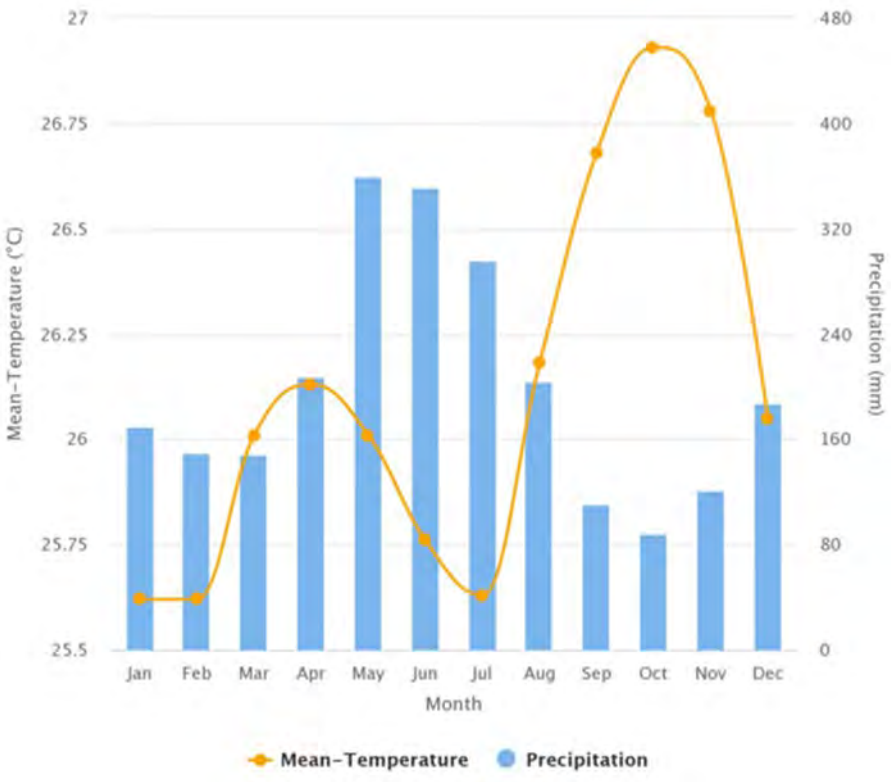
2.1. WATERSHED AND HYDROLOGICAL ASSESSMENT

In this section, descriptions are provided of the resources used to characterize the Study Area in order to gain an understanding of the hydrologic conditions relevant to the Direct Area of Influence for the Project. The hydrological resources, their methodologies, and a comparative analysis of hydrologic characteristics are provided below.

2.1.1. Site Characteristics

Guyana is divided into five major geographical regions: the coastal lowlands, the interior plains, the western highlands, the southern uplands, and the southwest savannah (USACE 1998). The Study Area is located in the coastal lowlands, which is an approximately 440-kilometer strip of land bordering the Atlantic Ocean. With portions of the coast at elevations as low as 3 meters below mean sea level, coastal lands in Guyana are vulnerable to flooding, erosion, and salinization (USACE 1998; World Bank Group Undated; Guyana Lands and Surveys Commission Undated).

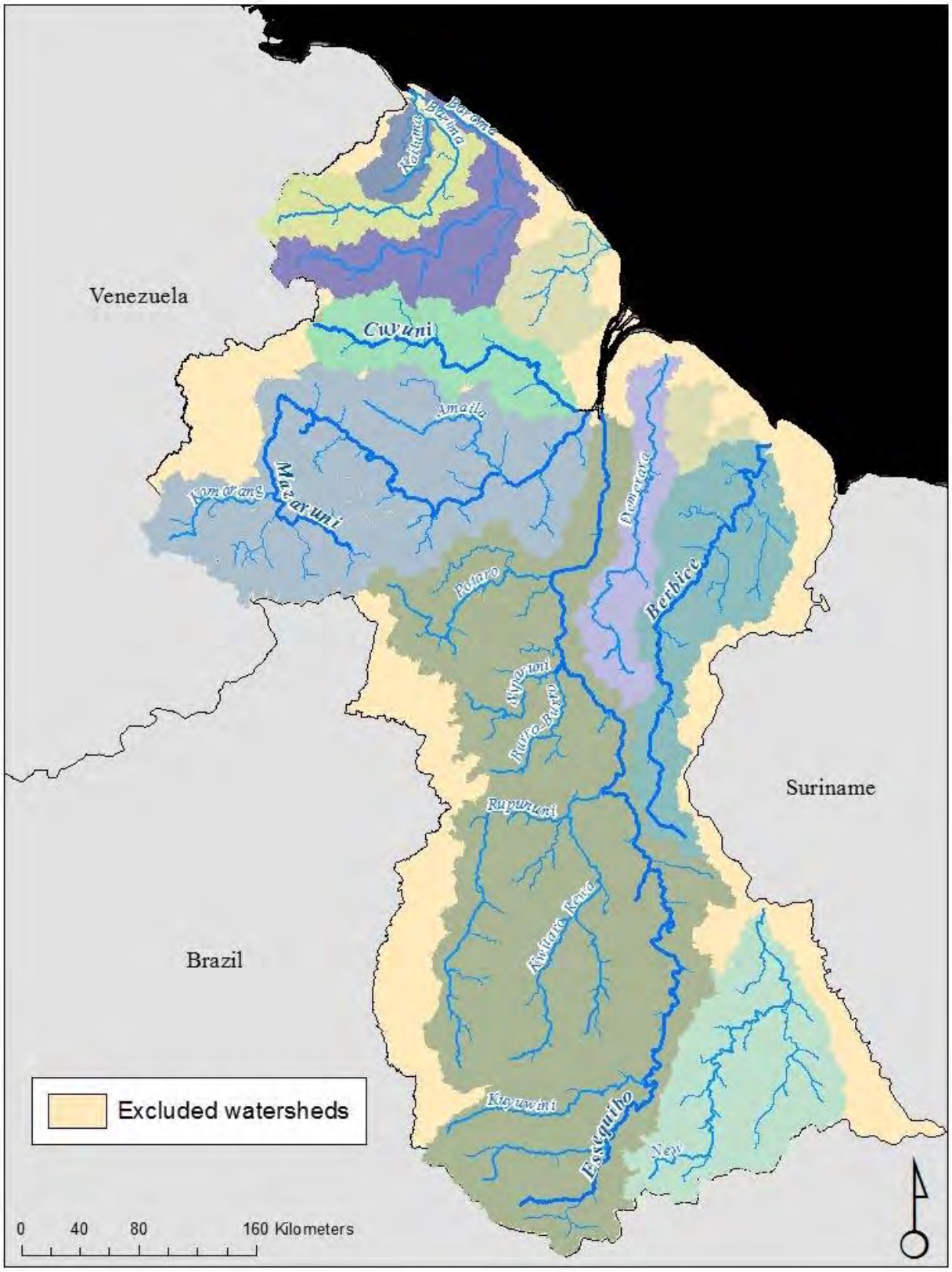
Guyana's climate is tropical, with two wet seasons and two dry seasons. The first wet season occurs from mid-April to mid-August, and the second occurs in December and January. According to data from 1991 to 2020, Guyana experiences, on average, over 50 percent of its yearly precipitation during the first wet season (Figure 2-1; World Bank Group 2021). The heavy amounts of precipitation produce high amounts of surface runoff and groundwater recharge (USACE 1998).



Source: World Bank Group 2021
°C = degrees Celsius; mm = millimeter

Figure 2-1: Monthly Mean Temperature and Precipitation in Guyana (1991–2020)

The Demerara River and the Essequibo River, two key freshwater sources within the Project's Indirect Area of Influence, are two of the country's four principal rivers (Figure 2-2). The Essequibo River forms the country's largest river system; it flows the entire length of the country, from the southern border to the Atlantic Ocean, and constitutes 40.4 percent of Guyana's total freshwater (USACE 1998; Netzer et al. 2014). The Demerara River flows from the forests in central Guyana to the Atlantic Ocean and constitutes 5 percent of Guyana's total freshwater (Netzer et al. 2014).



Source: Netzer et al. 2014

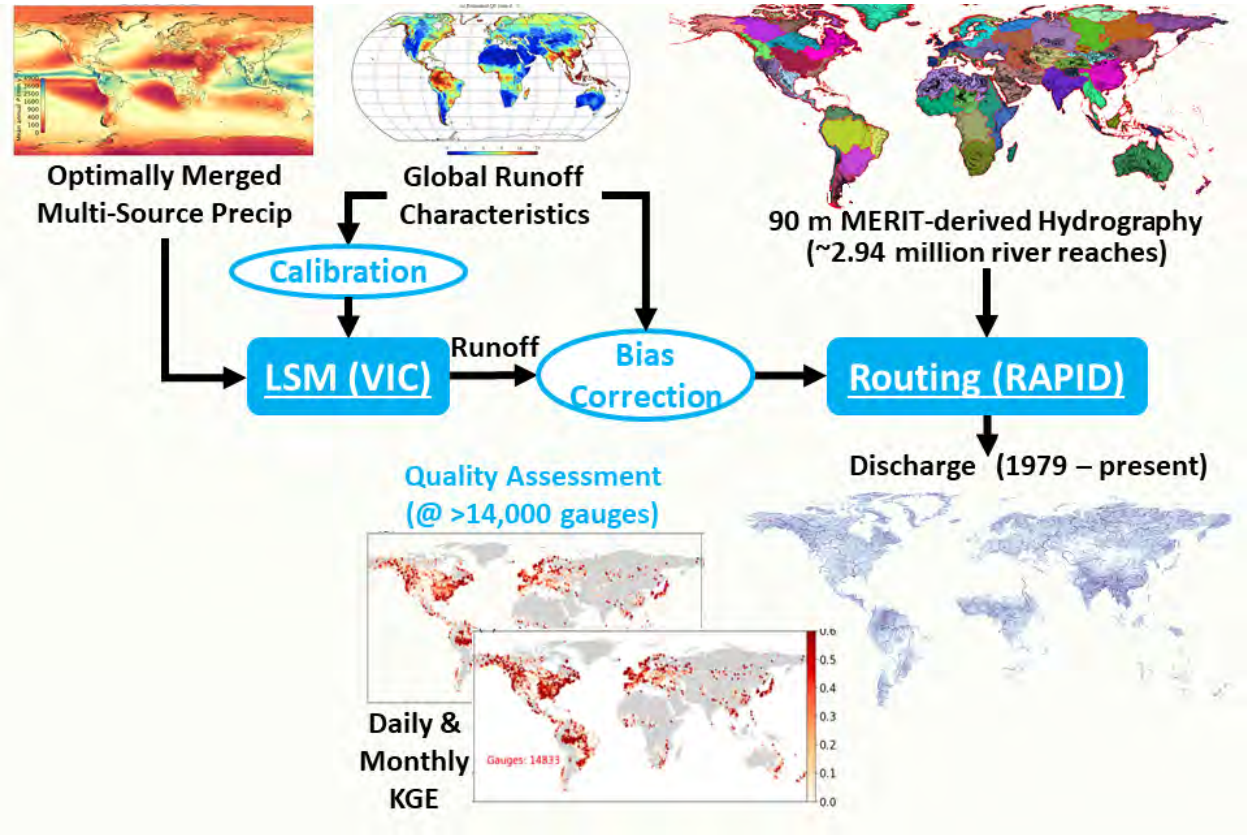
Figure 2-2: Watershed Delineation Denoting the Four Principal Rivers in Guyana

2.1.2. River Discharges

There are no known active flow gauges installed in the Demerara or Essequibo rivers, creating a lack of information with respect to monitored flow conditions for the assessment. Therefore, river discharge data for the hydrological assessment were obtained from a modeling system called Multi-Error-Removed Improved-Terrain (MERIT) Hydro. MERIT Hydro was developed by Dai Yamazaki of the University of Tokyo and is a global flow direction map with 3-arc-second resolution (approximately 90 meters at the equator); it is derived from elevation data (MERIT Digital Elevation Model) and water body datasets (Global 1-arc-second Water Body Map, Global Surface Water Occurrence, and OpenStreetMap; MERIT 2019).

MERIT Hydro's algorithm extracts river networks by separating actual inland basins. MERIT Hydro has verified the locations of streamlines with existing satellite-based global river channel data. Relative error in the drainage area was found to be smaller than 0.05 for 90 percent of Global Runoff Data Centre gauges. Differences in area occurred mostly in arid river basins containing depressions that are occasionally connected at high water levels, thus resulting in uncertain watershed boundaries (MERIT 2019).

MERIT Hydro includes flow direction, flow accumulation, hydrologically adjusted elevations, and river channel width. The modeling system consists primarily of a Land Surface Model (LSM), a river routing model (Routing Application for Parallel computation of Discharge [RAPID]), a calibration procedure, and a bias-correction (post-processing) procedure (Figure 2-3).



Source: Reachhydro.org Undated_a (accessed March 2022)
VIC = Variable Infiltration Capacity

Figure 2-3: MERIT Hydro Modeling System

As part of the MERIT Hydro system, Variable Infiltration Capacity (VIC) is used (Liang et al. 1994), which is a macroscale hydrologic model that solves full water and energy balances. VIC is a research model that has been applied to most of the major river basins around the world. [1] The VIC LSM is used for runoff simulation, where model parameter calibration and bias correction are performed against machine learning- (ML-) derived, global runoff characteristic maps in the Global Streamflow Characteristic Dataset (Lin et al. 2019).

RAPID—a river routing model using surface and groundwater inflow to rivers as inputs—is used to compute the flow and volume of water throughout extensive river networks. The design of RAPID uses a matrix version of the Muskingum method (David et al. 2011), and has an automated parameter estimation procedure that allows finding optimal model parameters based on available gauge measurements.

RAPID has the ability to run and/or optimize model parameters on any sub-basin included in its computing domain. If major manmade infrastructures are present on the river network, RAPID can substitute upstream flow measured by gauges within its simulations of river flow and its

[1] https://vic.readthedocs.io/en/master/

optimization of parameters. If information concerning water withdrawals or return flows is available, RAPID can remove or add the corresponding flows from its computations.

2.1.3. Climate Change Knowledge Portal

Climate data for the hydrological assessment was extracted from the Climate Change Knowledge Portal, a hub for climate-related information, data, and tools created by the World Bank Group. The portal is a web-based platform that uses the latest climate data and scientific research available. It provides global data on historical and future climate, vulnerabilities, and impacts at the national, sub-national, and watershed levels.

2.1.4. Hydrological Analysis

Discharge data were obtained and evaluated from MERIT Hydro for both the Essequibo and Demerara rivers as well as Demerara River tributaries (Figure 2-4). MERIT Hydro provides predicted daily discharges for a period of 40 years (1979 to 2019). Table 2-1 contains summary statistics for these rivers and select unnamed Demerara River tributaries. Figure 2-5 and Figure 2-6 show daily hydrographs for the Essequibo River and Demerara River, respectively.

Figure 2-4: Waterbodies Included in Hydrological Analysis

Table 2-1: MERIT Hydro Discharge Statistics for 1979–2019

Waterbody	Minimum Discharge (m^3/s)	5th Percentile Discharge (m^3/s)	50th Percentile Discharge (m^3/s)	95th Percentile Discharge (m^3/s)	Maximum Discharge (m^3/s)
Essequibo River	61.2	613.5	2,723.4	9,709.6	17,510.7
Demerara River	0.03	29.2	202.8	795.3	2,139.4
Tributary 1	0	23.9	178.9	725.4	1,965.1
Tributary 2	0	0.02	6.1	31.5	154.8
Tributary 3	0	0.003	1.3	5.2	21.1
Tributary 4	0	0.01	3.5	13.7	65.0
Tributary 5	0	0.1	3.3	17.8	75.6
Tributary 6	0	0.002	1.1	8.6	52.7

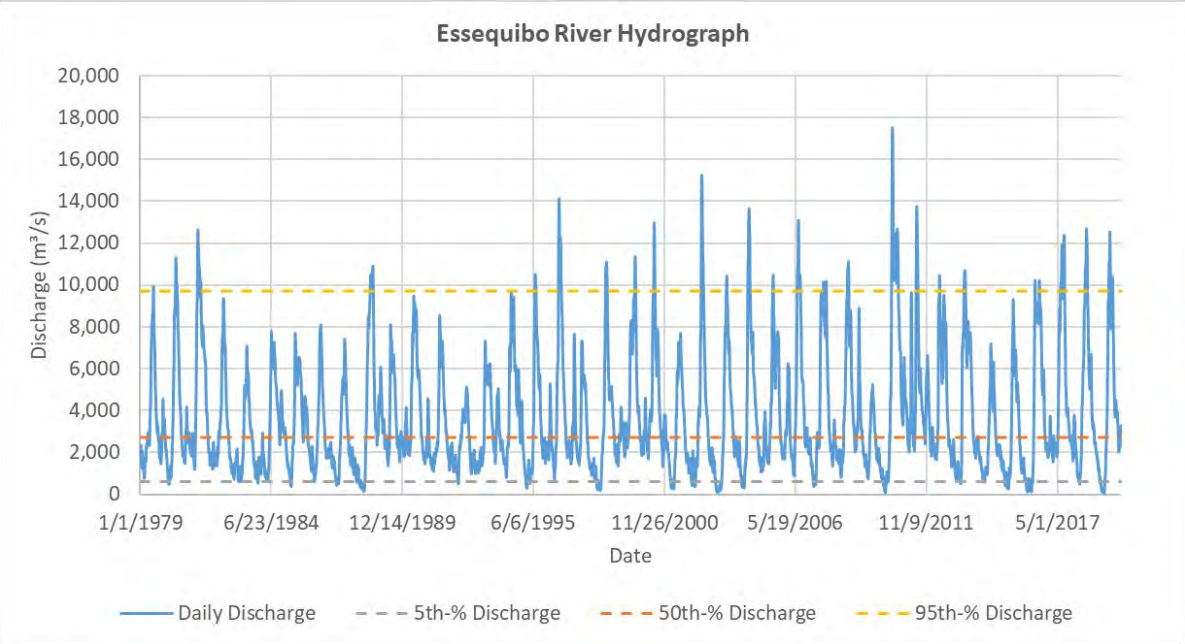
m^3/s = cubic meters per second

The Essequibo River's maximum discharge is more than eight times as high as the Demerara River's maximum discharge. The most significant tributary to the Demerara River's flow in the Study Area is Tributary 1, with a contribution as high as 90 percent to the maximum flow in the Demerara River. As summarized in Table 2-2, all waterbodies experience their highest monthly average flow during either June or July due to the heavy precipitation that occurs in the first wet season. Figure 2-7 provides a comparison between Guyana's total monthly precipitation and the average monthly flows of the Essequibo and Demerara rivers. Average monthly precipitation in the Essequibo River and Demerara River watersheds typically trend with the average monthly precipitation experienced throughout Guyana (Figure 2-8).

Table 2-2: MERIT Hydro Average Monthly Discharges for 1979–2019

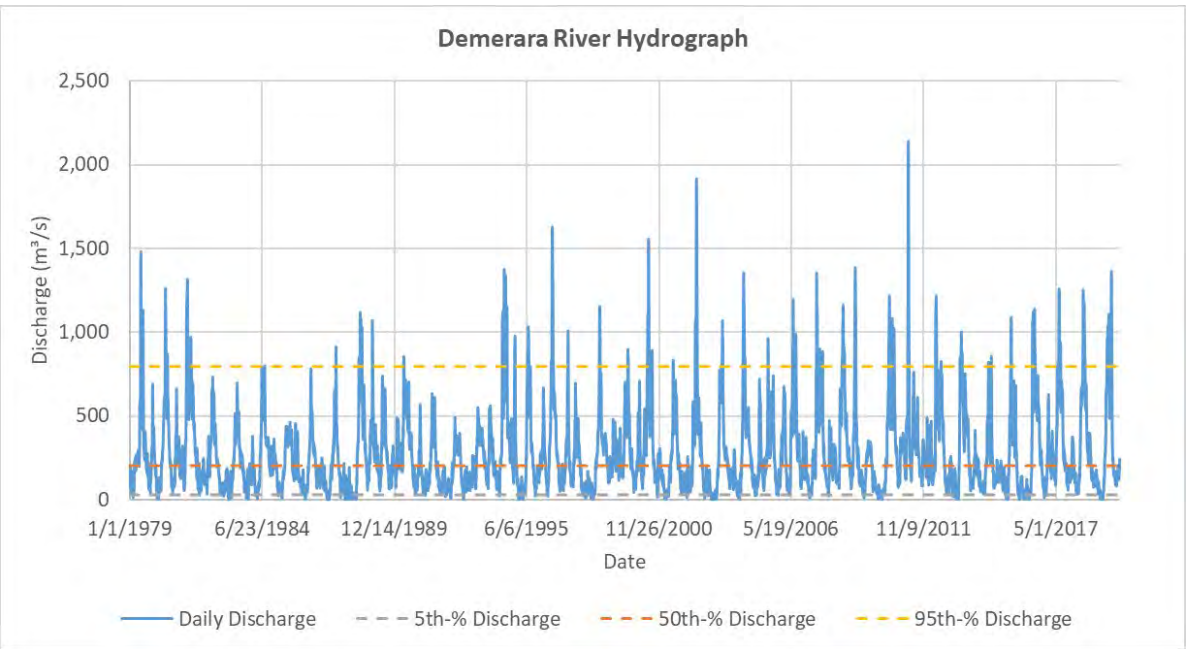
Month	Essequibo River Average Discharge (m^3/s)	Demerara River Average Discharge (m^3/s)	Tributary 1 Average Discharge (m^3/s)	Tributary 2 Average Discharge (m^3/s)	Tributary 3 Average Discharge (m^3/s)	Tributary 4 Average Discharge (m^3/s)	Tributary 5 Average Discharge (m^3/s)	Tributary 6 Average Discharge (m^3/s)
January	2,193	219	182	11	2	6	7	3
February	1,845	162	139	8	1	3	4	2
March	1,481	138	122	5	1	3	3	1
April	1,518	137	123	5	1	3	3	1
May	3,541	335	312	11	2	5	6	3
June	7,429	636	578	21	3	9	11	5
July	7,856	573	521	17	2	7	9	4
August	6,662	432	393	12	2	5	6	3
September	4,733	245	221	6	2	3	3	1
October	2,852	127	113	4	1	3	2	1
November	2,327	139	122	5	2	3	4	1
December	2,357	196	168	8	2	5	6	2

m^3/s = cubic meters per second



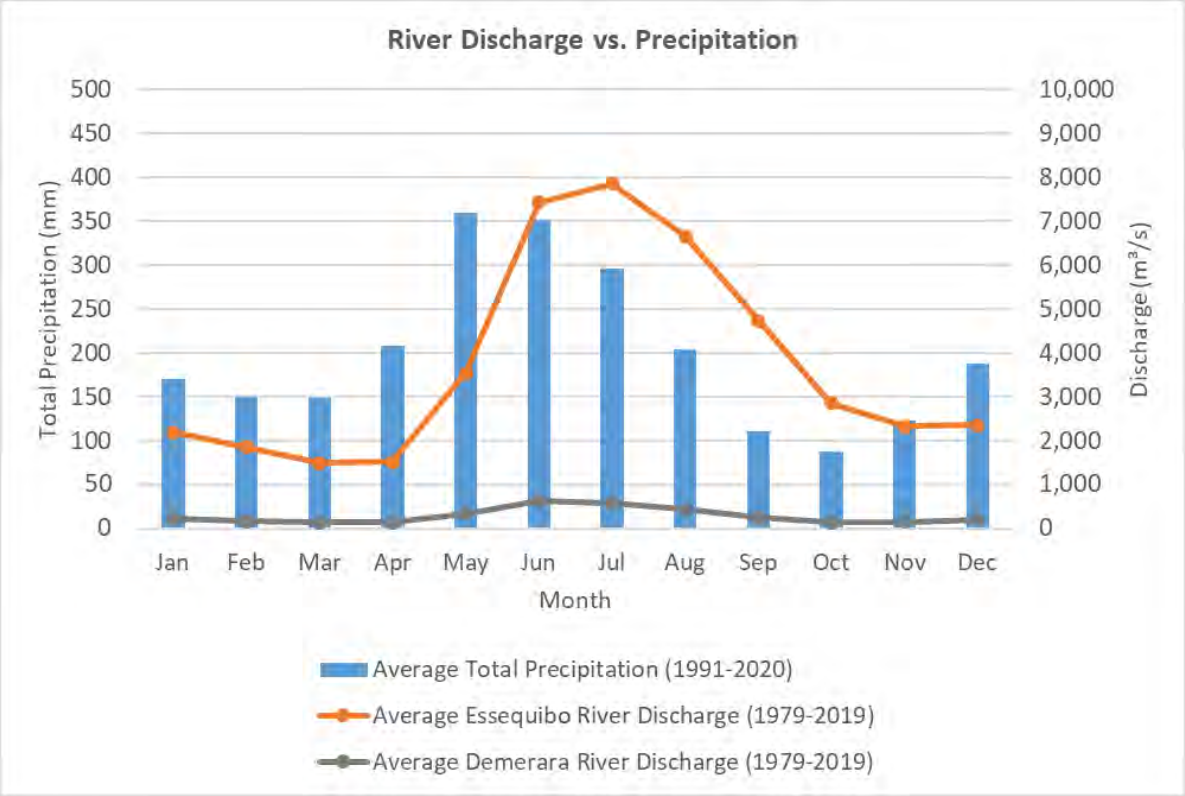
m^3/s = cubic meters per second

Figure 2-5: Essequibo River Hydrograph from 1979 to 2019



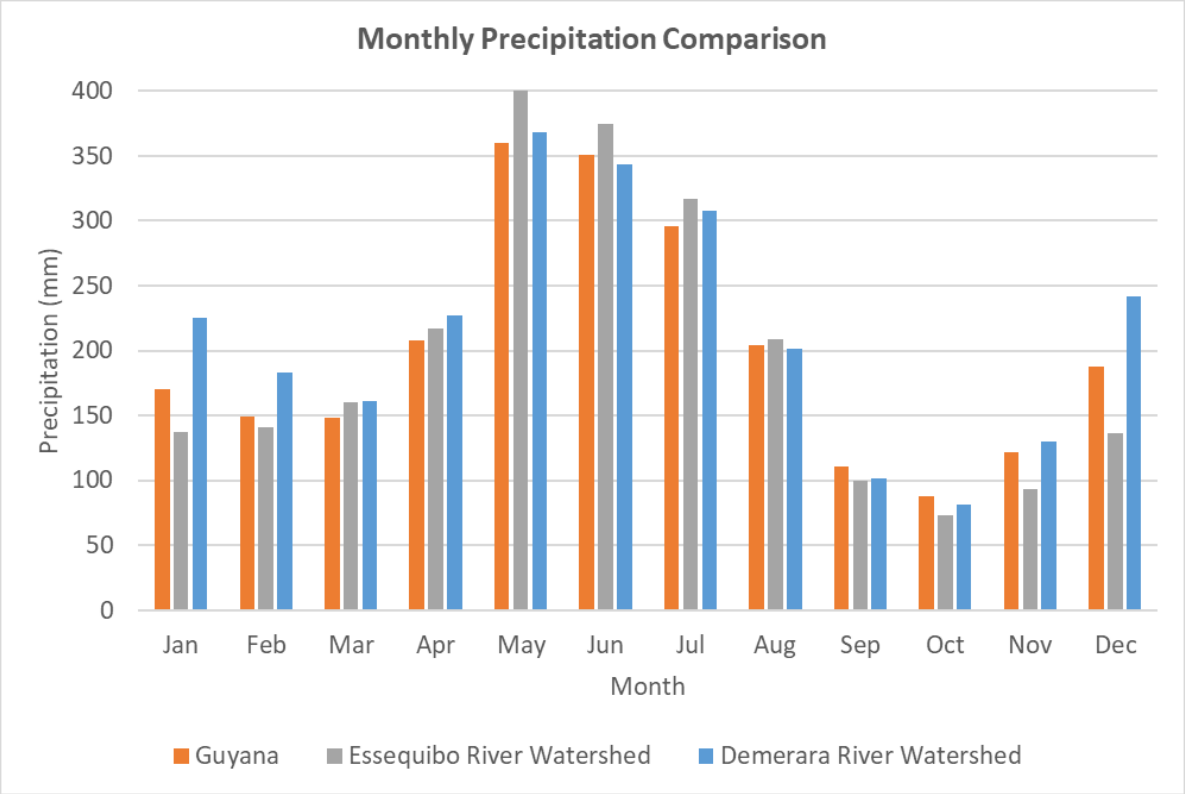
m^3/s = cubic meters per second

Figure 2-6: Demerara River Hydrograph from 1979 to 2019



m^3/s = cubic meters per second; mm = millimeter

Figure 2-7: Comparison of Guyana's Monthly Total Average Precipitation to Average River Discharges



mm = millimeter

Figure 2-8: Comparison of Essequibo and Demerara River Watershed Precipitation to Guyana's Monthly Total Average Precipitation from 1991–2020

2.2. HYDRODYNAMIC MODELING

In this section, descriptions are provided of the hydrodynamic model (HDM) developed to study the Demerara River and the surrounding coastal region of the Atlantic Ocean. The hydrodynamic modeling was performed to gain an understanding of the spatially and temporally varying behavior of the currents in the Study Area.

The HDM chosen to represent the motion (advection and dispersion) of the waters in the Study Area was Generalized Environmental Modeling System for Surfacewaters (GEMSS). GEMSS is an integrated system of three-dimensional (3D) hydrodynamic and transport modules embedded in a geographic information and environmental data system. GEMSS is in the public domain and has been used by the U.S. Bureau of Reclamation, Washington State Department of Ecology, the Norwegian Institute of Water Research, the Royal Institute of Sweden, and several other international organizations.

The theoretical basis of the hydrodynamic kernel of GEMSS is the 3D Generalized, Longitudinal-Lateral-Vertical Hydrodynamic and Transport (GLLVHT) model, which was first presented in Edinger and Buchak (1980) and subsequently in Edinger and Buchak (1985). The GLLVHT computation has been peer reviewed and published (Edinger and Buchak 1995; Edinger et al. 1994, 1997; Edinger and Kolluru 1999). The kernel is an extension of the well-known longitudinal-vertical transport model written by Buchak and Edinger (1984) that

forms the hydrodynamic and transport basis of the U.S. Army Corps of Engineers' (USACE) water quality model CE-QUAL-W2 (U. S. Army Engineer Waterways Experiment Station 1986). Improvements to the transport module, construction of the constituent modules, incorporation of supporting software tools, GIS interoperability, visualization tools, graphical user interface, and post-processors have been developed by Kolluru et al. (1998, 1999, 2003a, and 2003b).

GEMSS and its component modules have met agency approval among federal and state governments within the U.S. GEMSS has also been approved by regulatory agencies in the Bahamas, Qatar, India, Australia, Canada, and other countries.

2.2.1. Modeling Methodology

GEMSS requires two types of data: (1) spatial data, primarily the waterbody shoreline and bathymetry, but also the locations, elevations, and configurations of manmade structures; and (2) temporal data—that is, time-varying boundary condition data defining water surface elevation, salinity and temperature, freshwater inflow rate, temperature and salinity concentration, and meteorological data for air temperature and wind velocity (speed and direction) across the water surface. All deterministic models, including GEMSS, require uninterrupted time-varying boundary condition data. There can be no long gaps in the datasets, and all required datasets must be available during the span of the proposed simulation period.

For input to the model, the spatial data are encoded primarily in two input files: the control and bathymetry files. These files are georeferenced. The temporal data are encoded in many files, each file representing a set of time-varying boundary conditions, for example, meteorological data for surface heat exchange and wind shear, or inflow rates for a tributary stream. Each record in the boundary condition files is stamped with a year-month-day-hour-minute address. The set of input files and the GEMSS executable constitute the model application.

There are two types of output from deterministic simulations: values of a variable at a specific location through time ("time-series plots") and values of a variable throughout the domain at a particular time ("synoptic plots"). The latter can take the form of tables, vertical profiles, or contour ("isopleth") plots. Contour plots can show concentrations on a single plane, most often the horizontal plane at the water surface, but also on a horizontal plane anywhere in the water column or on a vertical plane. Displays of the latter type are referred to as "slices."

2.2.2. Model Setup

The HDM was set up through construction of a 3D hydrodynamic model grid, gathering and formatting of various model inputs, and selection of the study period.

2.2.2.1. Model Grid

The hydrodynamic model grid consists of a curvilinear boundary- (shoreline-) following shape covering a region roughly 100 kilometers along the coastline of Guyana, roughly centered on the Essequibo River, and including approximately 40 kilometers upriver in the Essequibo and Demerara rivers. The grid sizes range from 2.9 kilometers by 1.8 kilometers at the grid's periphery to 100 meters by 500 meters in the Demerara River near the proposed temporary MOF location (Figure 2-9). The full grid extent is shown in the upper right corner, with the grid's marine boundaries labeled as W (West), N (North), and E (East).

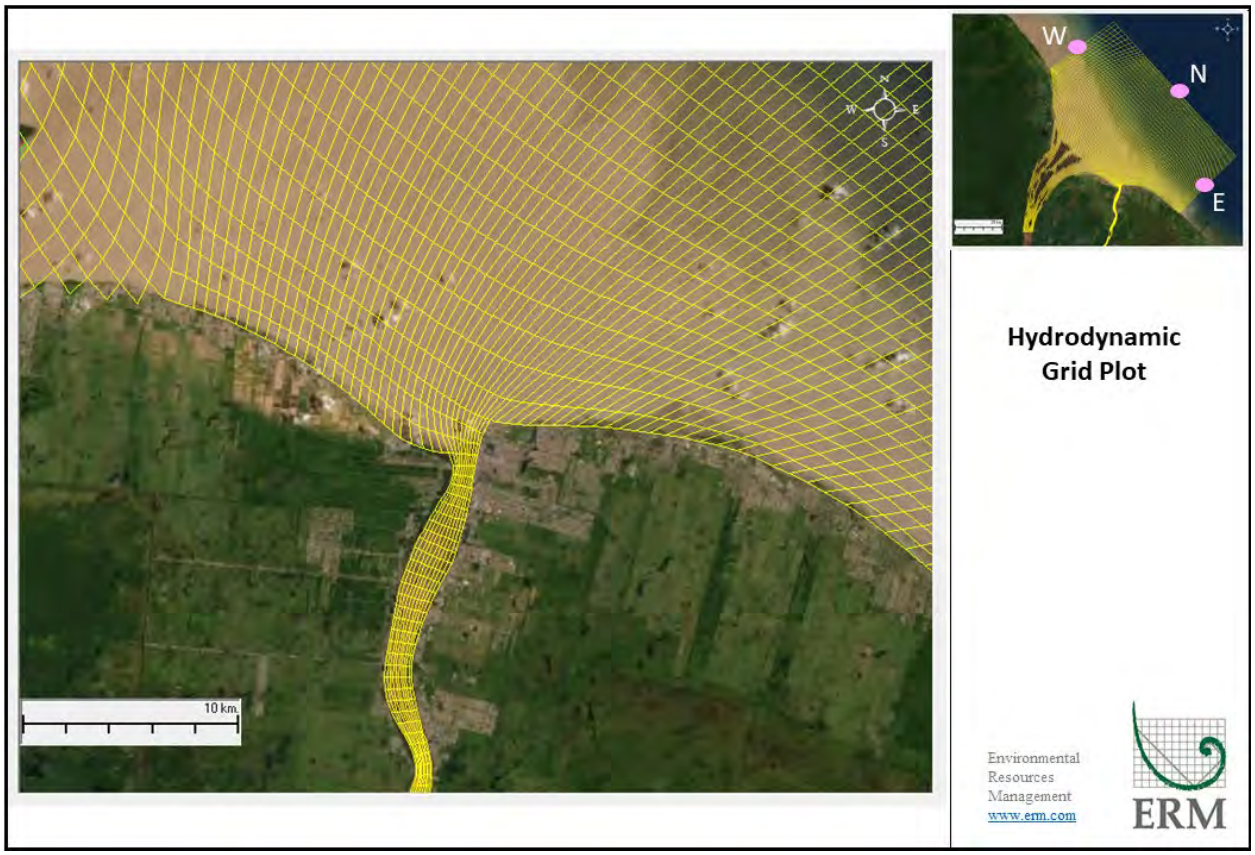


Figure 2-9: Hydrodynamic Model Grid

2.2.2.2. Model Inputs

Model inputs included spatially varying information and time-varying data. Spatially varying data included delineation of the coastline near the Study Area and coastal bathymetry. Bathymetric and land elevation data were sourced from various public agencies and field efforts. These various data sets within the Study Area cover water depths generally ranging from zero meters to 6 meters. The data sources used for the model input are listed in Table 2-3.

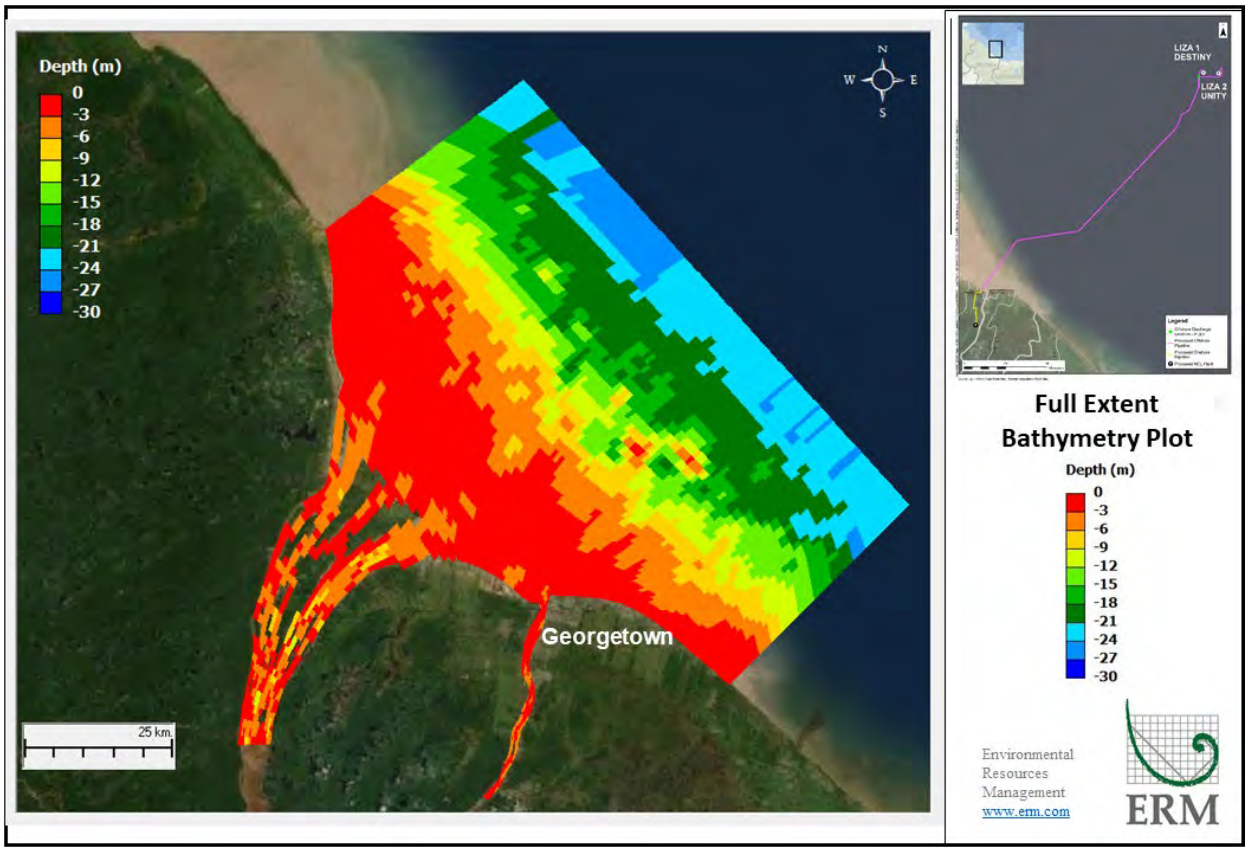
Table 2-3: List of Bathymetry Data Sources used for Hydrodynamic Modeling

Data Source	Approximate Resolution
Navionics	NA
GEBCO	15 arc-second

Source: Sonar Chart 2022; GEBCO Compilation Group 2021

GEBCO = General Bathymetric Chart of the Oceans; NA = not applicable

The General Bathymetric Chart of the Oceans (GEBCO) data source was used to extract seafloor bathymetry (GEBCO Compilation Group 2021), while the Navionics data source was used to extract river bathymetry (Sonar Chart 2022). Figure 2-10 shows bathymetric elevations based on data combined from the various sources and scanned into the hydrodynamic model grid.

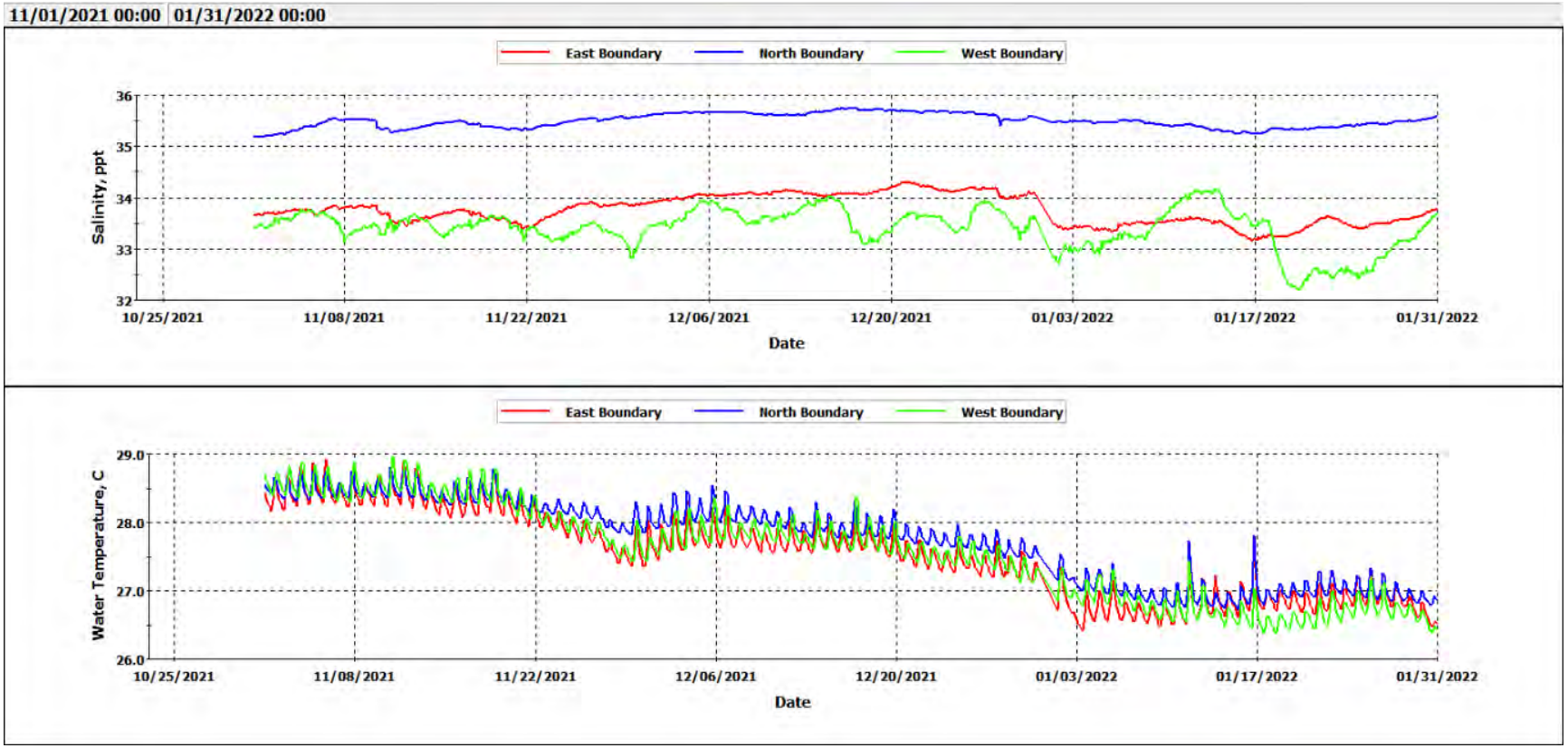


km = kilometer

Figure 2-10: Bathymetry Used in Hydrodynamic Model Grid

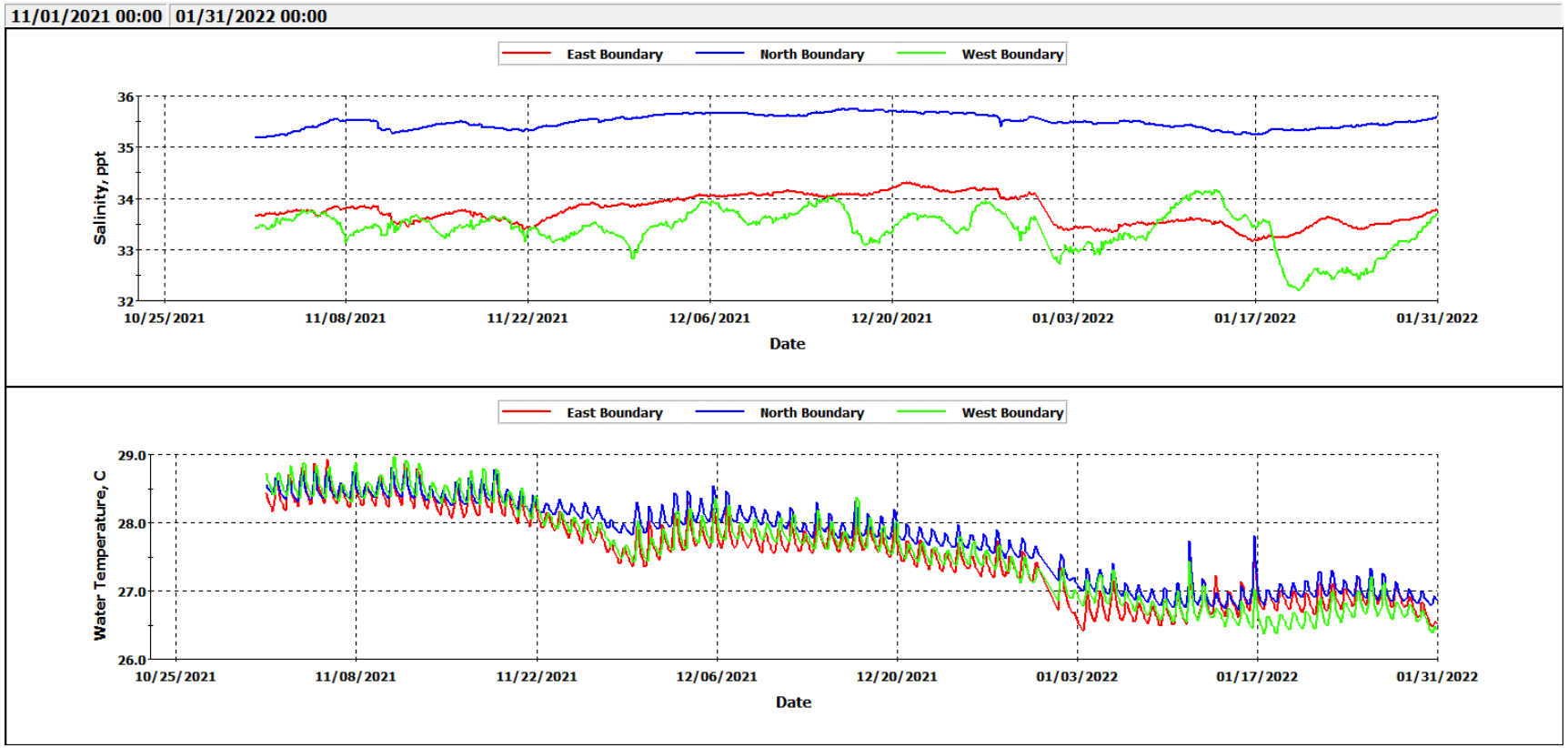
Time-varying data included water surface elevation, salinity, water temperature, and meteorological data. Time-varying 3D salinity and water temperature values were obtained from multiple sources. One such source is the global circulation model HYCOM (HYbrid Coordinate Ocean Model), a data assimilative, hybrid isopycnal-sigma-pressure coordinate model (www.hycom.org). HYCOM output values are available for the earth's oceans at every 1/12 degree (0.0833°) spacing in latitude and longitude. Vertically, values of salinity and temperature are available every 5 meters for depths zero to 10 meters, every 10 meters for 10 to 50 meters, every 25 meters for 50 to 150 meters, every 100 meters for 200 to 500 meters, and every 500 meters for 500 to 4,000 meters. These values for salinity and temperature were applied along the model domain's eastern, western, and northern marine boundaries with daily values throughout 2021. HYCOM surface and bottom salinity and temperature time-varying data are shown on Figure 2-11 and Figure 2-12.

Another source of time-varying data was that collected by the Consultants in 2021 and 2022 using Solinst Data Loggers (Solinst 2020) at one coastal site (C1) and two river sites (R3 and R4). Figure 2-13 displays the locations of these sites, along with other sites at which sediment or water quality samples were collected. Figure 2-14 and Figure 2-15 show the calibrated time-varying temperature verification with the model at these three sites. C1 was the only measurement site during 2021, while three measurement sites (C1, R3, and R4) were used during 2022.



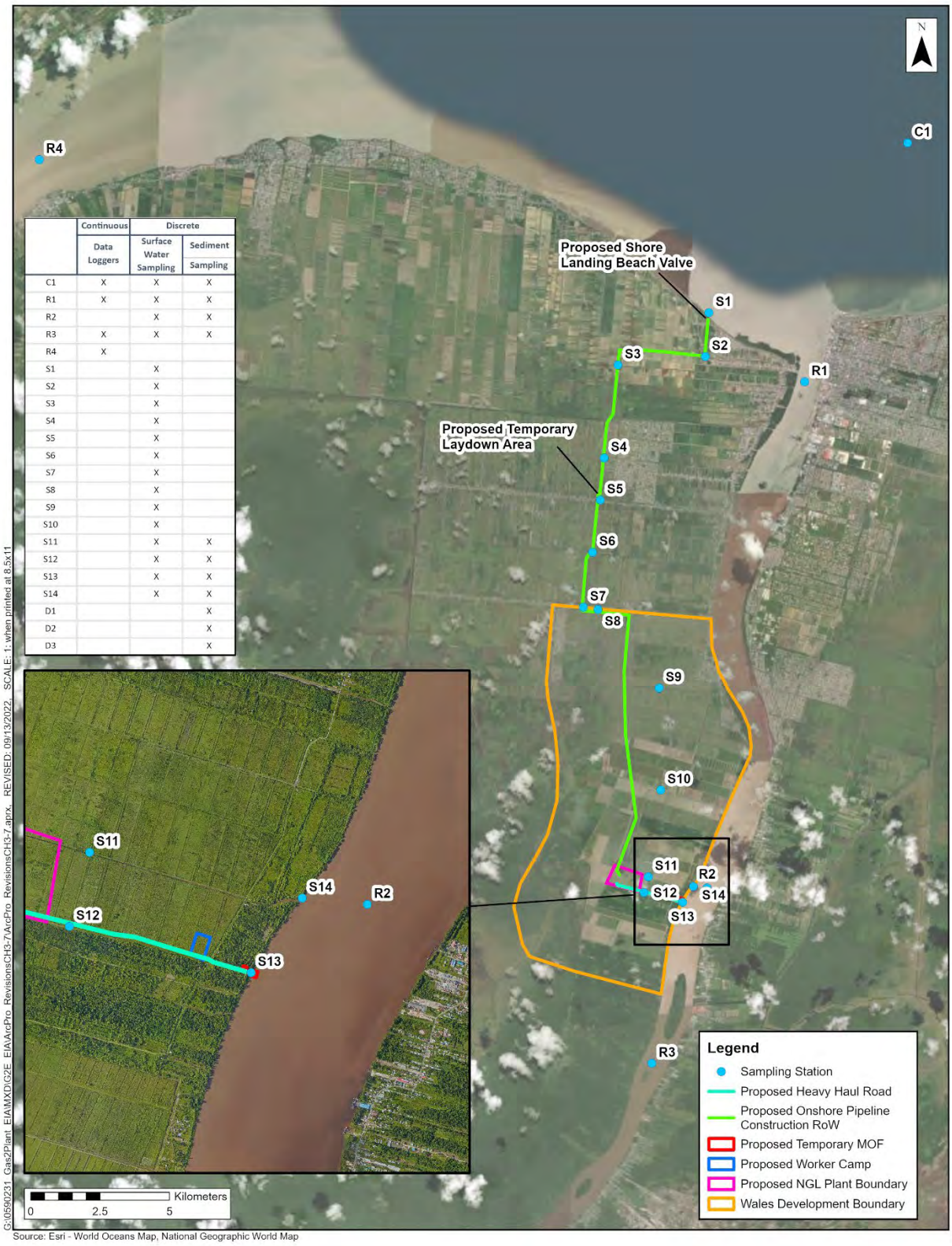
°C = degrees Celsius; ppt = parts per thousand

Figure 2-11: HYCOM Surface Salinity and Temperature Time-Varying Boundary Plot



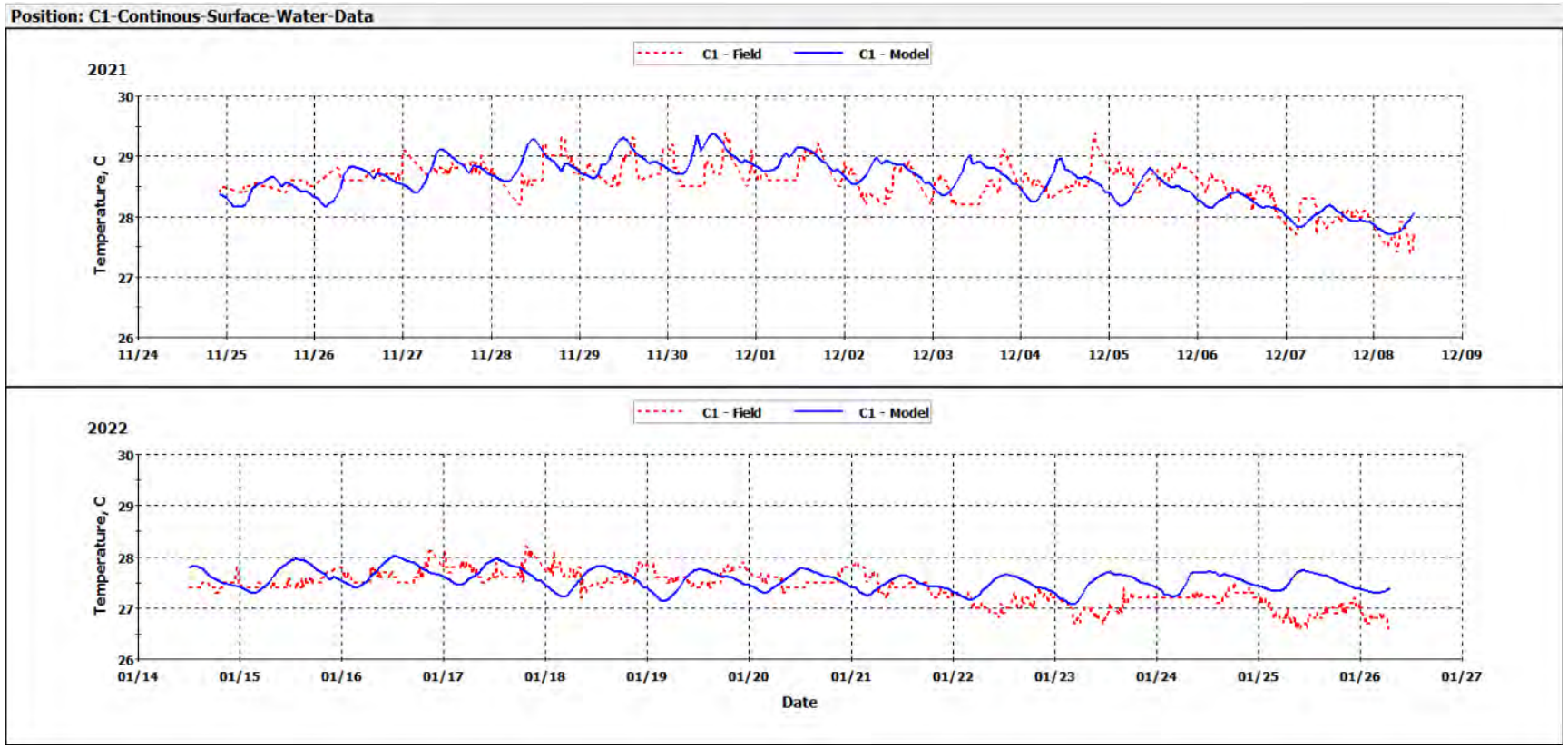
°C = degrees Celsius; ppt = parts per thousand

Figure 2-12: HYCOM Bottom Salinity and Temperature Time-Varying Boundary Plot



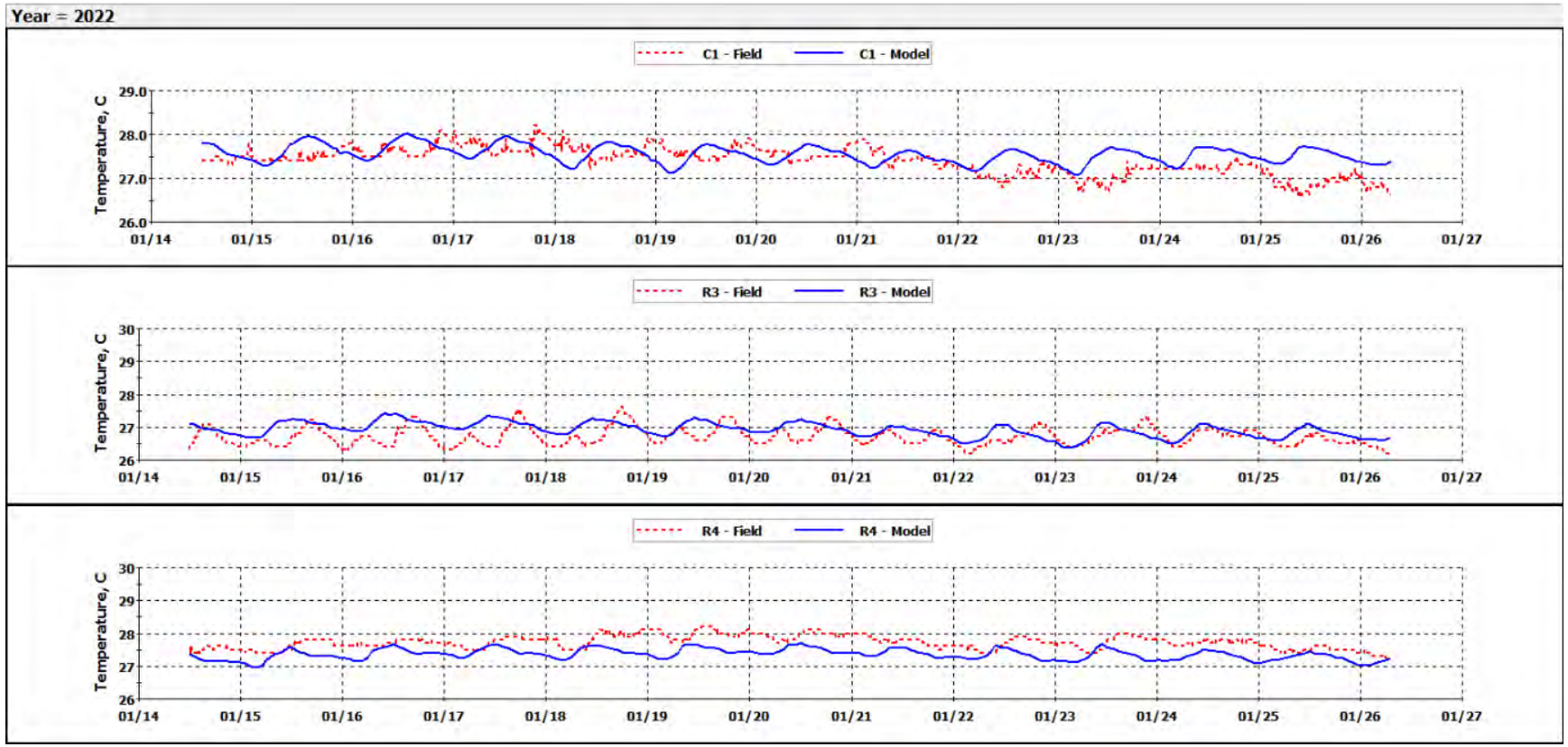
	Continuous	Discrete	
	Data Loggers	Surface Water Sampling	Sediment Sampling
C1	X	X	X
R1	X	X	X
R2		X	X
R3	X	X	X
R4	X		
S1		X	
S2		X	
S3		X	
S4		X	
S5		X	
S6		X	
S7		X	
S8		X	
S9		X	
S10		X	
S11		X	X
S12		X	X
S13		X	X
S14		X	X
D1			X
D2			X
D3			X

Figure 2-13: Coastal, Riverine, and Canal Sampling Locations



°C = degrees Celsius

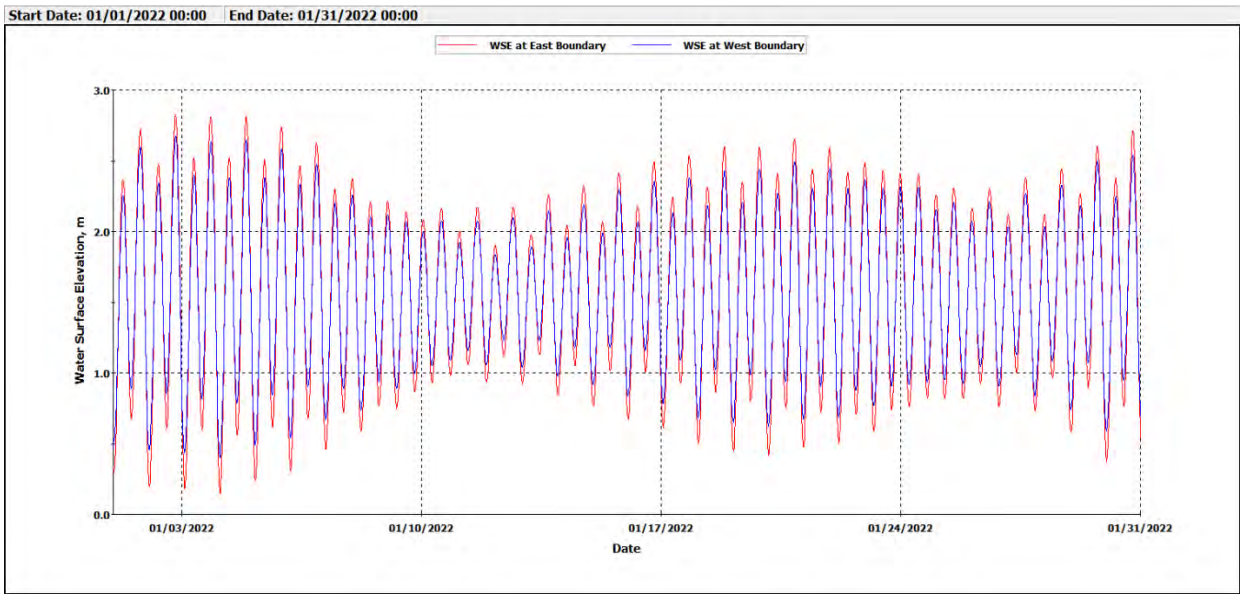
Figure 2-14: Coastal Sampling Location (C1)—Temperature Calibration



°C = degrees Celsius

Figure 2-15: Coastal and River Sampling Locations (C1, R3, and R4)—Temperature Calibrations

The tidal elevations needed at the model open boundaries were obtained from Oregon State University's Tidal Prediction Software (OTPS) and HYCOM. This software provides predicted tidal elevations at any user-defined location globally. A regional tidal solution for the Demerara River and Atlantic Ocean with a resolution of 1/60° was used. OTPS elevation data were applied along the model's eastern, western, and northern marine boundaries with values applied at a frequency of every 15 minutes. Examples from January 2022 data are provided on Figure 2-16.



m = meter

Figure 2-16: OTPS and HYCOM Water Surface Elevation January 2021—Eastern and Western Model Boundaries

Meteorological data were obtained from the U.S. National Oceanic and Atmospheric Administration Automated Surface Observing System for station SYCJ—Georgetown located on the eastern side of Guyana (6.4985º N latitude, -58.2541º W longitude). Data obtained included air temperature, dew point temperature, relative humidity, wind speed, wind direction, air pressure, and cloud cover. Figure 2-17 displays a wind rose at the SYCJ station from 2011 to 2022. The time-varying data plots for air temperature, dew point temperature, relative humidity, air pressure, and solar radiation are shown on Figure 2-18 through Figure 2-21.

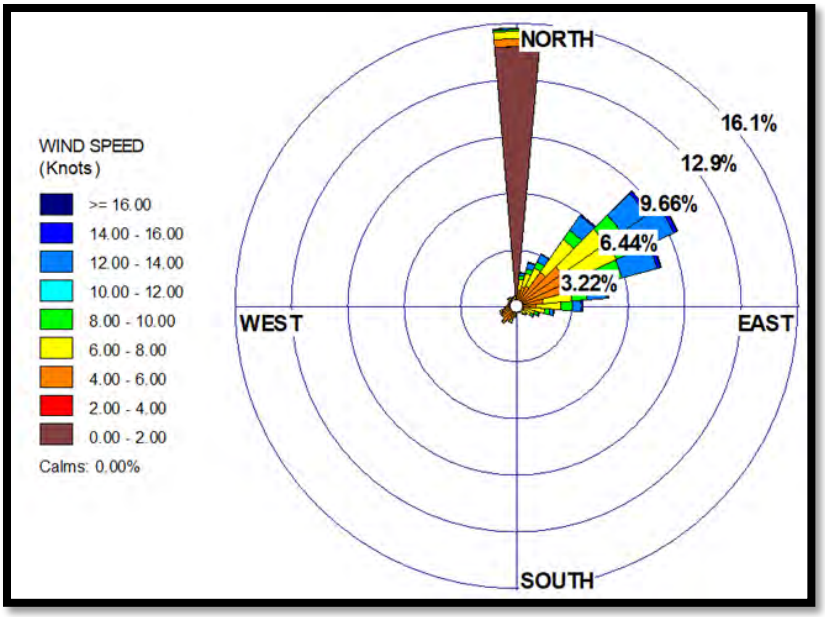
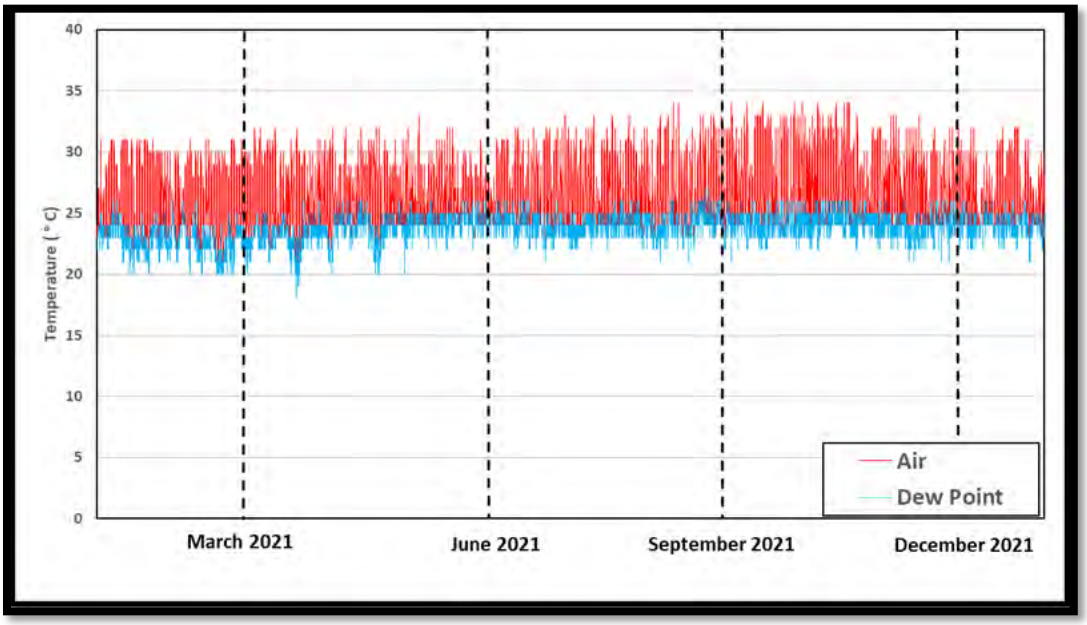


Figure 2-17: Wind Rose Plot of SYCJ Station



°C = degrees Celsius

Figure 2-18: Example Yearly (2021) Air and Dew Point Temperature Data for SYCJ Station

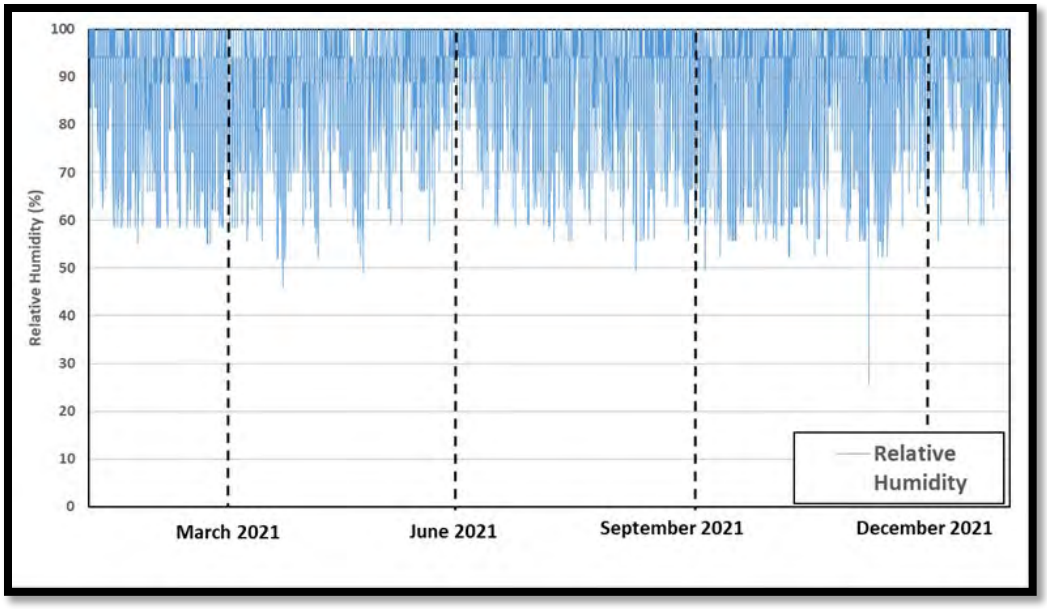
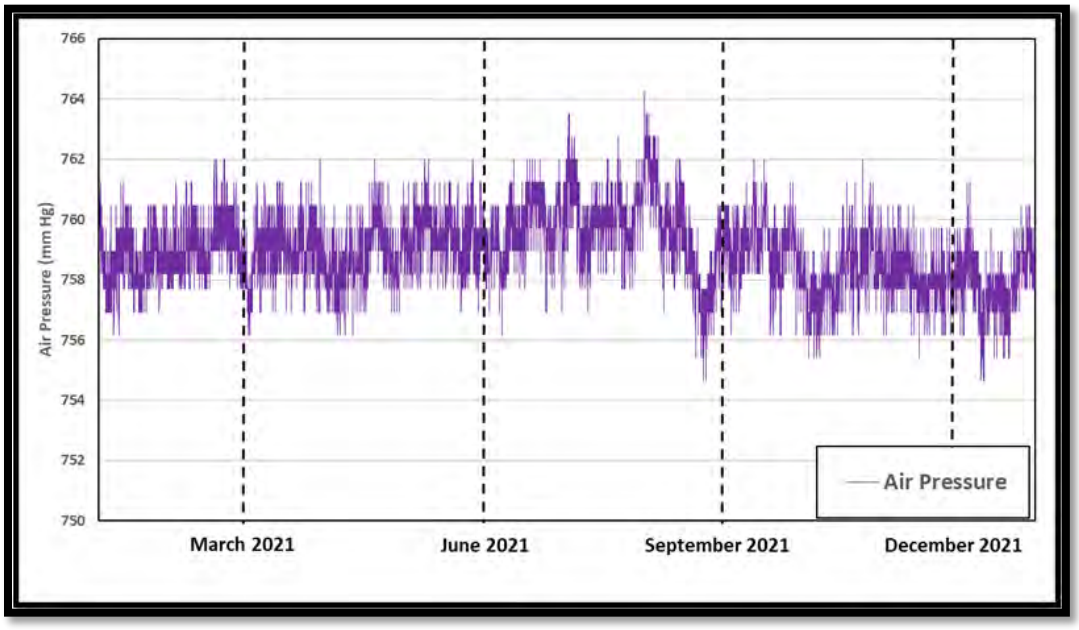
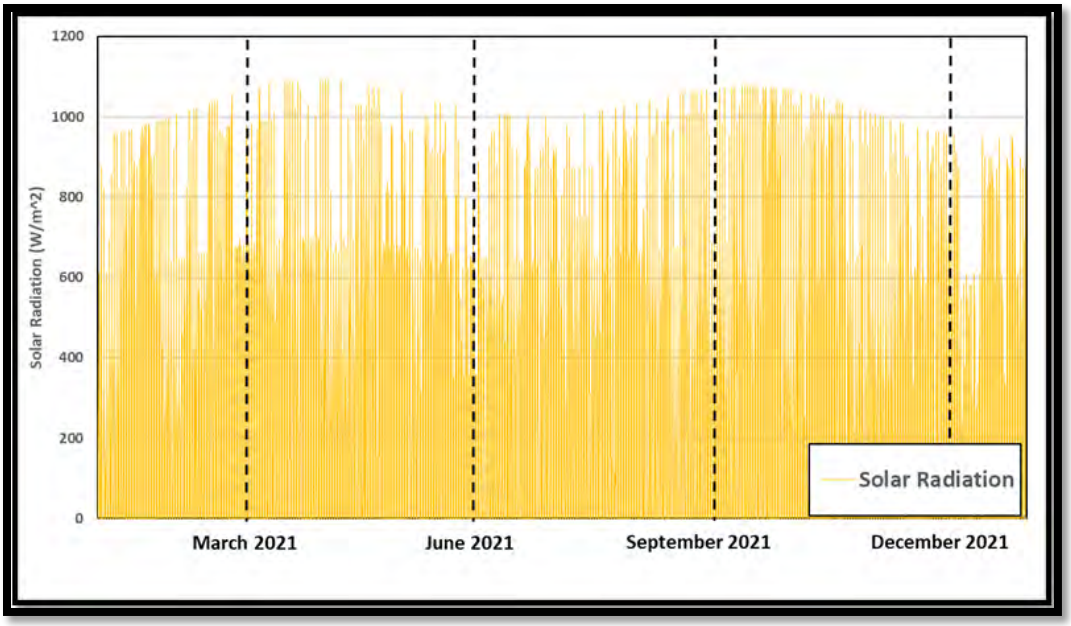


Figure 2-19: Example Yearly (2021) Relative Humidity Data for SYCJ Station



mm Hg = millimeter of mercury

Figure 2-20: Example Yearly (2021) Air Pressure Data for SYCJ Station



W/m^2 = watts per square meter

Figure 2-21: Example Yearly (2021) Solar Radiation Data for SYCJ Station

2.2.2.3. Simulation Period

Scenarios were designed to simulate two flow periods: minimum Demerara River flow and maximum Demerara River flow. Minimum Demerara River flow was chosen during the dry period, while maximum Demerara River flow was chosen during the wet period. Dry and wet periods were determined based on a 14-day running average freshwater flow for the Demerara River using MERIT Hydro (discussed in Section 2.1). While data were coded to January 2022 for model simulations, the actual model runs under the two scenarios corresponded to the wet (maximum flow) and dry (minimum flow) seasons. Actual values of the freshwater flows were set to match the values from the date selected in the 14-day average min/max flow analysis. Each flow period was set to include the full tidal period consisting of low, high, flooding, and ebbing tides. The simulations were run for 31 simulation days: 15 days to account for model spin-up (a period that allows simplified initialization of the model to respond to realistic conditions of the model setup), and 16 days to simulate the hydrodynamics of the Study Area.

2.2.2.4. Hydrodynamic Analysis

Results from the two simulated flow conditions (minimum and maximum Demerara River flow) were set up to examine the currents, salinity, and temperature in the Study Area. Minimum (dry season) river flow is referred to as Scenario 1, and maximum (wet season) river flow is referred to as Scenario 2. Model results showing these variables (currents, salinity, and temperature) at different tidal snapshot periods (flooding, high, ebbing, and low) are presented on Figure 2-22 through Figure 2-27.

Figure 2-22 through Figure 2-24 display the currents, temperature, and salinity characteristics during the minimum (dry season) Demerara River flow. The small river flow keeps the river influence on the Atlantic Ocean at a minimum. The extent of influence of freshwater temperature and salinity from the Demerara River is limited to the area close to the mouth of the river, with a higher-salinity environment at approximately 20 kilometers past the mouth of the river.

Figure 2-25 through Figure 2-27 show the currents, temperature, and salinity characteristics during the maximum (wet season) Demerara River flow. The large river flow has a higher influence on the coastal region. The freshwater influence from the Demerara River is seen to a larger extent, with a higher-salinity environment noted farther away, approximately 50 kilometers from the mouth of the river.

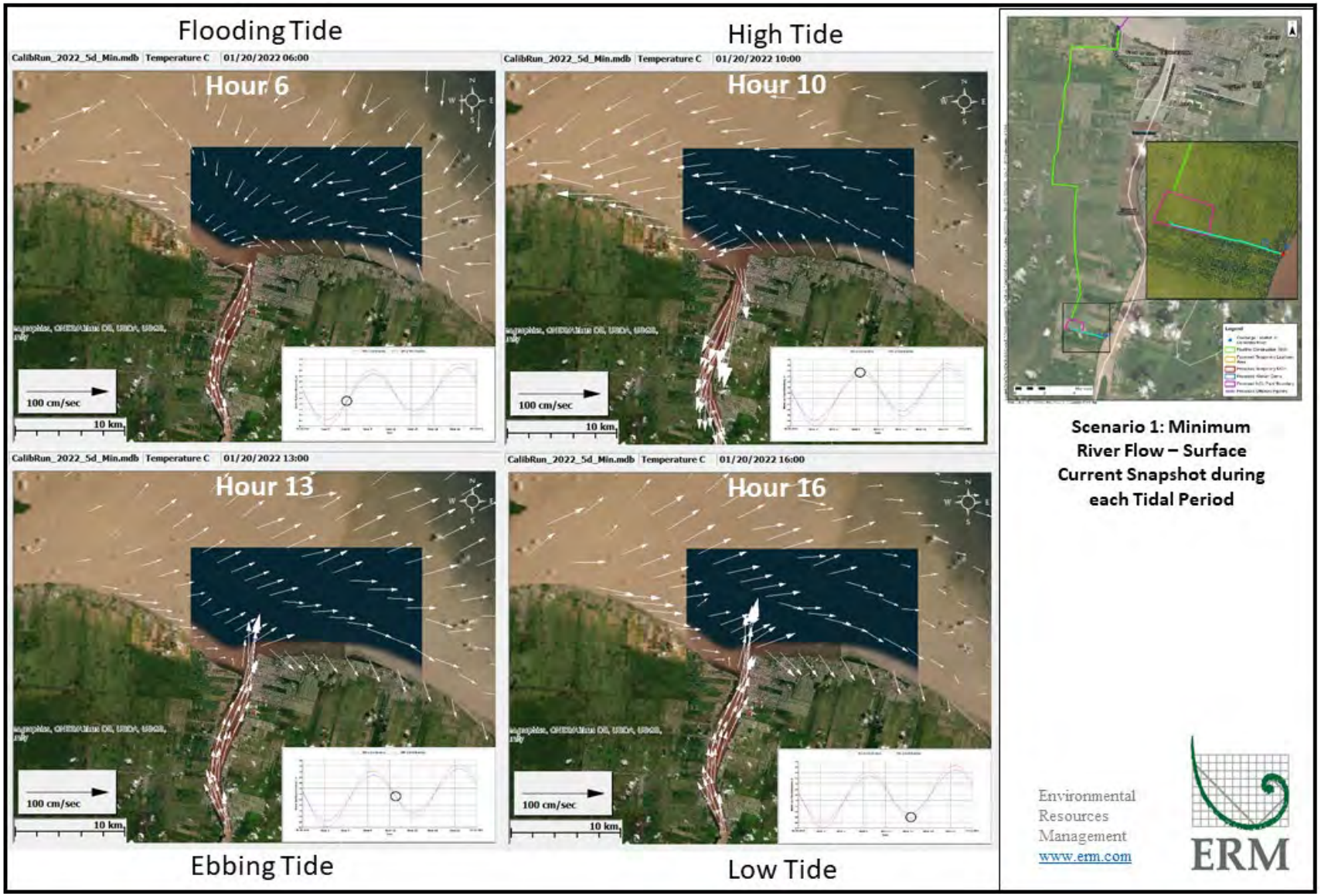
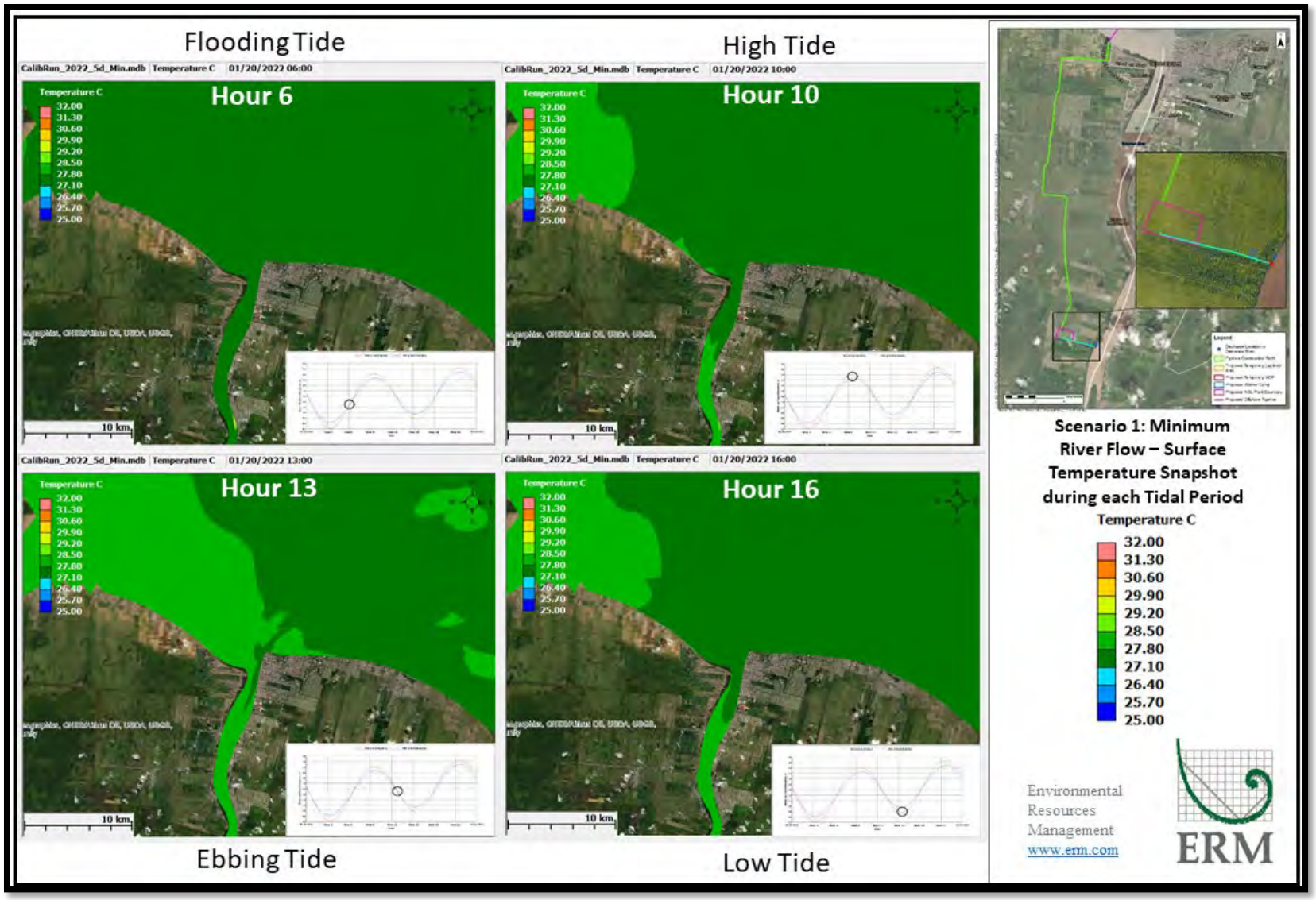
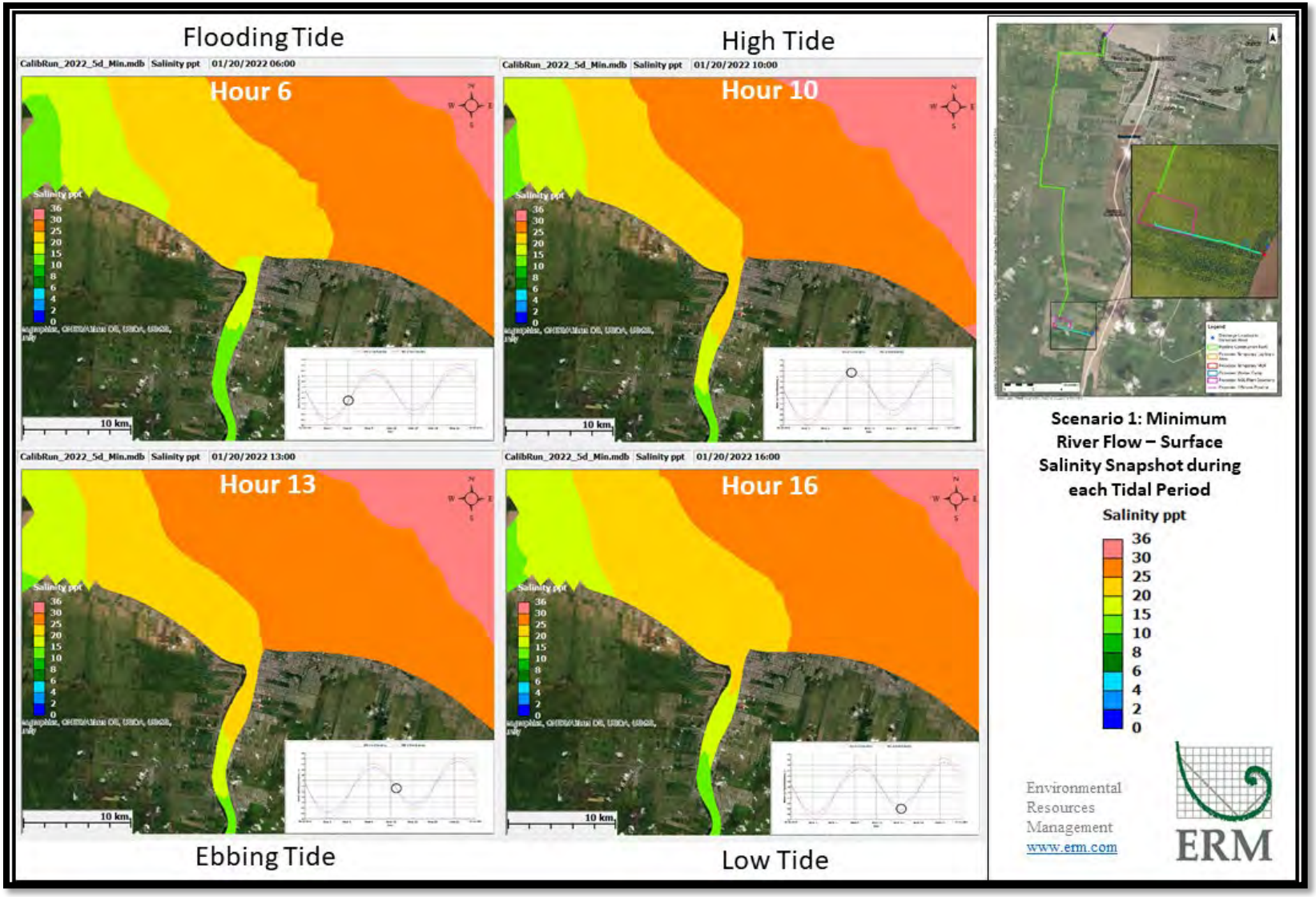


Figure 2-22: Scenario 1: Minimum River Flow—Dry Season—Surface Current Snapshot at each Tidal Period



°C = degrees Celsius

Figure 2-23: Scenario 1: Minimum River Flow—Dry Season—Surface Temperature Snapshot at each Tidal Period



ppt = parts per thousand

Figure 2-24: Scenario 1: Minimum River Flow—Dry Season—Surface Salinity Snapshot at each Tidal Period

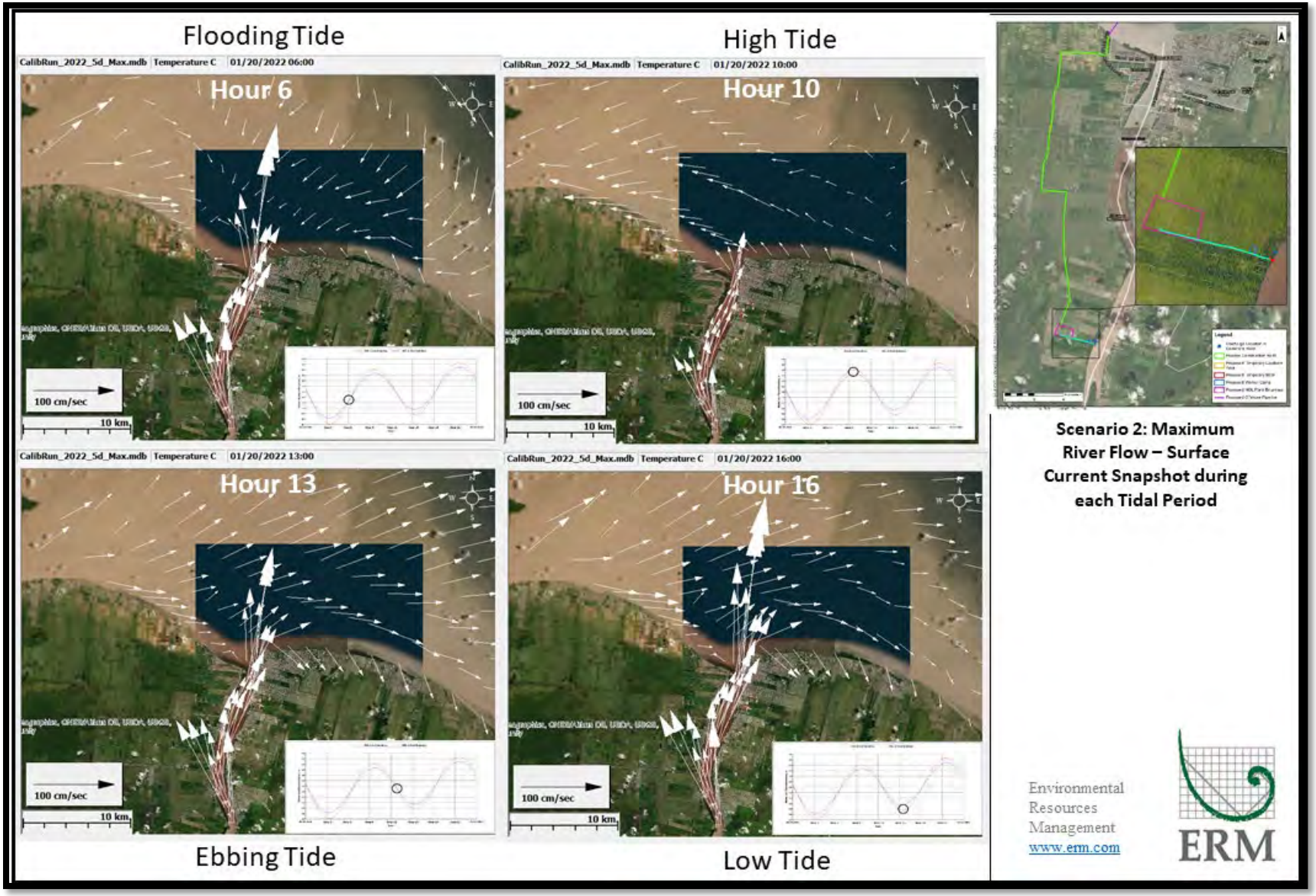
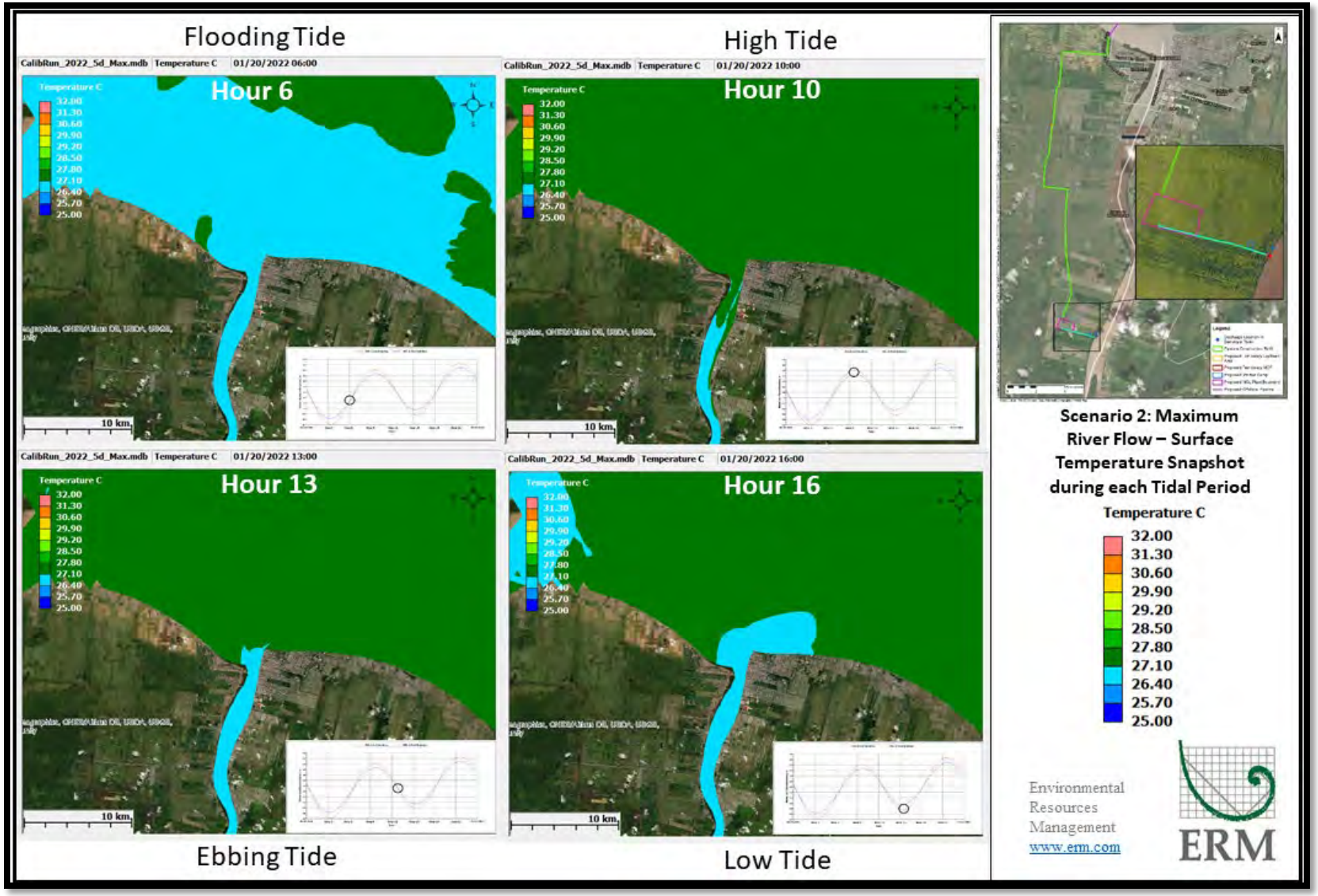
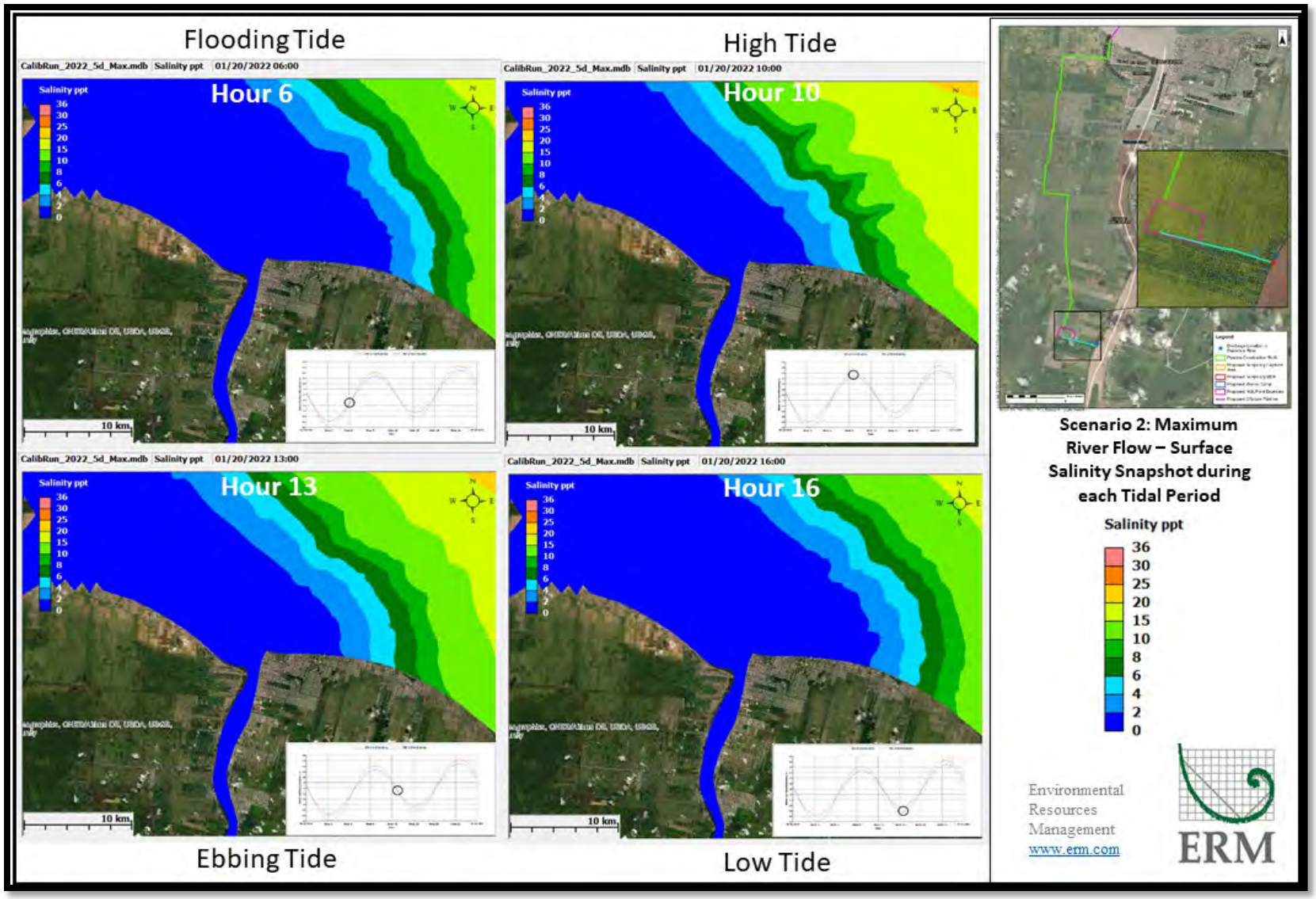


Figure 2-25: Scenario 2: Maximum River Flow—Wet Season—Surface Current Snapshot at each Tidal Period



°C = degrees Celsius

Figure 2-26: Scenario 2: Maximum River Flow—Wet Season—Surface Temperature Snapshot at each Tidal Period



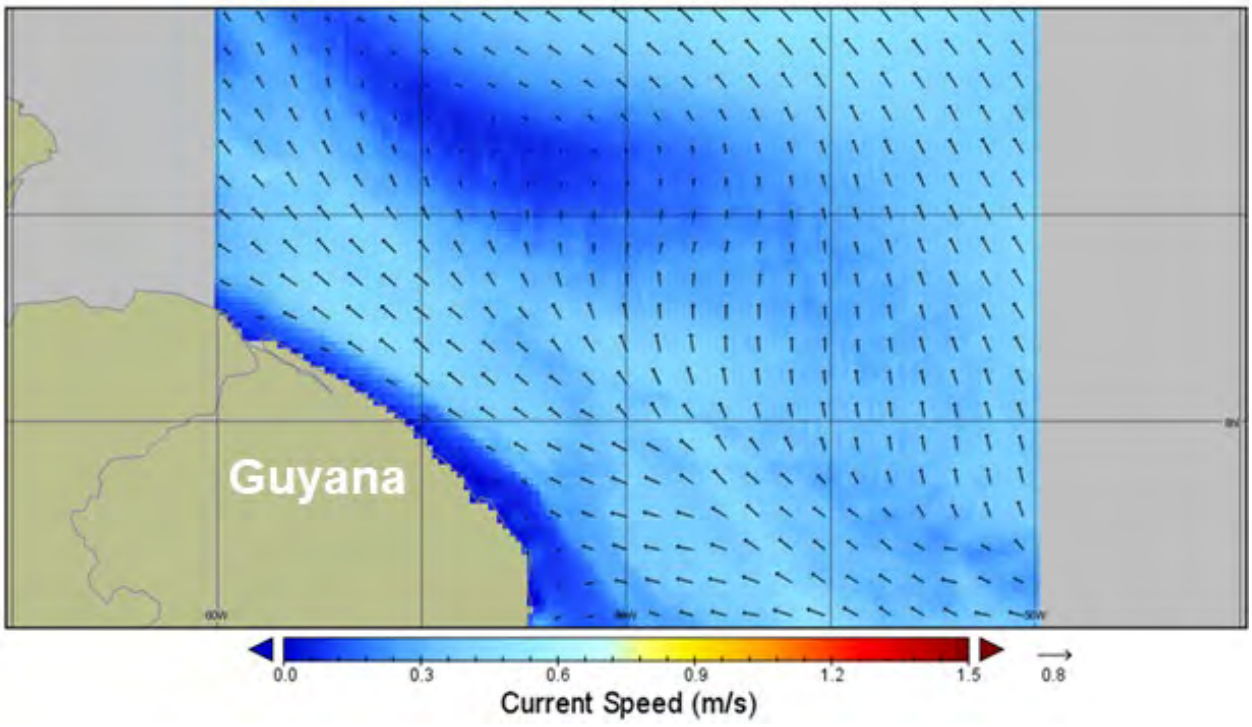
ppt = parts per thousand

Figure 2-27: Scenario 2: Maximum River Flow—Wet Season—Surface Salinity Snapshot at each Tidal Period

2.3. OFFSHORE HYDRODYNAMIC ENVIRONMENT

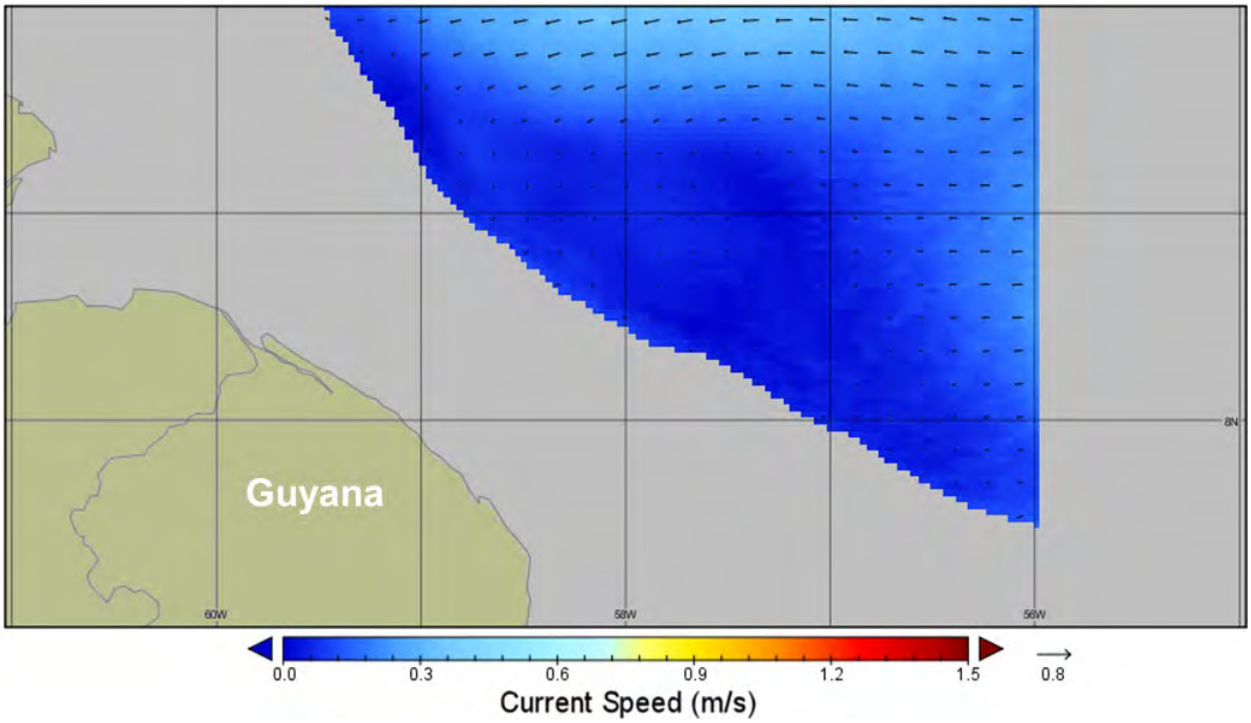
Representation of offshore conditions for the hydrotesting discharge and offshore pipeline trenching simulations requires time-varying currents on a 3D grid. Hourly depth-varying and spatially varying currents were obtained from ExxonMobil Upstream Research Company using the SAT-OCEAN model combined with currents from the HYCOM global ocean circulation hindcast model (hycom.org). Currents were obtained every 3 hours from 2005 through 2014. The model extended from 56º W to 58º W longitude and 7ºN to 11ºN latitude over 128 by 128 grid cells and 22 depth bins at 0, 5, 10, 20, 30, 40, 50, 75, 100, 125, 150, 200, 300, 400, 500, 1,000, 1,500, 2,000, 2,500, 3,000, 3,500, and 4,000-meter depths. Depth-varying temperature and salinity values were obtained directly from HYCOM model output.

Example current velocity vector diagrams from HYCOM/SAT-OCEAN for March 2006 and August 2013 are shown below on Figure 2-28 through Figure 2-31 at the surface (zero meter) and in deeper water (1,000 meters).



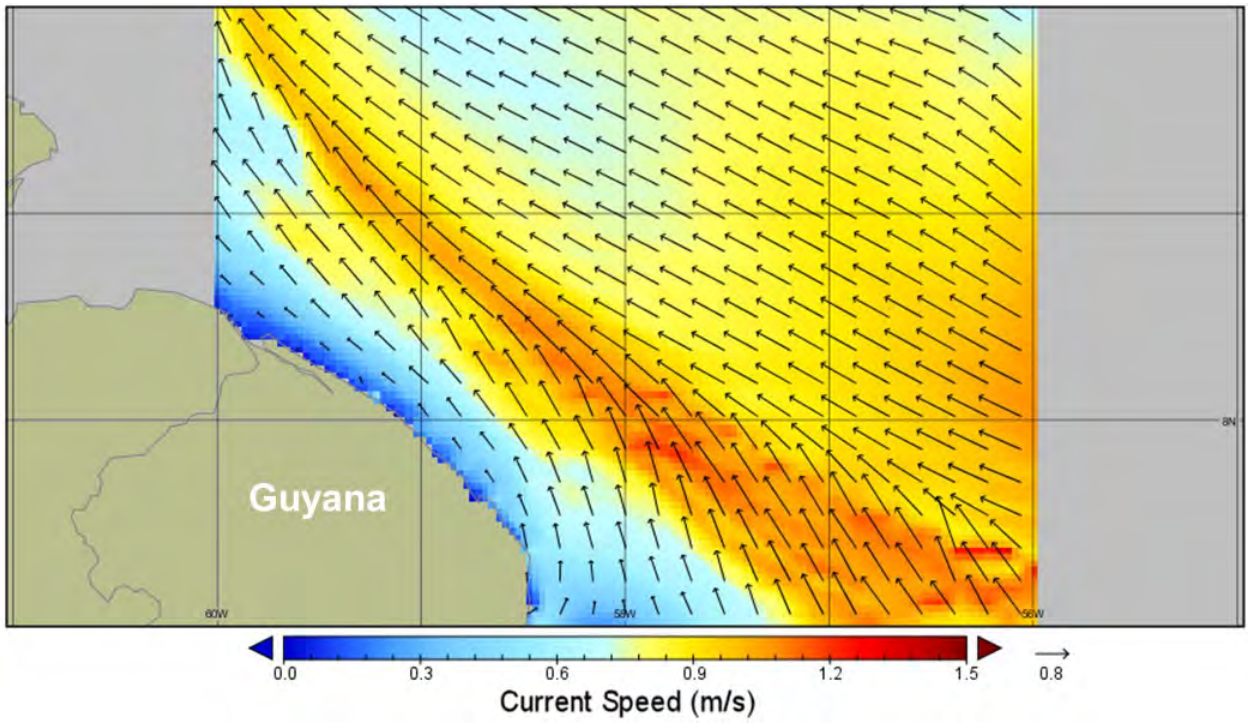
m/s = meter per second

Figure 2-28: Example HYCOM/SAT-OCEAN Currents, 1 March 2006 (surface)



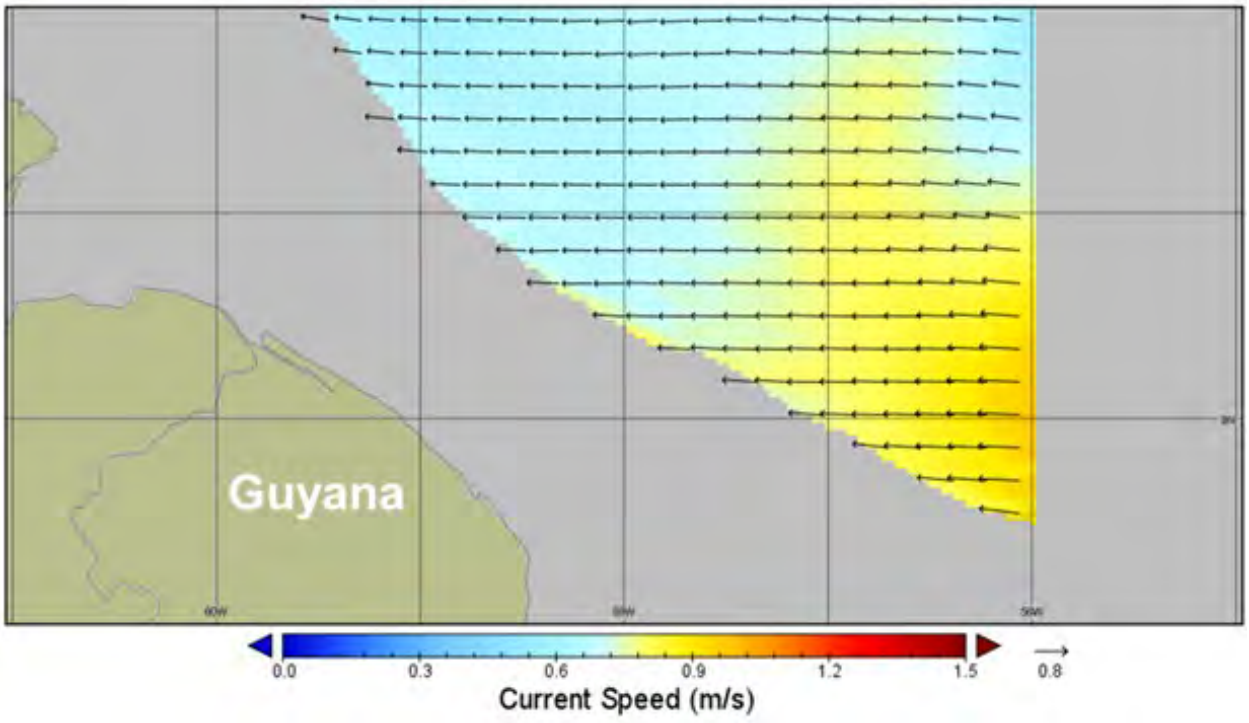
m/s = meter per second

Figure 2-29: Example HYCOM/SAT-OCEAN Currents, 1 March 2006 (1,000-meter depth)



m/s = meter per second

Figure 2-30: Example HYCOM/SAT-OCEAN Currents, 1 August 2013 (surface)



m/s = meter per second

Figure 2-31: Example HYCOM/SAT-OCEAN Currents, 1 August 2013 (1,000-meter depth)

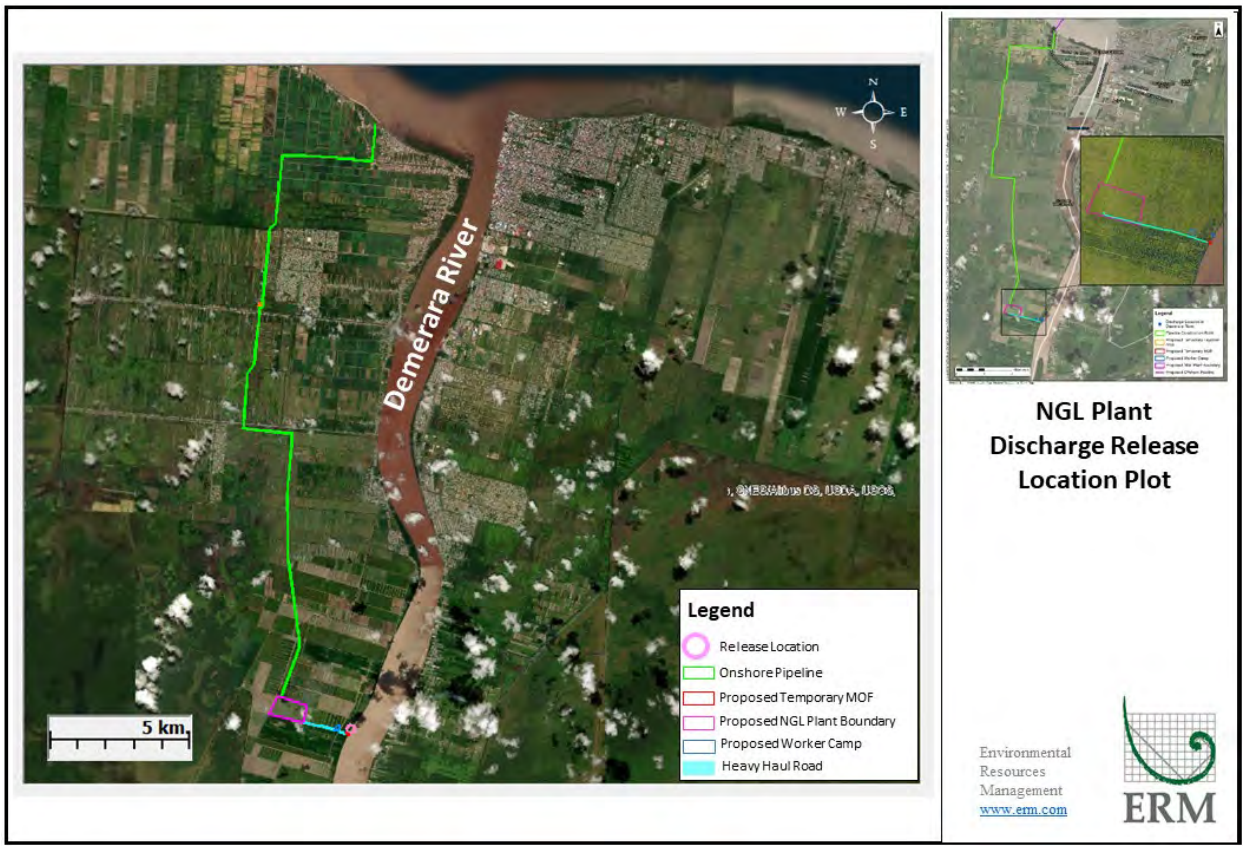
3. NGL PLANT EFFLUENT DISCHARGE

In this section, hydrodynamic and water quality modeling were used to simulate the intermittent effluent discharges from the NGL Plant into the Demerara River. Although the NGL Plant effluent will be discharged into the river either directly or via a canal adjacent to the NGL Plant, for modeling purposes, a direct discharge to the Demerara River approximately 100 meters downstream of the temporary MOF is assumed. The NGL Plant discharge was modeled to determine the extent of the plume, mixing characteristics, and effluent constituent dispersion. The model inputs, scenario design, NGL Plant discharge information, and model results are provided below.

3.1. MODEL INPUTS

EEPGL provided information on the NGL Plant discharge configuration, release rate information, and treated effluent discharge values. EEPGL plans to discharge both process wastewater and the sanitary wastewater into a stormwater pond with an expected capacity of approximately 13,000 cubic meters (m^3). The process wastewater will be treated through a wastewater treatment plant to meet regulatory discharge limits prior to being sent to the stormwater pond. Treatment standards for sanitary sewage discharges (Table 3-1) and natural gas processing facilities (Table 3-2) are outlined below. The sanitary sewage system within the facility will collect all sanitary wastewater and treat it prior to discharge into the stormwater pond.

The stormwater pond will be emptied through use of pumps eventually into the Demerara River. A maximum discharge rate of 550 cubic meters per hour (m³/hr) was provided by EEPGL with an assumption that the entire contents of the pond can be emptied within a 24-hour period. For modeling purposes, the location of this discharge into the Demerara River is assumed to be downstream of the temporary MOF and is shown on Figure 3-1. Table 3-3 provides the inputs used for modeling of the NGL Plant effluent discharge.



km = kilometer

Figure 3-1: NGL Plant Stormwater Pond Discharge Location

Table 3-1: Indicative Values for Treated Sanitary Sewage Discharges

Pollutants	Units	Guideline Value
pH	pH	6–9
BOD	mg/L	30
COD	mg/L	125
Total nitrogen	mg/L	10
Total phosphorus	mg/L	2
Oil and grease	mg/L	10
Total suspended solids	mg/L	50
Total coliform bacteria	Most Probable Number / 100 milliliters	400

Source: World Bank 2007a

BOD = biochemical oxygen demand; COD = chemical oxygen demand; mg/L = milligrams per liter

Table 3-2: Effluent Levels for Natural Gas Processing Facilities

Pollutant	Units	Guideline Value
pH	—	6–9
BOD_5	mg/L	50
COD	mg/L	150
Total suspended solids	mg/L	50
Oil and grease	mg/L	10
Cadmium	mg/L	0.1
Total residual chlorine	mg/L	0.2
Chromium	mg/L	0.5
Copper	mg/L	0.5
Iron	mg/L	3
Zinc	mg/L	1
Cyanide free/total	mg/L	0.1/1.0
Lead	mg/L	0.1
Nickel	mg/L	1.5
Heavy metals total	mg/L	5
Phenol	mg/L	0.5
Nitrogen	mg/L	40
Phosphorous	mg/L	3

Source: World Bank 2007b

BOD_5 = biochemical oxygen demand after 5 days; mg/L = milligrams per liter

Table 3-3: NGL Plant Effluent Discharge Model Inputs

Data Source	Value/Information (unit)
Release Location	365821 m Easting; 733584.00 m Northing (UTM Zone 21)
Distance from temporary MOF	100 meters downstream
Discharge Rate	550 (m^3/hr)
Diameter of Discharge	9 inches
Depth of Discharge	Slightly Submerged
Orientation of Discharge	Perpendicular to river flow
Flow conditions	Minimum and Maximum 14-day average freshwater Demerara River Flow

L/day = liters per day; UTM = Universal Transverse Mercator

3.2. SCENARIO DESIGN

Both minimum and maximum Demerara River flow conditions representing a dry and wet season respectively (summarized in Table 3-4 and described in Section 2.2.2.3) were used as the foundation for the scenario design. Each flow condition was modeled for the full tidal conditions and included the planned NGL Plant effluent discharge from the stormwater pond. In addition to stormwater runoff, the stormwater pond as noted earlier will receive both the treated process water and the treated sanitary sewage water. The pond's size is based on the maximum rainfall rate over a 24-hour period from a 100-year return period event. The two effluent streams will comingle and will likely dilute when mixed with stormwater runoff that has entered the pond. However, as a conservative estimate, no dilution in the stormwater pond was accounted for, to assess the mixing of the undiluted discharge into the Demerara River.

Table 3-4: Minimum and Maximum 14-day Average Freshwater Demerara River Flow

Flow	Value (m^3/s)
Minimum Flow	0.84
Maximum Flow	1,682

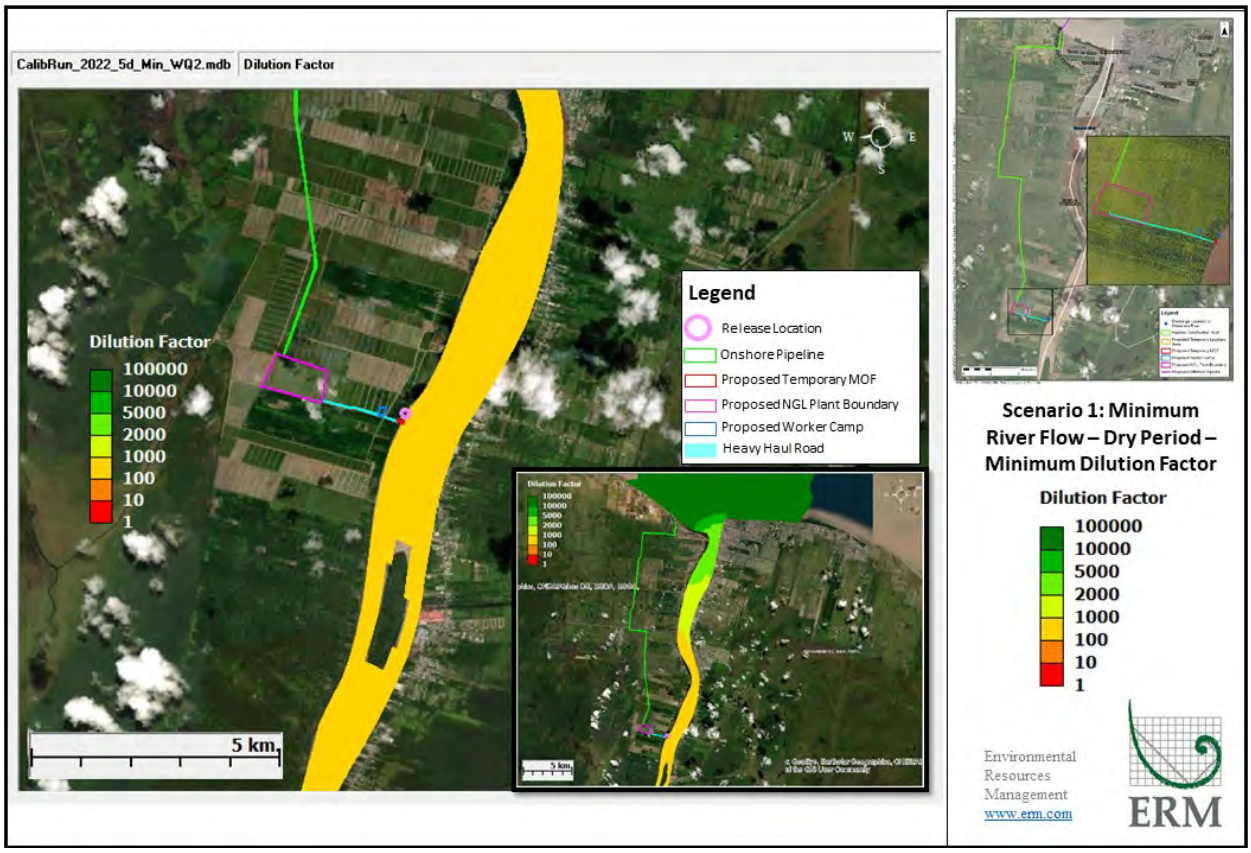
m^3/s = cubic meters per second

3.3. MODEL RESULTS

The NGL Plant discharge modeling was performed under two scenarios: minimum and maximum Demerara River flow. The minimum river flow condition is noted as Scenario 1, and the maximum river flow condition is noted as Scenario 2. A plot of dilution values for Scenario 1 and Scenario 2 are provided in Figure 3-2 and Figure 3-3. Since the river is tidally driven and the resulting plume orientation and size will therefore change with time, the minimum modeled dilution factors at each modeled location were estimated and used to develop the plots. These plots represent the minimum dilution factors each location will experience during the model simulation period (full tidal cycle). This approach is highly conservative, as these minimum dilution values will not occur at the same time, but at different times as the discharge plume moves, expands, or shrinks under the varying tidal conditions. These plots are simply an

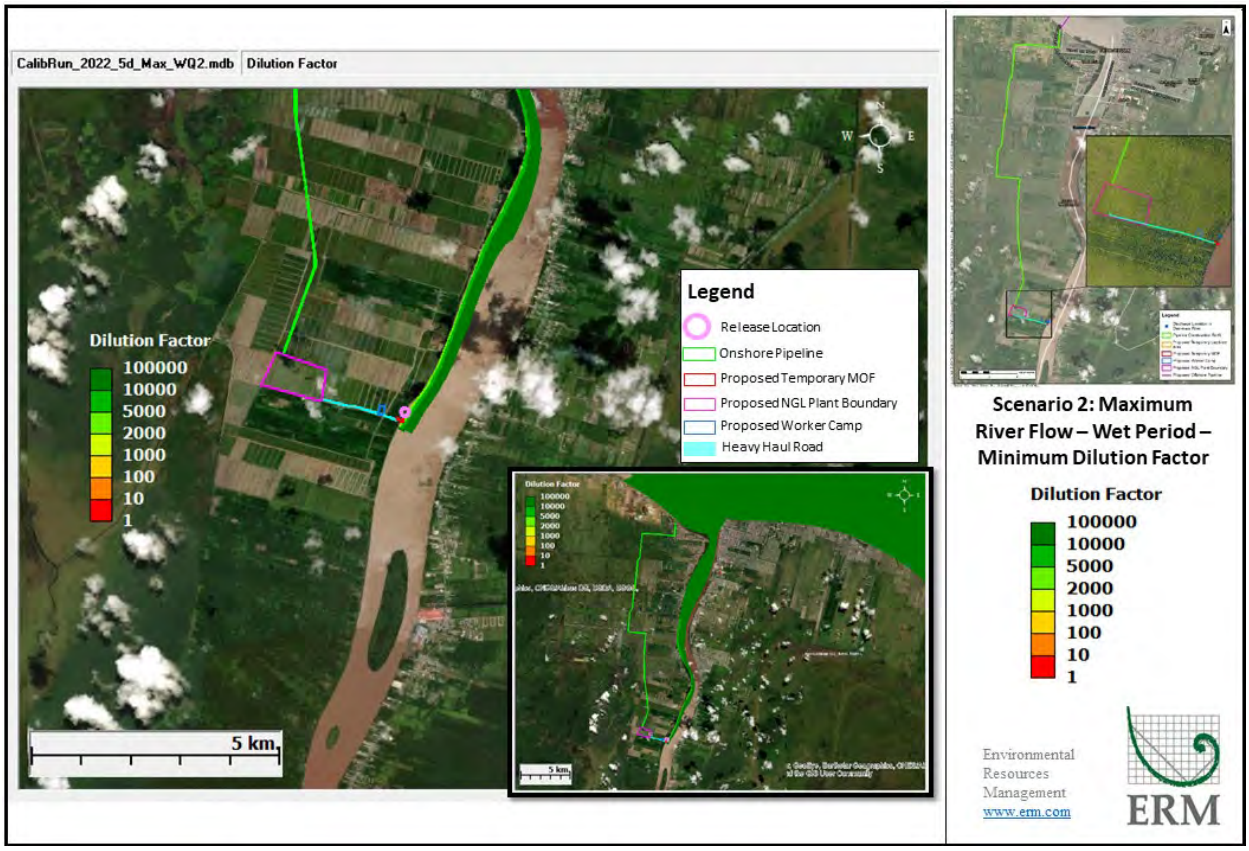
amalgamation of minimum expected dilution factors throughout the river during the model simulation period.

The discharge achieved more dilution under the maximum Demerara River flow period. A lower dilution was achieved closer to the release location under the minimum Demerara River flow period. Table 3-5 lists the minimum modeled dilution factors for each scenario at a 100-meter and 500-meter distance downstream of the discharge.



km = kilometer

Figure 3-2: Scenario 1: Minimum River Flow—Dry Season—Surface Minimum Dilution Factor



km = kilometer

Figure 3-3: Scenario 2: Maximum River Flow—Wet Season—Surface Minimum Dilution Factor

Table 3-5: NGL Plant Effluent Results - Modeled Dilution Factors 100 and 500 meters Downstream of Discharge

	Dilutions Factors	
	Scenario 1 —Minimum River Flow – Dry Season	**Scenario 2 —Maximum River Flow – Wet Season**
100 meter downstream of discharge location	154	2475
500 meter downstream of discharge location	194	2625

4. TEMPORARY MOF DREDGING

4.1. APPROACH

Dredging activities are planned in the Demerara River adjacent to the proposed temporary MOF location to remove sediments within two areas: a circular turning basin adjacent to the temporary MOF, and a navigation channel to connect the turning basin to the existing navigation channel along the east bank. The turning basin will have a radius of 120 meters, and will be situated in an area that presently has a riverbed elevation of -4.25 to -5 meters relative to the International Great Lakes Datum (IGLD) 1985. The navigation channel will be approximately 50 meters wide and will extend northeasterly from the turning basin, parallel to the western riverbank for approximately 2,222 meters before angling toward the eastern riverbank for 1,049 meters, where it will tie in to the existing navigation channel. Both the navigation channel and the turning basin will be dredged to an elevation of -5.5 meters IGLD 1985. See Figure 4-1 for the approximate locations of the proposed turning basin and navigation channel. The total volume to be dredged is estimated to be between 100,000 m^3 and 200,000 m^3.

Dredging is planned to be conducted using a trailing suction hopper dredger (TSHD). The TSHD will suction sediments from the riverbed into a hopper within the vessel. As both water and sediments fill the hopper, settling will occur such that solid materials separate from the water, creating a supernatant above the sands and silts in the hopper. The supernatant typically contains suspended solids generally with small particle sizes since the larger-sized particles will settle more quickly. To maximize the amount of solids stored within the hopper, the supernatant will be discharged back into the river during the dredging process. This overflow will continue until the hopper is filled or is filled to the extent practicable. Although the suctioning process used by a TSHD is effective at controlling the suspended solids generated during the dredging process, the overflow of supernatant can temporarily generate a total suspended solids (TSS) plume in the adjacent waterbody. In one study, the TSS concentrations generated by a TSHD operation were generally higher near the bottom than at the surface; bottom TSS concentration from TSHD activity without overflow was 230 milligrams per liter (mg/L), while the bottom TSS with overflow was as high as 870 mg/L (Wakeman et al. 1975).

Modeling was performed to simulate the transport and settling of suspended solids released to the environment during the dredging process. A typical schedule was estimated for dredging sediments until the hopper is filled, traveling to a disposal site, emptying the hopper, and traveling back to the dredge area to initiate a new dredging cycle. The cycle of dredging and disposal of dredge spoils will occur over a 24-hour workday, and it was assumed that each dredging cycle would take 6 hours (as further described below).

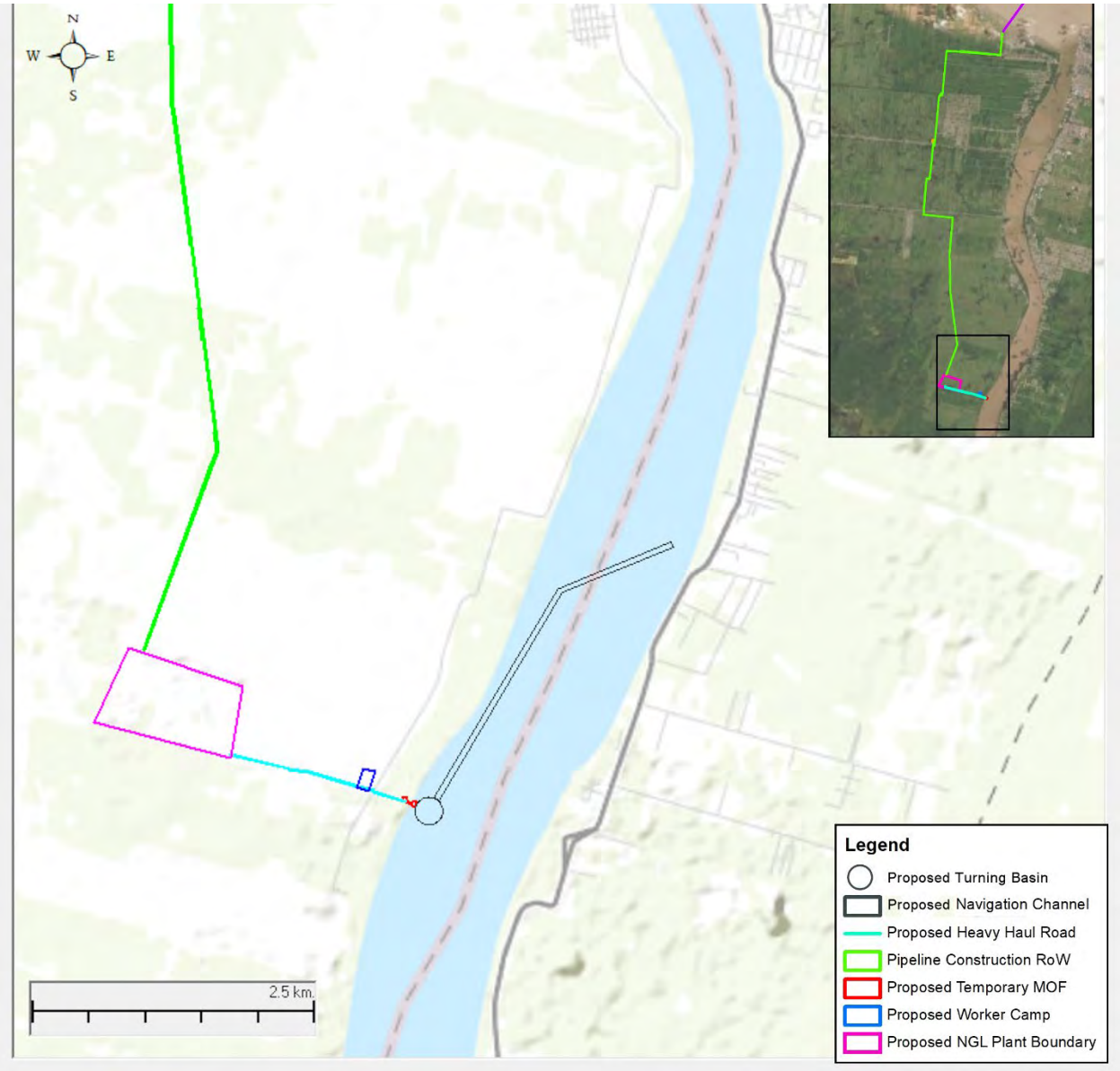


Figure 4-1: Temporary MOF Dredging Locations

4.2. ASSESSMENT CRITERIA

The sediment transport modeling scenarios provide predicted thickness of solids deposited on the riverbed on a two-dimensional basis, as well as predicted increases in TSS concentrations in the water column on a 3D basis.

4.2.1. Total Suspended Solids

Water quality impacts may be possible due to increases in TSS concentrations in the water column from the dredging disturbance of the riverbed and hopper overflow. The TSS plume will dissipate with distance from the release as it mixes in the water column and as solids settle

back to the riverbed. Larger particles will settle more quickly than finer particles, such that smaller particles may stay suspended longer and travel further than larger particles. Because the Demerara River has existing TSS concentrations, model results reflect increases above ambient concentrations.

Impacts on aquatic organisms related to elevated TSS may occur if light penetration is impeded significantly for long periods of time (reducing the ability of plants and phytoplankton to photosynthesize). Increases in TSS may also decrease water clarity and clog fish gills. Water quality criteria for TSS in natural waters are often not developed by regulatory jurisdictions, as turbidity is more commonly used to regulate the effects of the suspended solids and other constituents that can impede sunlight. However, turbidity is difficult to estimate in computational model, as the correlation between TSS and turbidity varies for each waterbody and under different circumstances, such as seasonality or times with high-runoff loads. Therefore, TSS concentrations were examined in the model and compared to a reference value. In the absence of a local TSS water quality criterion for the Demerara River, a value of 30 mg/L was referenced from criteria promulgated in the Emirate of Dubai for guidance on development and infrastructure projects (Dubai Municipality 2019).

The model computes TSS concentrations added to the waterbody above background due to planned activities. Therefore, to assess the extent to which TSS increases due to dredging activities are predicted to exceed 30 mg/L, the model results need to be added to ambient values. However, ambient TSS concentrations can vary greatly in the Demerara River. In the sampling performed during October and November 2021 (Appendix B), TSS values in the Demerara River by the temporary MOF (Station R2) ranged from 14.8 mg/L to 319 mg/L (the latter value exceeding the 30 mg/L reference value by an order of magnitude). Assessing the relative increase of impacts on water quality when the existing conditions in the river can be over 10 times the TSS threshold is thus difficult; the effect of increasing TSS may be indiscernible when background levels are that high. Accordingly, for the purpose of this assessment, the analysis focused on delineation of the distance downstream in which TSS is increased due to dredging to concentrations above 30 mg/L, assuming the lower of the measured background TSS concentrations in the vicinity of the proposed dredging (14.8 mg/L).

4.2.2. Depositional Thickness

Sudden burial by sediments that are suspended and redeposited from the dredging activity may cause physical impacts upon benthic communities on the riverbed. The potential severity of burial impacts depends on the sensitivity of the benthic organism, the thickness of deposition, and the duration of the burial. Thickness thresholds vary by species and sediment impermeability. A suggested value of 6.5 millimeters has been reported (Smit et al. 2006); this is representative of instantaneous burials adversely affecting 5 percent of the studied benthic species (i.e., the more sensitive members of the population).

4.3. SIMULATION DESIGN

The modeling was performed using GEMSS and its sediment particle and fluids discharge module, GIFT (Generalized Integrated Fate and Transport) (Kolluru and Spaulding 1993; Kolluru et al. 1998; Fichera and Kolluru 2007; Fichera et al. 2013; Prakash and Kolluru 2014). GIFT simulates the fate of dissolved and particulate material of various sizes discharged into a waterbody. This 3D particle-based model uses Lagrangian algorithms in conjunction with currents, specified mass load rates, release times and locations, particle sizes, settling velocities, and shear stress values. The modeling methodology is based on a deterministic mode of simulation. In deterministic, single-event simulations, the starting date and current speed and direction at each time step are chosen from a database of properties in the selected periods.

The released sediments were modeled as particles. Movement in the vertical direction resulted in transport, settling, and deposition on the riverbed.

Model input requirements included:

- dredging schedule;
- sediment particle grain size distribution;
- sediment density; and
- sediment release rates, durations, and discharge depths.

The specific TSHD vessel to be used for this dredging operation is unknown at the time of this writing, and therefore its exact specifications are unknown. Hopper dimensions, rates of dredging, and sailing speed of a typical TSHD were therefore obtained from literature and applied to this analysis.

The following assumptions of a typical TSHD listed in Table 4-1 were obtained from Vlasblom (2017). The 20 percent overflow loss cited by Vlasblom was increased to 30 percent to account for uncertainty and additional losses occurring during the suctioning process suspending the sediments on the riverbed to escape capture into the hopper.

Table 4-1: Modeled TSHD Dredging Parameters

Parameter	Value
Hopper Maximum Capacity	2,700 m^3
Hopper Sediment Maximum Capacity	2,274 m^3
Density—water	1,025 kg/m^3
Density—dry sediments	2,650 kg/m^3
Density—bulk sediments	1,900 kg/m^3
Fraction water in sediments	0.462
Fraction solids in sediments	0.538
Overflow Sediment Losses	20%
Additional Sediment Losses	10%
Total Sediment Losses	30%

Parameter	Value
Average Load Time	60 min
Sediment Suction Rate	37.89 m³/min
Sediment Suction Rate + 30% Total Losses	49.26 m³/min

kg = kilogram; min = minute

From Vlasblom 2017, a sailing speed to empty a loaded hopper and return to the Project area was estimated to be approximately 10 knots (18.5 kilometers per hour) loaded and 11 knots (20.4 kilometers per hour) unloaded. A 6-hour dredging cycle was therefore calculated, including 1 hour of dredging until the hopper is filled, and 5 hours to travel to a dredge spoils disposal location (presumed upstream of the temporary MOF at a specific location to be determined), unload the hopper, and return to the temporary MOF. Assuming the dredging process will be performed 24 hours a day, four cycles can be performed in a single day.

The amount of sediment material released to the water column during the dredging was estimated assuming a 20 percent overflow loss plus an additional 10 percent loss during dredging (independent of the overflow) by the suctioning disturbing the riverbed's sediments. The maximum sediment volume in a full hopper is estimated as 2,274 m³; 30 percent of 2,274 m³ is 682 m³ lost per cycle over 60 minutes (i.e., 11.4 m³/minute). Assuming a bulk density of 1,900 kilograms per m³, the mass of sediments released is 1,296 metric tons per hour. Assuming water is 46.2 percent of the sediments, the mass load of solids in the sediments released is approximately 700 metric tons per hour.

Since larger-sized sediment particles will settle in the hopper, the range of particle sizes released to the river are assumed to be silt and clay (less than 75 micrometers), based on guidance from Vlasblom 2017. Particle size distributions were obtained from the mid-river sampling (Location D4, Figure 2-13) from the December 2021 sampling event (Table 4-2), from which only coarse silt, fine silt, and clay were used as inputs to the model.

Table 4-2: Sediment Grain Size Distribution (Station D4)

Description	Grain Size Distribution (mm)	Percent
Gravel (19.0 mm)	>=19	0.00
Gravel (9.50 mm)	9.5–18.999	0.00
Gravel, Medium	4.75–9.499	0.00
Gravel, Fine	2.0–4.749	0.00
Sand, Very Coarse	0.85–1.999	1.03
Sand, Coarse	0.425–0.849	6.12
Sand, Medium	0.25–0.424	7.71
Sand, Fine	0.106–0.249	5.14
Sand, Very Fine	0.0750–0.0105	1.41
Silt, Coarse	0.006–0.074	3.05
Silt, Fine	0.002–0.005	28.82
Clay	<=0.001	46.72

mm = millimeter

The modeling was performed for two flow conditions: the 14-day average minimum and maximum freshwater flow in the Demerara River simulated over a 14-day period to examine conditions across the entire lunar tidal cycle including the influence of both neap and spring tides.

Releases of solids was assumed to occur continuously for 60 minutes every 6 hours, four times per day (corresponding to the four dredge cycles estimated per day). To represent the various locations across the river where dredging may occur, releases were simulated to occur simultaneously at four locations selected within the areas to be dredged: one in the turning basin (Circ-1), and three in the navigation channel (Nav-1, Nav-2 and Nav-3) (Figure 4-2). Although dredging will likely take place at only one location at a time within the turning basin or navigational channel, the model simulates dredging at four locations at once to cover a range of potential impacts on any given day.

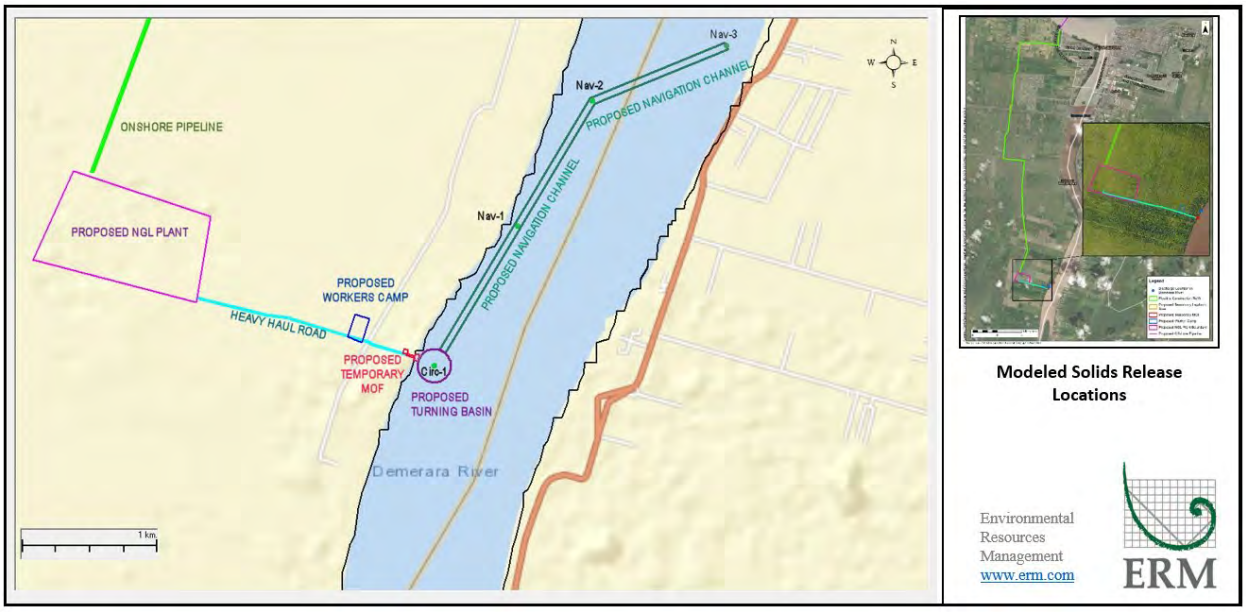


Figure 4-2: Modeled Solids Release Locations

4.4. MODEL RESULTS

Modeling was performed for both minimum and maximum flow conditions in the Demerara River for three periods in the lunar tidal cycle (spring tide, neap tide, and mid-point between spring and neap tide), resulting in a total of six simulations. The maximum modeled TSS concentrations and solids deposition are presented below. Note that the TSS results in this section take into account the additive impacts of dredging during the low and high ambient background TSS concentrations described in Section 4.2.1.

4.4.1. Total Suspended Solids

TSS is first modeled as increases in concentration above background TSS. The area immediately surrounding the location being dredged where the overflow will be discharged will experience an immediate increase in TSS above 1,000 mg/L while the dredging activity takes place (estimated at 60 minutes per dredge cycle). The plume of TSS will then dilute and settle as it travels generally in the downstream direction (although daily flood tide conditions, especially during times with low freshwater flow, can direct the TSS plume upstream as well).

Model results were examined across the day's dredging activities through the daily high tides, low tides, and slack tides. As such, the output displays the time and depth layer in which the model predicted the largest area of TSS concentrations above the 30 mg/L threshold for all four simultaneous release locations. While this was useful to cover the various dredging locations at once, it is noted that in actuality there would be no situation in which all four locations would have elevated TSS at the same time. The areas calculated and figures displayed show a composite of releases at the four locations.

From the range of measured background TSS values in the Demerara River, the model results are presented as the increase in TSS above the minimum and maximum background values.

Error! Reference source not found. summarizes the maximum total area above 30 mg/L during a representative day of dredging activity with dredging assumed at each of the four representative locations, considering the lower background TSS concentration in the Demerara River (14.8 mg/L).

Table 4-3: Maximum Total Area with TSS above Threshold from One Day of Dredging at Four Dredge Locations, Assuming 14.8 mg/L Background TSS

Scenario	Area (km²) with TSS > 30 mg/L threshold	Furthest distance downstream from Temporary MOF (km) with TSS > 30 mg/L threshold
Minimum Flow: Spring Tide	0.62	3.2
Minimum Flow: Mid-Cycle Tide	0.49	3.3
Minimum Flow: Neap Tide	0.67	3.9
Maximum Flow: Spring Tide	1.10	5.1
Maximum Flow: Mid-Cycle Tide	0.96	4.6
Maximum Flow: Neap Tide	0.86	4.3

During maximum flow conditions, the addition of suspended sediments from dredging (assuming a background TSS of 14.8 mg/L) resulted in areas with TSS concentrations above the 30 mg/L threshold lasting during the hour of dredging and dissipating during the periods in the cycle while the hopper was emptied. Among the three dates chosen along the lunar tidal cycle, the largest of the three areas with TSS above the 30 mg/L threshold occurred during the spring tide (1.10 km²) and extended approximately 5.1 kilometers downstream from the temporary MOF along the length of the river (Figure 4-3). The large freshwater flow during this time pushes the TSS plume downstream before suspended solids can settle, spreading the eventual deposition over a larger area.

If dredging were to occur during times with a higher background TSS concentration in the Demerara River (e.g., the maximum measured concentration of 319 mg/L), the entirety of the river would exceed the TSS threshold of 30 mg/L, even without the addition of TSS due to dredging activities, as shown on Figure 4-4.

The shortest distance downstream of the temporary MOF to which increases of TSS above 30 mg/L were predicted during the maximum flow conditions occurred during the neap tide, with a reach of approximately 4.3 kilometers, due to the reduction in the tidal influence associated with those times during the lunar cycle.

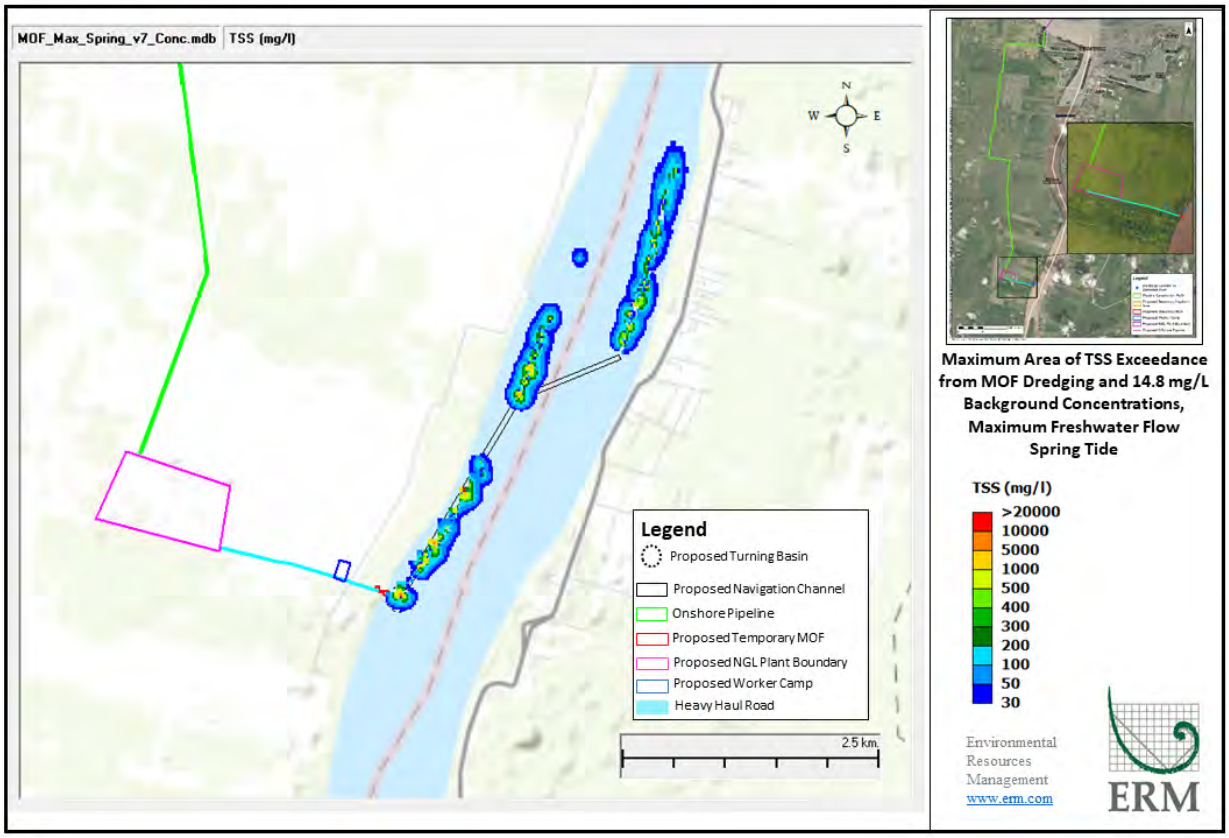


Figure 4-3: Temporary MOF Dredging—Largest Area with TSS > 30 mg/L during Maximum Flow Conditions—Dredging Solids + 14.8 mg/L Background (Spring Tide)

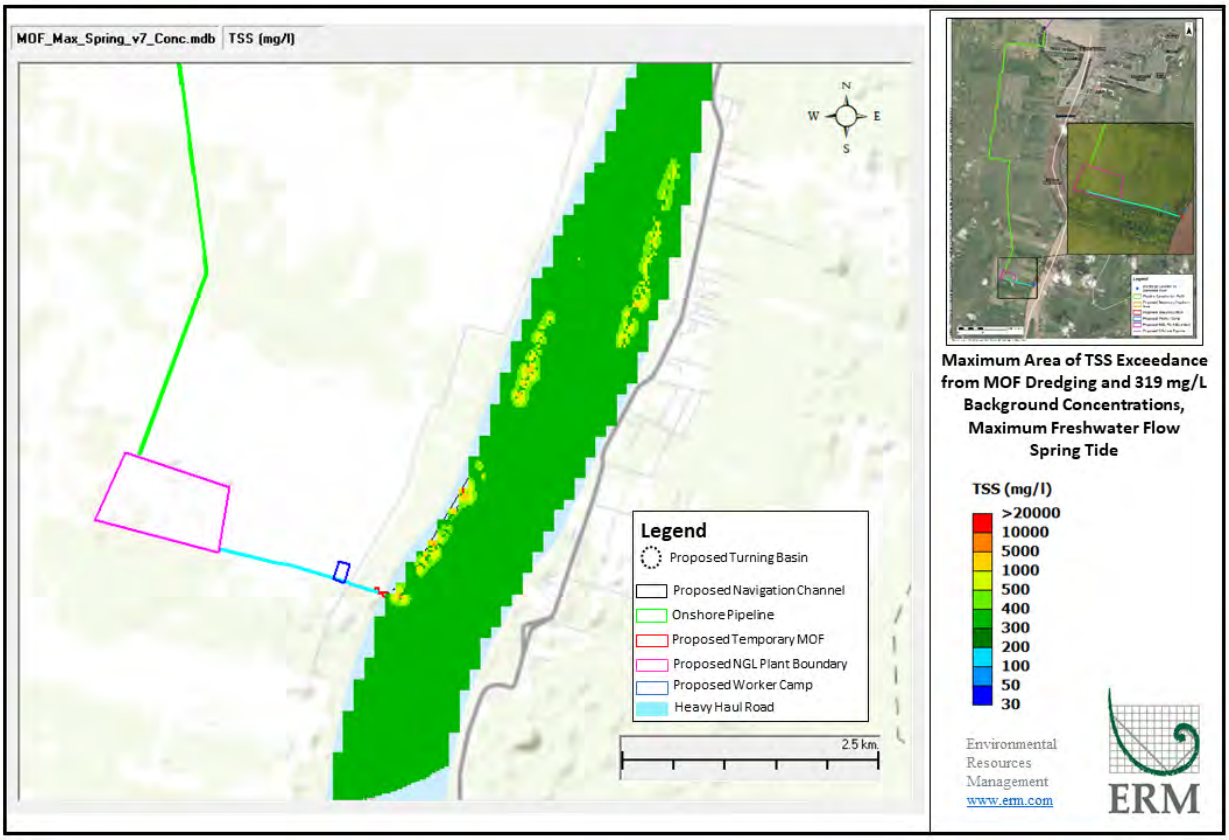


Figure 4-4: Temporary MOF Dredging—Largest Area with TSS > 30 mg/L during Maximum Flow Conditions—Dredging Solids + 319 mg/L Background (Spring Tide)

During minimum river flow condition, the reduction in river velocity provides greater opportunity for suspended particles to settle more quickly than during the maximum flow conditions, and therefore to leave the water column rather than traveling downstream as a suspended plume. Therefore, the areas with TSS above the 30 mg/L threshold were about half of the areas predicted under maximum flow conditions.

When accounting for the lower background TSS concentration of 14.8 mg/L in the Demerara River, the addition of suspended sediments during dredging resulted in areas with TSS concentrations above the 30 mg/L threshold lasting during the hour of dredging and dissipating during the breaks in dredging while the hopper was emptied. Among the three dates chosen along the lunar tidal cycle, the largest area above the 30 mg/L threshold occurred during the neap tide (0.67 km²), with a plume from the four dredge locations modeled extending over a length of 3.9 kilometers downstream of the temporary MOF (Figure 4-5). The smallest area among the three lunar tidal cycle dates with TSS concentrations exceeding 30 mg/L was 0.49 km² during the mid-cycle between neap and spring tides.

As stated above for maximum flow conditions, when accounting for the higher background TSS concentration in the Demerara River (319 mg/L), the entirety of the river exceeds the threshold

even without the addition of TSS due to dredging activities, as shown on Figure 4-6 for the neap tide condition.

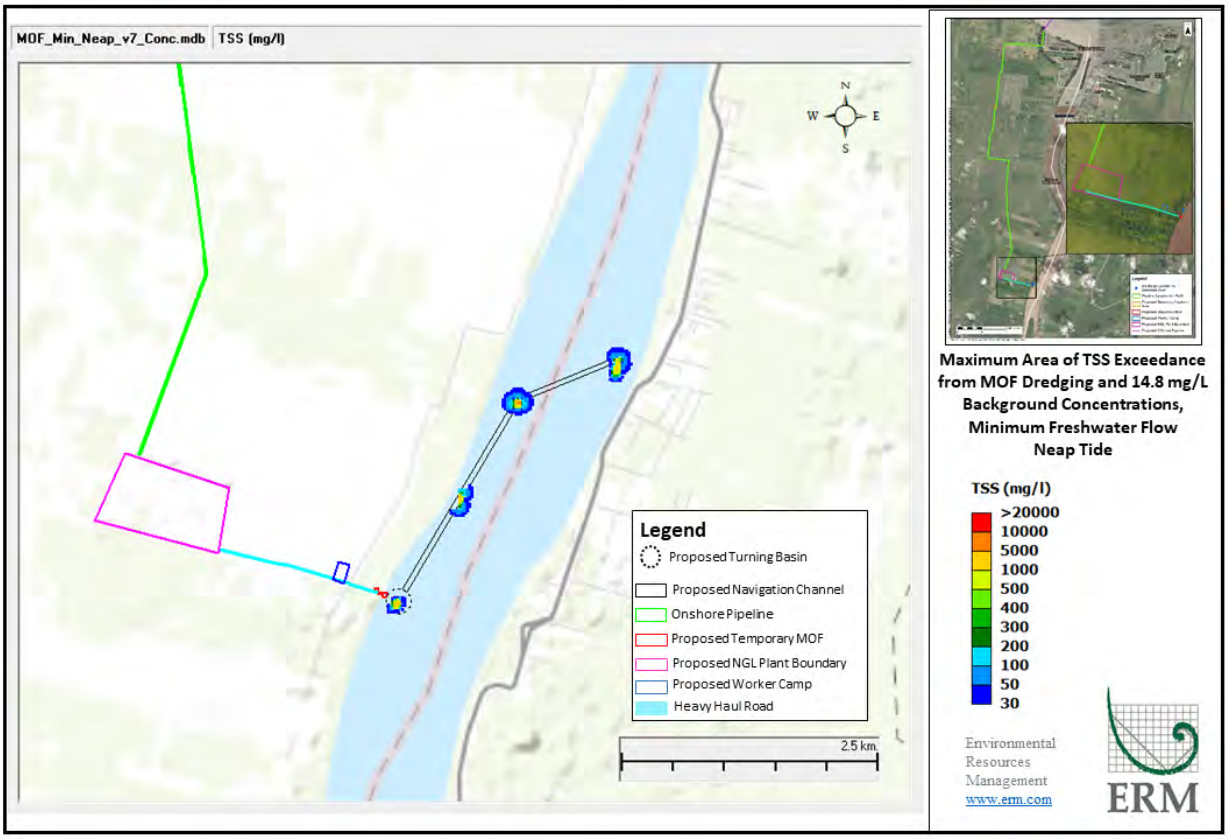


Figure 4-5: Temporary MOF Dredging—Largest Area with TSS > 30 mg/L during Minimum Flow Conditions—Dredging Solids + 14.8 mg/L Background (Neap Tide)

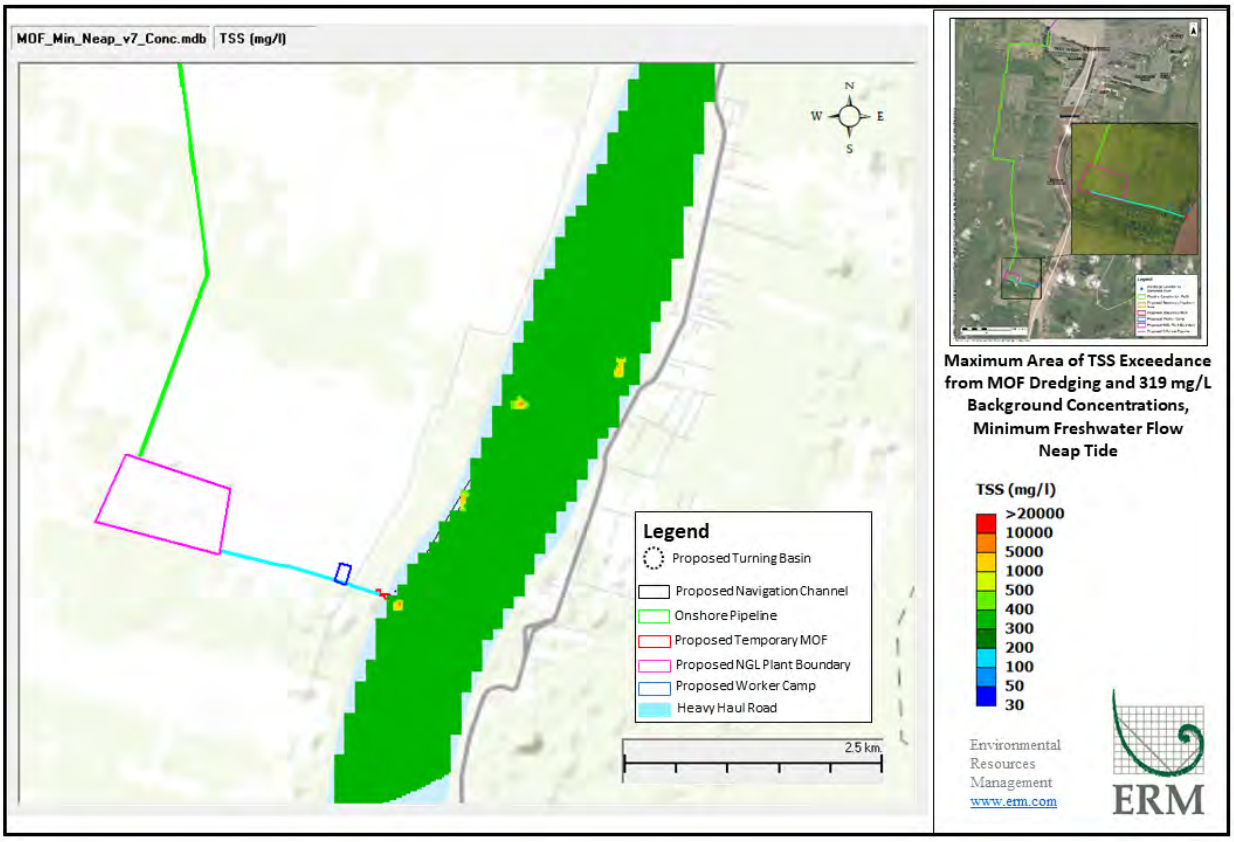


Figure 4-6: Temporary MOF Dredging—Largest Area with TSS > 30 mg/L during Minimum Flow Conditions—Dredging Solids + 319 mg/L Background (Neap Tide)

4.4.2. Depositional Thickness

Modeling also provided output describing the total thickness of particles that settled and deposited on the riverbed after a single day of dredging, which included four dredge cycles—one assumed to be at each of four locations (see Figure 4-2). The potential for impacts was estimated by comparing the thickness of the deposits during a day relative to the short duration ("instantaneous") burial thickness reference threshold. As such, the comparison can be considered conservative since the threshold is compared to the total accumulations after a day rather than from an instantaneous (i.e., one cycle) deposition. For each of the simulations performed for the two extremes in river flow and three times in the 14-day lunar tidal cycle, the total single-day accumulations of sediments across the model grid were calculated, and the total riverbed area above the threshold was computed. Although each day's dredging may repeat the process of burial in similar or nearby locations, impacts at the same locations would not occur if the benthic organisms were previously impacted from the previous day's events. Also, the tiny particles that settle may readily resuspend and continue transport downstream due to significantly large river velocities shearing the riverbed, potentially further mitigating impacts. Therefore, the net accumulation of sediments over the entire dredging period was not calculated separately because the maximum area from each of the six scenarios delineates the region where impacts may occur due to deposition during dredging.

For the minimum freshwater flow scenario, the mid-cycle tide produced the largest area with a total daily riverbed accumulation thickness exceeding the 6.5-millimeter threshold, covering an area of approximately 0.243 km², as shown on Figure 4-7.

For the maximum freshwater flow scenario, the mid-cycle tide also produced the largest area with a total daily riverbed accumulation thickness exceeding the 6.5-millimeter threshold, covering an area of approximately 0.007 km², as shown on Figure 4-8.

Note that in the minimum flow scenario, particles are more apt to settle and concentrate in a localized area as compared to the maximum flow scenario—where the particles will tend to travel downstream more quickly and settle across the riverbed in a less concentrated manner.

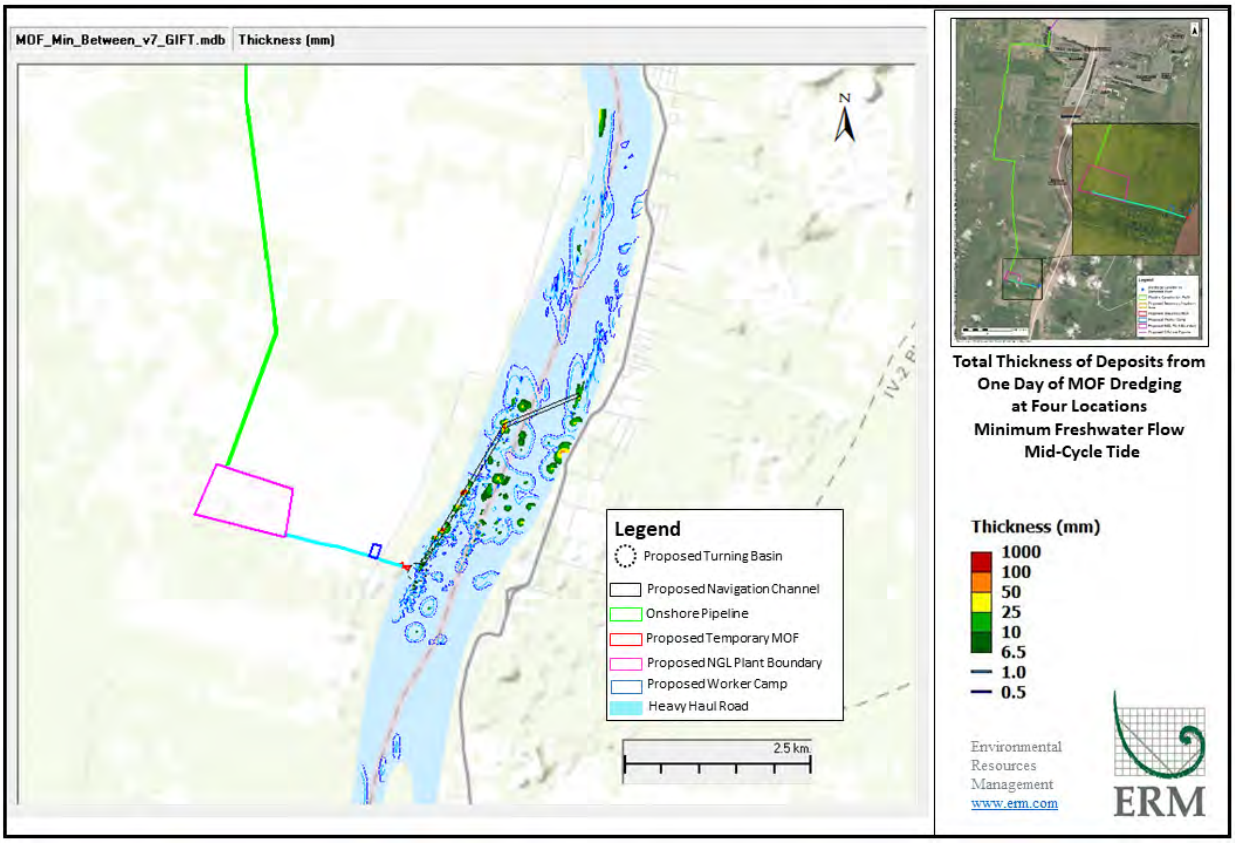


Figure 4-7: Modeled Thickness of Deposits from One Day of Dredging Activity at Four Locations under Minimum Flow Conditions (Mid-Cycle Tide)

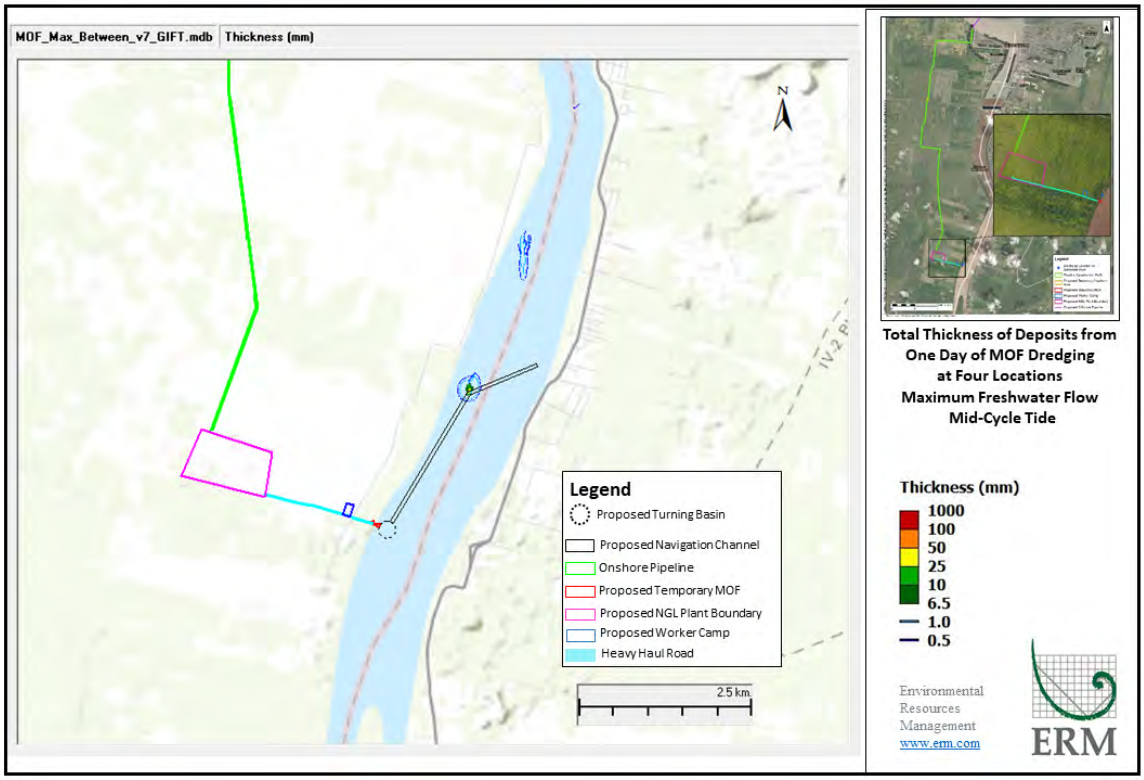


Figure 4-8: Maximum Thickness of Deposits after One Day of Temporary MOF Dredging Activity under Maximum Flow Conditions (Mid-Cycle Tide)

Table 4-4 summarizes the analysis of daily sediment deposition under minimum and maximum freshwater flow scenarios.

Table 4-4: Maximum Area of One-Day Sediment Deposition above the 6.5- Threshold after One Day of Dredging at Four Locations

Scenario	Area (km^2) with Thickness > 6.5 mm Threshold
Minimum Flow: Spring Tide	0.111
Minimum Flow: Mid-Cycle Tide	0.243
Minimum Flow: Neap Tide	0.167
Maximum Flow: Spring Tide	0.005
Maximum Flow: Mid-Cycle Tide	0.007
Maximum Flow: Neap Tide	0.007

5. PIPELINE TRENCHING

Sections of the offshore pipeline in shallower waters will be installed to facilitate burial of the pipeline. The process of trenching for the pipeline will cause the excavated sediments to be pushed to either side of the trenching device, which will suspend sediments in the water column.

Modeling was performed to simulate the transport and settling of suspended solids during the trenching process.

5.1. APPROACH

Trenching is planned for the portion of the pipeline located from the shore to approximately 47 kilometers (20-meter water depth) off the coastline. The remainder of the offshore pipeline length to the offshore platforms will not be trenched, but rather laid directly on the seafloor. The rate of trenching is estimated at 60 m³/hr. The typical cross-section of the trench will be 2.6 square meters (m²) in a triangular shape with a depth approximately 1.6 meters deep. Assuming trenching is able to be performed 24 hours a day, the time to trench 47 kilometers is approximately 85 days.

Modeling was performed to simulate the sediments suspended during the trenching process during 1 workday at three representative depth locations along the 47-kilometer stretch of trenching (Figure 5-1): coastal (1.6-meter depth), shallow (10-meter depth), and offshore (20-meter depth).

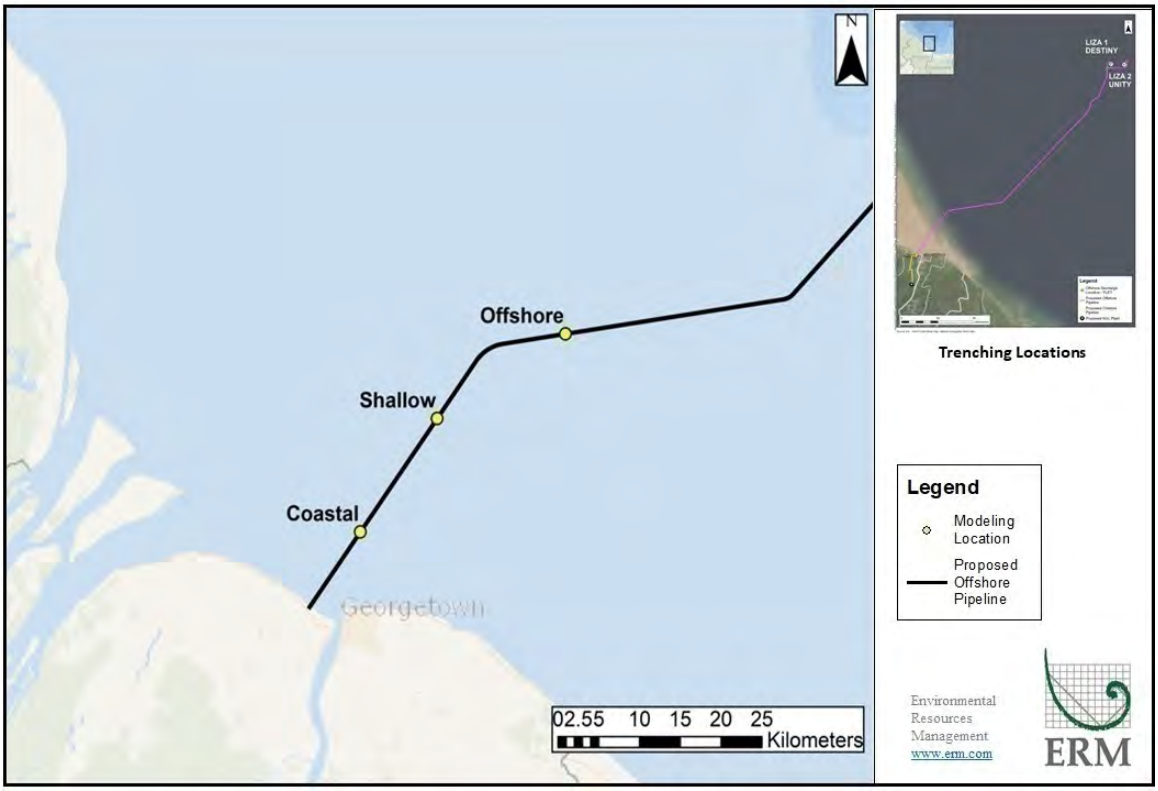


Figure 5-1: Map of Three Offshore Trenching Locations Modeled

5.2. SIMULATION DESIGN

As in the case of the temporary MOF dredging modeling to simulate the transport of suspended sediments in water from offshore trenching, modeling was performed using GEMSS and its sediment particle and fluids discharge module, GIFT (Section 4.2).

For each of the three scenarios representing different locations and depths along the pipeline, the sediment materials were simulated to be released near the seabed, splitting the 60 m³/hr discharge in two at angles perpendicular to and on either side of the pipeline trench.

Sediment analyses at locations along the pipeline route were used for sediment property data (such as particle size distribution) of the material to be trenched (Table 5-1). These values were applied to the GIFT model to characterize the settling rates of particles, which varies depending on the range of particle sizes (Table 5-5).

Table 5-1: Locations of Sediment Sampling used for Modeled Sediment Data

Scenario Location	EBS Reference Sediment Station	Sediment Study	Approximate Distance from Scenario Location to Sediment Station (kilometer)
Offshore	BC22	Environmental Sciences Ltd. 2018. *Exxon Guyana Project: Phase 2. Final Environmental Baseline Sediment Quality Report*. Offshore Guyana.	7.3
Shallow	EEBS119-04	EAME (Earth& Marine Environmental Consultants). 2021. *Guyana Gas to Shore Pipeline Project*. Environmental Baseline Survey. Project Reference: 021-1863. REV01. Georgetown Guyana.	0.2
Coastal	EEBS103-04	EAME (Earth& Marine Environmental Consultants). 2021. *Guyana Gas to Shore Pipeline Project*. Environmental Baseline Survey. Project Reference: 021-1863. REV01. Georgetown Guyana.	0.6

Table 5-2: Mass Fractions of Various Particle Sizes for Sediment Sampling Locations [a]

Scenario Location	Chunks (> 2mm)	Sand (>0.062–2 mm)	Coarse Silt (>0.016–0.062 mm)	Fine Silt (0.004–0.016 mm)	Clay (< 0.004 mm)
Offshore	0%	1%	4%	4%	92%
Shallow	0%	8%	31%	31%	31%
Coastal	0%	2.0%	32.7%	32.7%	32.7%

[a] Percentages are rounded in the table; the sum of all mass fractions for a given location was 100%.

The density of the various particle sizes assumed are summarized in Table 5-3, obtained from the StructX engineering database.

Table 5-3: Density for Various Particle Size Categories

Particle Size Category	Dry Density (kg/m³)
Sand (>0.062–2 mm)	1,762.5
Coarse Silt (>0.016–0.062 mm)	1,738.0
Fine Silt (0.004–0.016 mm)	1,738.0
Clay (< 0.004 meters)	1,818.0

kg = kilogram

5.3. ASSESSMENT CRITERIA

The sediment transport modeling scenarios provide predicted thickness of sediment particles deposited on the seabed on a two-dimensional basis, and increases in TSS concentrations in the water column on a 3D basis.

Sudden burial by sediments that are suspended and redeposited from the trenching activity may cause physical impacts upon benthic communities on the seabed. The potential severity of burial impacts depends on the sensitivity of the benthic organism, the thickness of deposition, and the duration of the burial. Thickness thresholds vary by species and sediment impermeability. A suggested threshold of 6.5 mm has been reported (Smit et al. 2006); this is representative of instantaneous burials adversely affecting 5 percent of the studied benthic species (i.e., the more sensitive members of the population).

Water quality impacts may also be possible due to increases in TSS concentrations in the water column from the trenching disturbance of the seabed. The TSS plume will dissipate with distance from the release as it mixes in the water column or solids settle back to the seabed. Larger particles will settle more quickly than finer particles, such that smaller particles may stay suspended longer and travel further than larger particles.

Impacts on aquatic organisms related to elevated TSS may occur if light penetration is impeded significantly for long periods of time (reducing the ability of plants and phytoplankton to photosynthesize). Increases in TSS may also decrease water clarity and clog fish gills.

5.3.1. Total Suspended Solids

Increases in TSS concentrations in the water column will occur during the trenching process. The highest concentration increases will occur on either side of the plow and will decrease over time and distance as the TSS plume dissipates and settles. Larger particles will settle more quickly than finer particles, such that smaller particles may stay suspended longer and travel further than larger particles. As such, elevated TSS concentrations may form in regions where tiny, suspended particles linger in a cloud and mix with particles from subsequent releases.

Impacts on marine organisms related to elevated TSS may occur if light penetration in photic zones is impeded significantly for long periods of time (reducing the ability of plants and phytoplankton to photosynthesize). Increases in TSS may also decrease water clarity and clog

fish gills. A commonly used guidance value for impacts related to increased TSS in the marine environment is 35 mg/L, promulgated by MARPOL 73/78 (IMO 2006). Accordingly, for the purpose of modeling, results are presented in terms of the lateral area with TSS concentrations added to the marine environment above 35 mg/L.

5.3.2. Depositional Thickness

Burial by sediments released into the water column during the trenching process may cause physical impacts upon benthic communities on the seabed. The potential severity of burial impacts depends on the sensitivity of the benthic organism, the thickness of deposition, and the duration of the burial. Thickness thresholds vary by species and sediment impermeability. A maximum threshold deposition rate of 5 centimeters per month has been reported based on publications by Ellis and Heim (1985) and MarLIN (2011) for gradual releases in the marine environment. However, for relatively instantaneous depositions similar to what would occur during pipeline trenching, a threshold of 6.5 mm is recommended (Smit et al. 2006); this is representative of instantaneous burials adversely affecting 5 percent of the studied benthic species (i.e., the more sensitive members of the population).

5.4. MODELING RESULTS

Modeling was performed for both minimum and maximum current conditions for each of the three modeled trenching locations, resulting in a total of six simulations. The maximum predicted TSS concentrations and sediment depositional thicknesses after 1 day of trenching are presented below.

5.4.1. Total Suspended Solids

5.4.1.1. Coastal

The minimum currents scenario for the coastal trenching location had a maximum TSS concentration of approximately 36.2 mg/L, which occurred near the bottom, as shown on Figure 5-2. The area exceeding 35 mg/L travels up to 19 meters from the trench and covers an area of 47 m² after 1 day of trenching activity.

The maximum currents scenario for the coastal trenching location had a maximum TSS concentration of approximately 35.3 mg/L, which occurred near the bottom, as shown on Figure 5-3. The area exceeding 35 mg/L travels up to 14 meters from the trench and covers an area of 44 m² after 1 day of trenching activity.

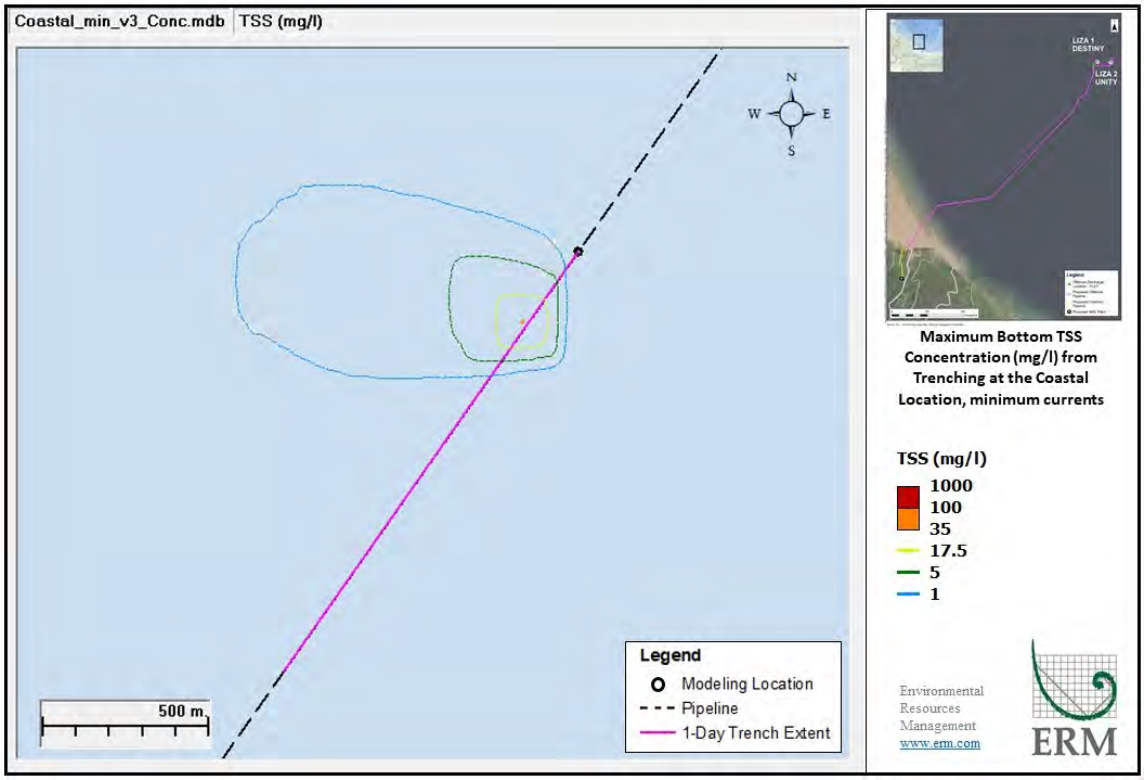


Figure 5-2: Maximum TSS Concentrations at Sea Bottom at the Coastal Modeling Location under Minimum Currents after 1 Day of Trenching

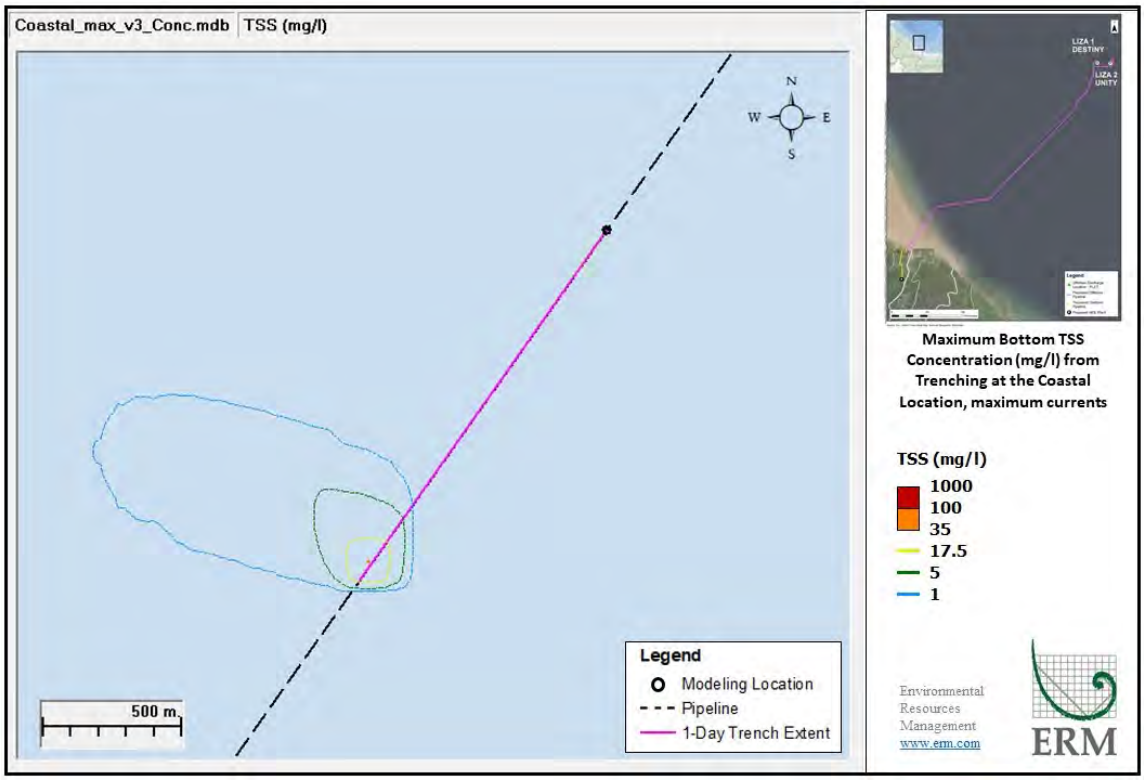


Figure 5-3: Maximum TSS Concentrations at Sea Bottom at the Coastal Modeling Location under Maximum Currents after 1 Day of Trenching

5.4.1.2. Shallow

The minimum currents scenario for the shallow trenching location had a maximum TSS concentration of approximately 38.7 mg/L, which occurred near the bottom, as shown on Figure 5-4. The area exceeding 35 mg/L travels up to 46 meters from the trench and covers an area of approximately 3,500 m² after 1 day of trenching activity.

The maximum currents scenario for the shallow trenching location had a maximum TSS concentration of approximately 35.8 mg/L, which occurred near the bottom, as shown on Figure 5-5. The area exceeding 35 mg/L travels a maximum distance of up to 36 meters from the pipeline and covers an area of 600 m² after 1 day of trenching activity.

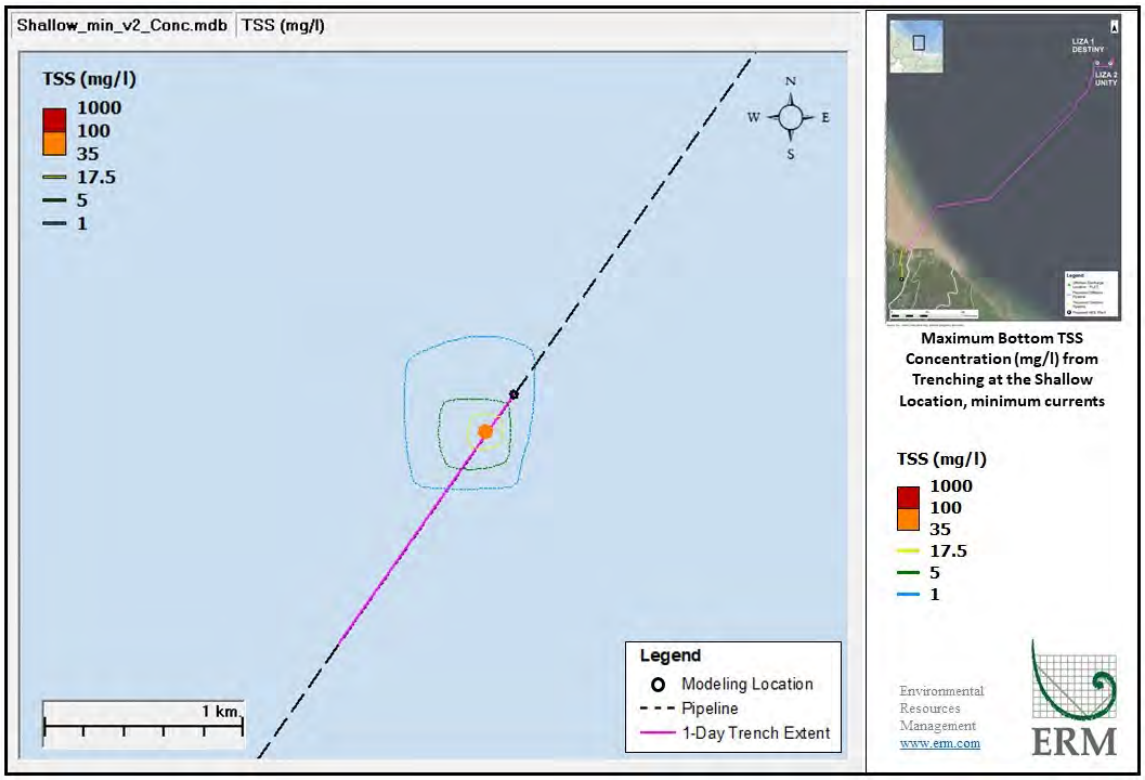


Figure 5-4: Maximum TSS Concentrations at Sea Bottom at the Shallow Modeling Location under Minimum Currents after 1 Day of Trenching

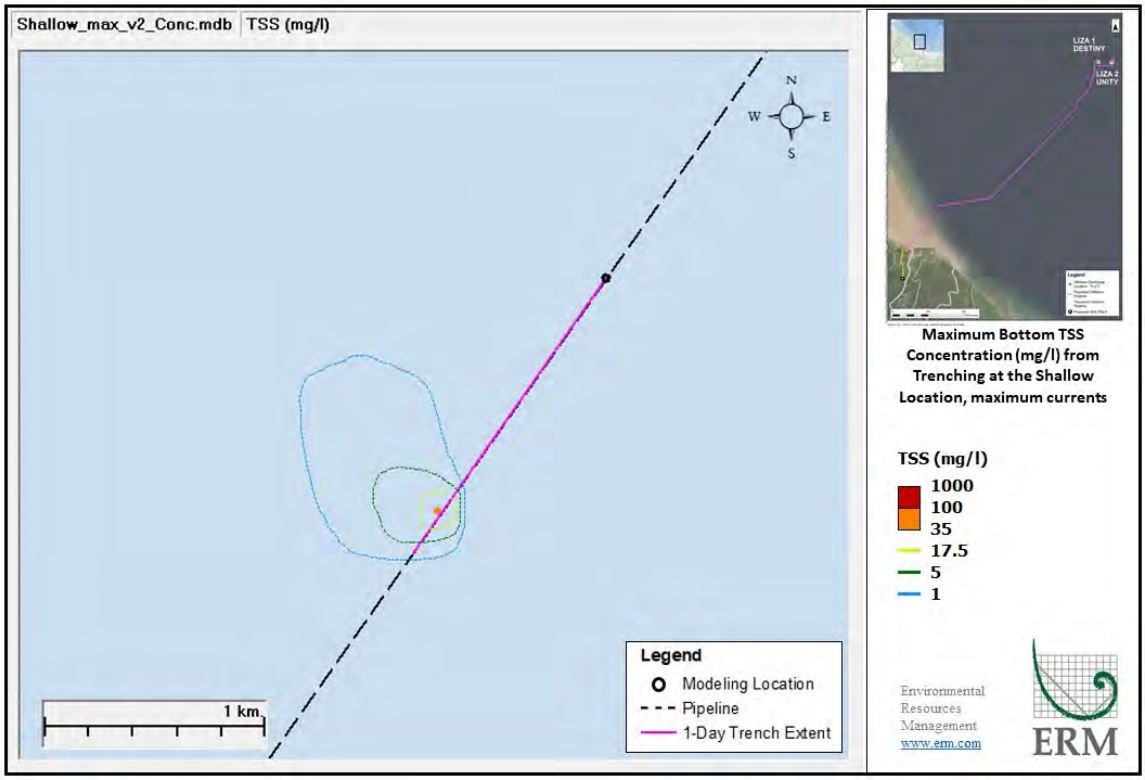


Figure 5-5: Maximum TSS Concentrations at Sea Bottom at the Shallow Modeling Location under Maximum Currents after 1 Day of Trenching

5.4.1.3. Offshore

The minimum currents scenario for the offshore trenching location had a maximum TSS concentration of approximately 47.3 mg/L, which occurred near the bottom, as shown on Figure 5-6. The area exceeding 35 mg/L travels a maximum distance of up to 75 meters from the pipeline and covers an area of 11,900 m² after 1 day of trenching activity.

The maximum currents scenario for the offshore trenching location had a maximum TSS concentration of approximately 40.4 mg/L, which occurred near the bottom, as shown on Figure 5-7. The area exceeding 35 mg/L travels a maximum distance of up to 56 meters from the pipeline and covers an area of 4,700 m² after 1 day of trenching activity.

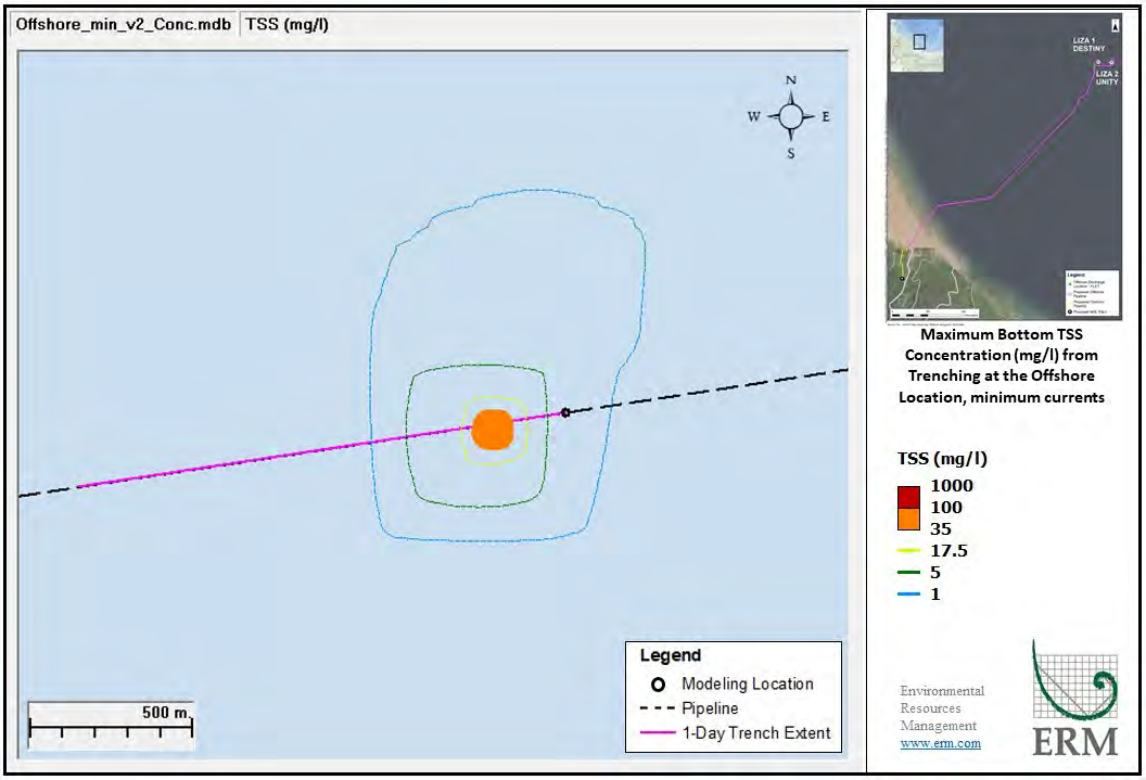


Figure 5-6: Maximum TSS Concentrations at Sea Bottom at the Offshore Modeling Location under Minimum Currents after 1 Day of Trenching

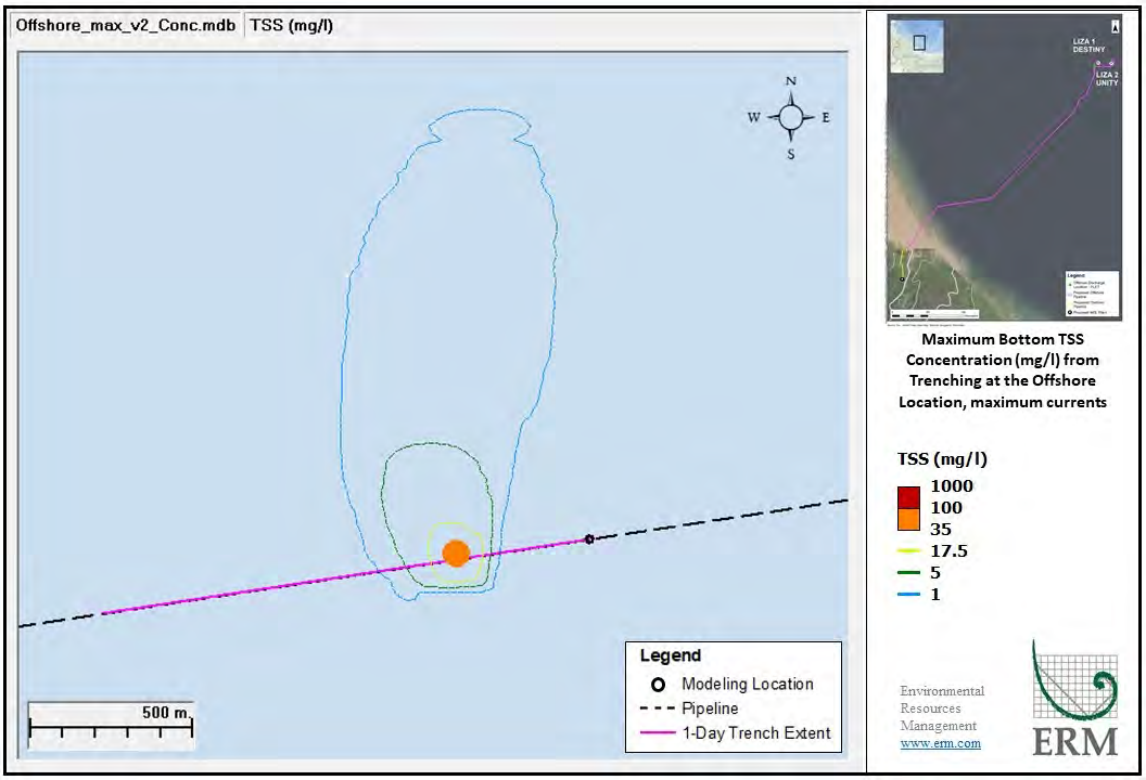


Figure 5-7: Maximum TSS Concentrations at Sea Bottom at the Offshore Modeling Location under Maximum Currents after 1 Day of Trenching

5.4.1.4. Summary

Table 5-4 summarizes the results found in the TSS analysis for the three trenching locations under minimum and maximum currents scenarios. In all scenarios, the threshold of incremental TSS of 35 mg/L is exceeded, with the potential to cover an area up to approximately 12,000 m² after 1 day of trenching activity.

Table 5-4: Summary of Results for Coastal, Shallow, and Offshore Trenching under Different Currents at Time of Maximum TSS Occurrence

Scenario	Maximum Bottom TSS (mg/L)	Area (m²) after 1 Day of Trenching with TSS > 35 mg/L Threshold
Coastal_min	36.2	47
Coastal_max	35.3	44
Shallow_min	38.7	3,495
Shallow_max	35.8	598
Offshore_min	47.3	11,932
Offshore_max	40.4	4,669

5.4.2. Depositional Thickness

5.4.2.1. Coastal

The maximum predicted seabed accumulation of sediment at the coastal trenching location under minimum current conditions was 3.6 mm, as shown on Figure 5-8. The maximum predicted seabed accumulation of sediment under maximum current conditions was 3 mm after 1 day of trenching activity, as shown on Figure 5-9. The 6.5-milimeter impact threshold was not exceeded under either current condition.

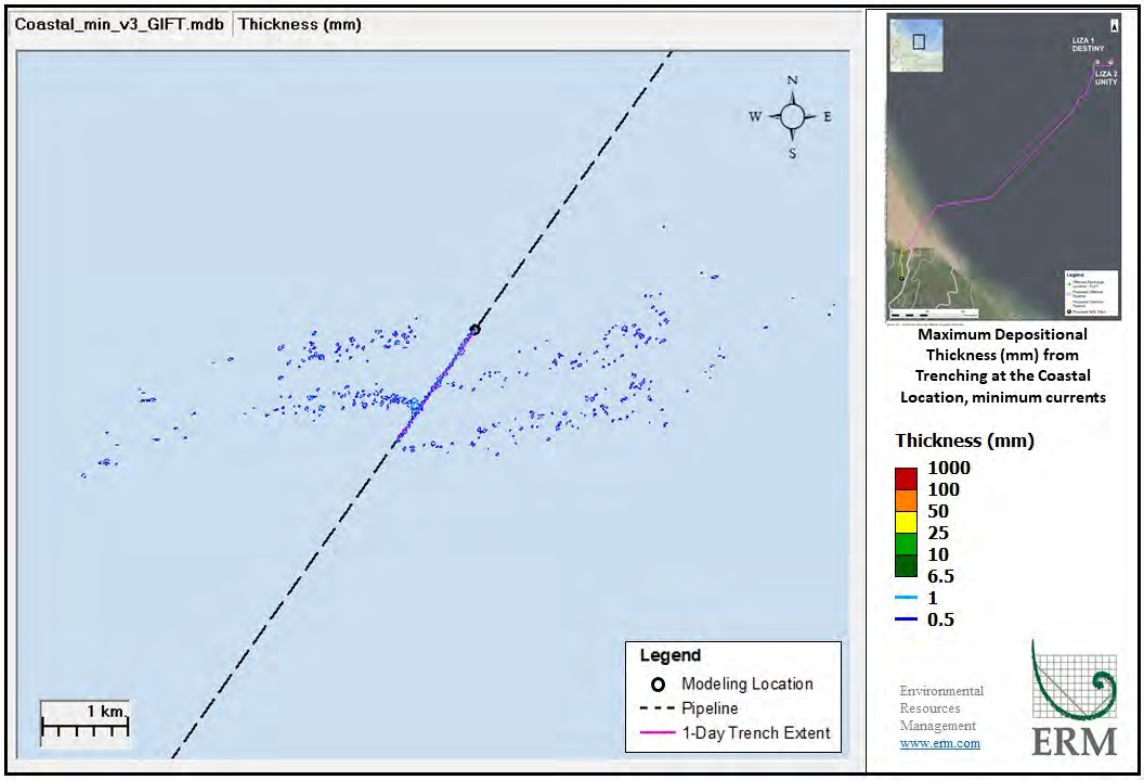


Figure 5-8: Maximum Depositional Thickness at Sea Bottom at the Coastal Modeling Location under Minimum Currents after 1 Day of Trenching

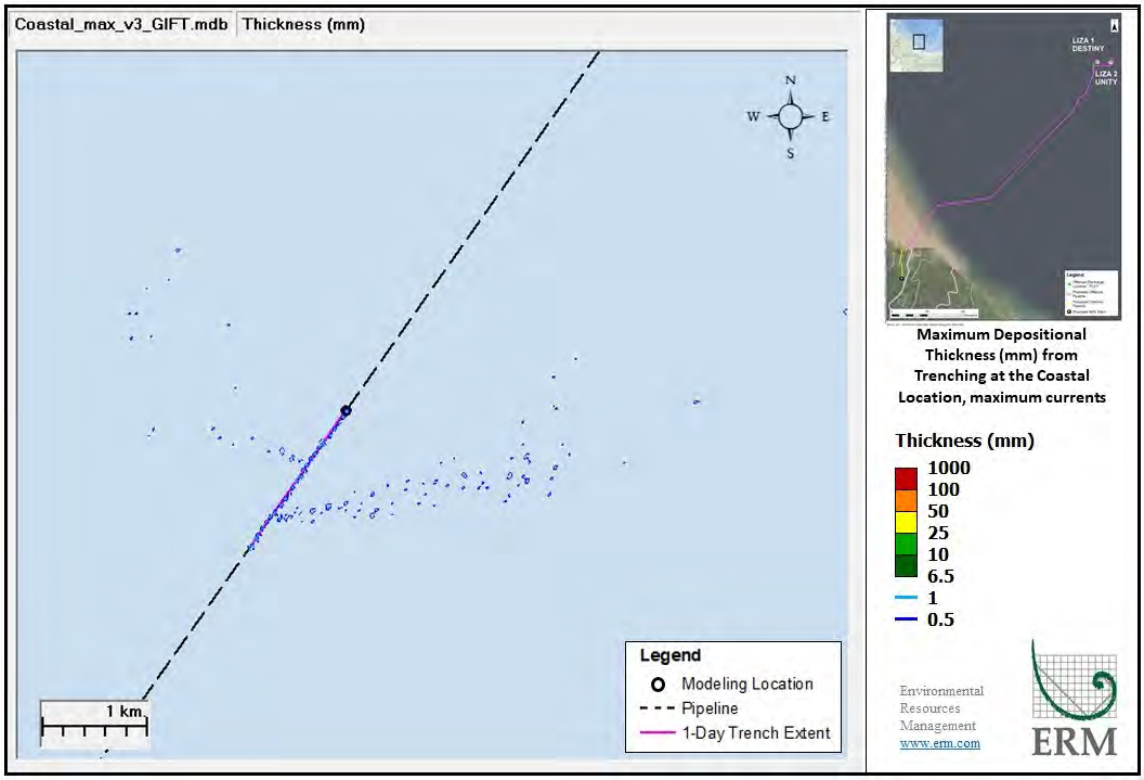


Figure 5-9: Maximum Depositional Thickness at Sea Bottom at the Coastal Modeling Location under Maximum Currents after 1 Day of Trenching

5.4.2.2. Shallow

The maximum predicted seabed accumulation for this scenario was 13.2 mm. The predicted seabed accumulation of sediment exceeding the 6.5-milimeter threshold at the shallow trenching location under minimum current conditions was 0.021 km², as shown on Figure 5-10 and Figure 5-11. The maximum distance of this mound extending from the trenched area was approximately 38 meters.

The maximum predicted seabed accumulation for this scenario was also 13.2 mm. The predicted seabed accumulation of sediment exceeding the 6.5-milimeter threshold at the shallow trenching location under maximum current conditions was 0.018 km², as shown on Figure 5-12 and Figure 5-13. The maximum distance of this mound extending from the trenched area was approximately 35 meters.

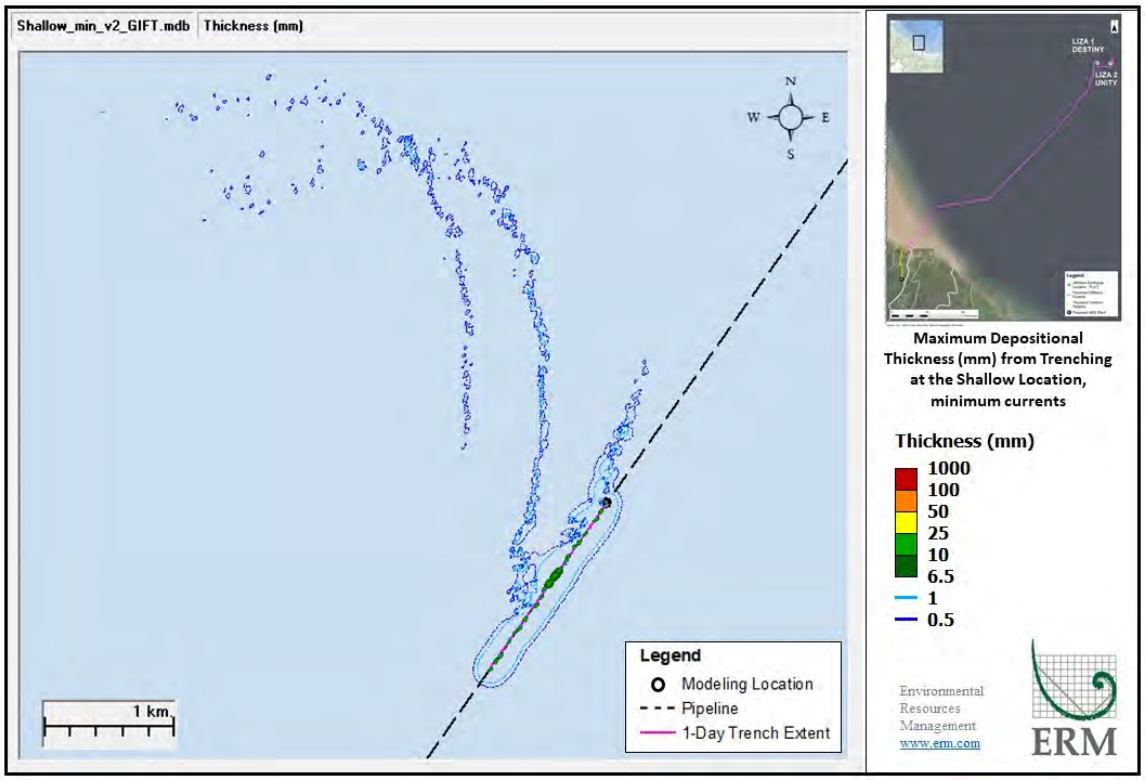


Figure 5-10: Maximum Depositional Thickness at Sea Bottom at the Shallow Modeling Location under Minimum Currents after 1 Day of Trenching (Full Extent)

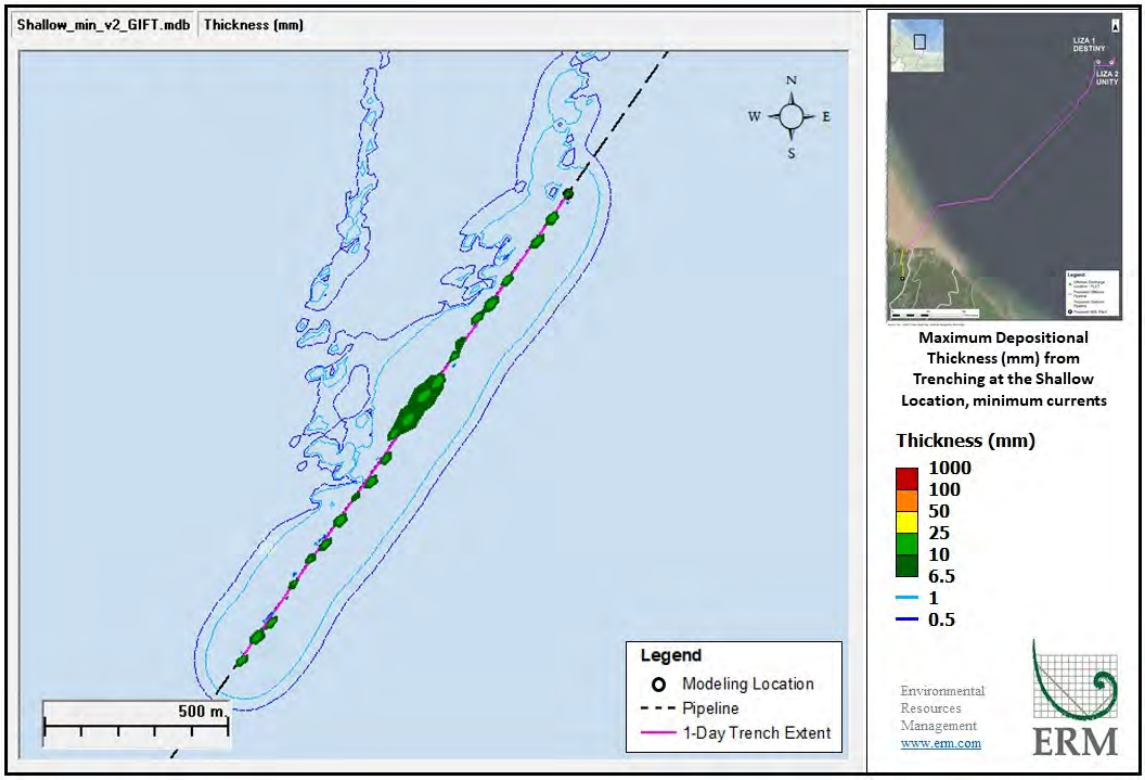


Figure 5-11: Maximum Depositional Thickness at Sea Bottom at the Shallow Modeling Location under Minimum Currents after 1 Day of Trenching (Close Up)

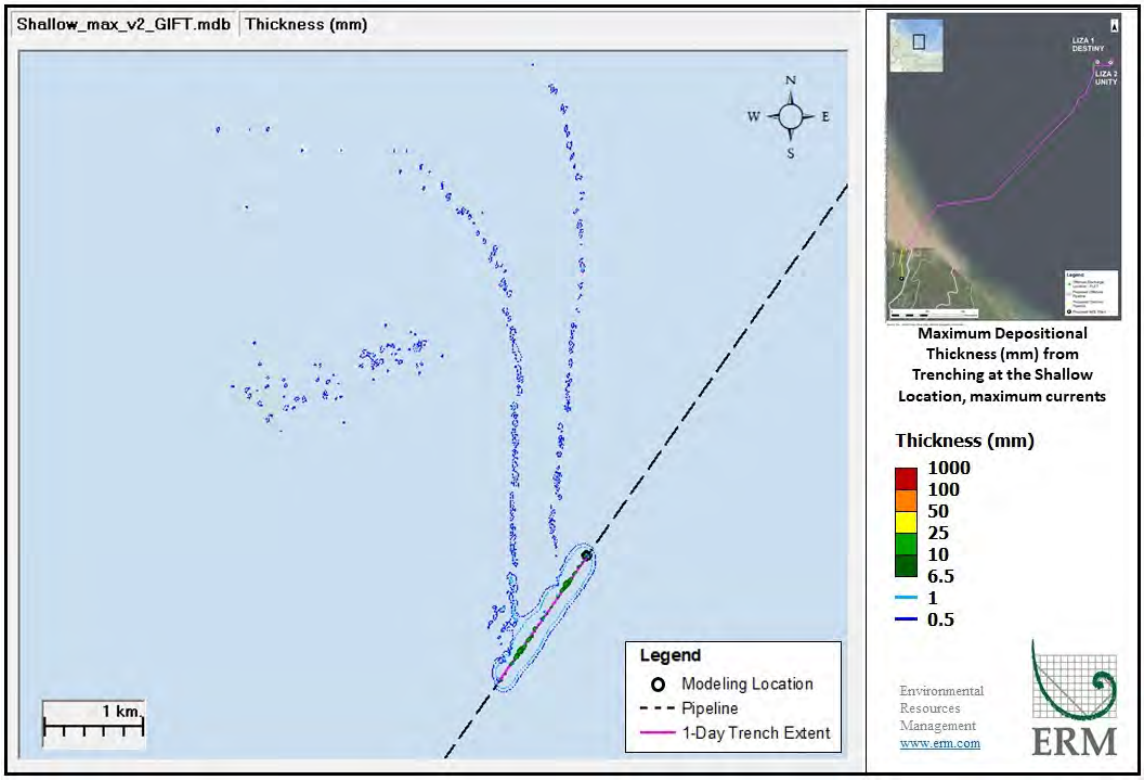


Figure 5-12: Maximum Depositional Thickness at Sea Bottom at the Shallow Modeling Location under Maximum Currents after 1 Day of Trenching (Full Extent)

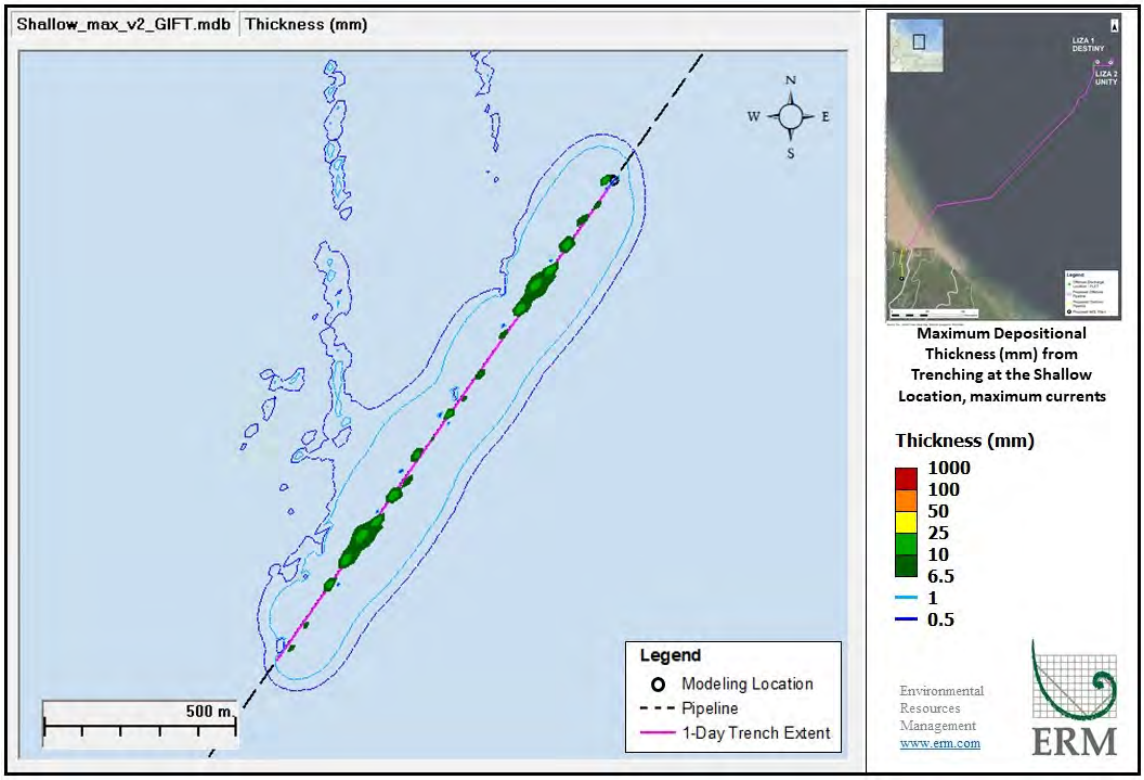


Figure 5-13: Maximum Depositional Thickness at Sea Bottom at the Shallow Modeling Location under Maximum Currents after 1 Day of Trenching (Close up)

5.4.2.3. Offshore

The maximum predicted seabed accumulation of sediment at the offshore trenching location under minimum current conditions was 1.4 mm, as shown on Figure 5-14. The maximum predicted seabed accumulation of sediment under maximum current conditions was 1 mm, as shown on Figure 5-15. The 6.5-milimeter impact threshold was not exceeded under either current condition.

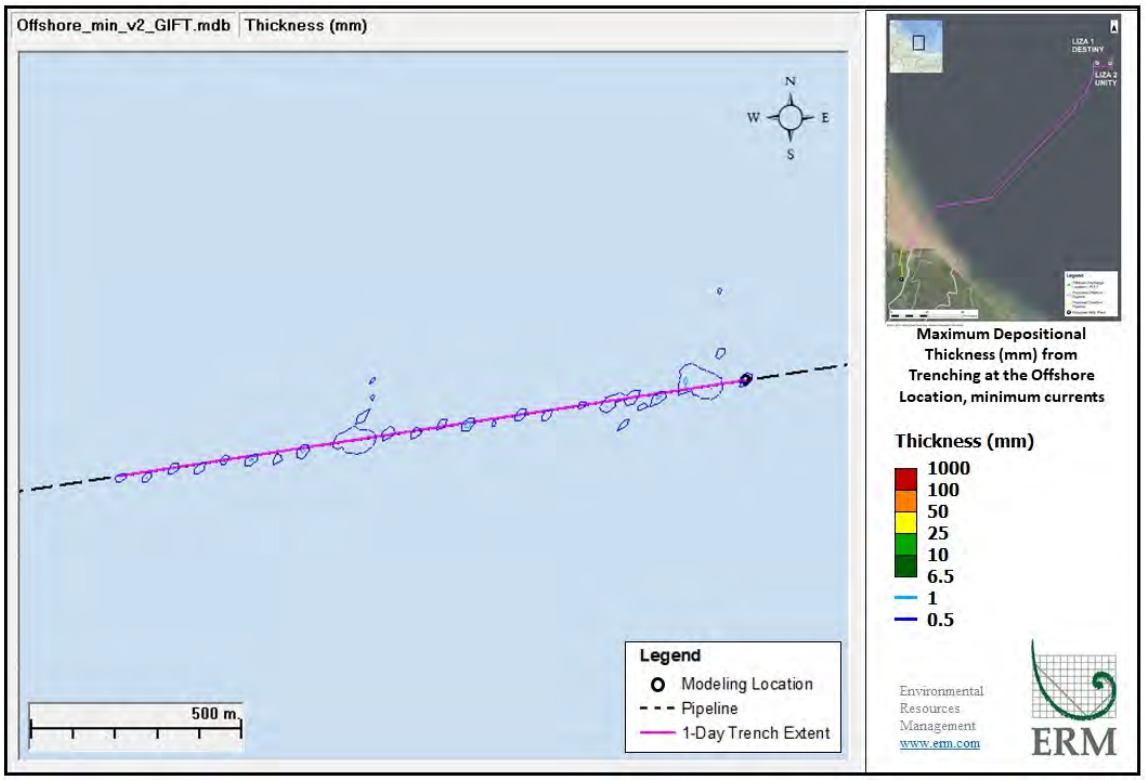


Figure 5-14: Maximum Depositional Thickness at Sea Bottom at the Offshore Modeling Location under Minimum Currents after 1 Day of Trenching

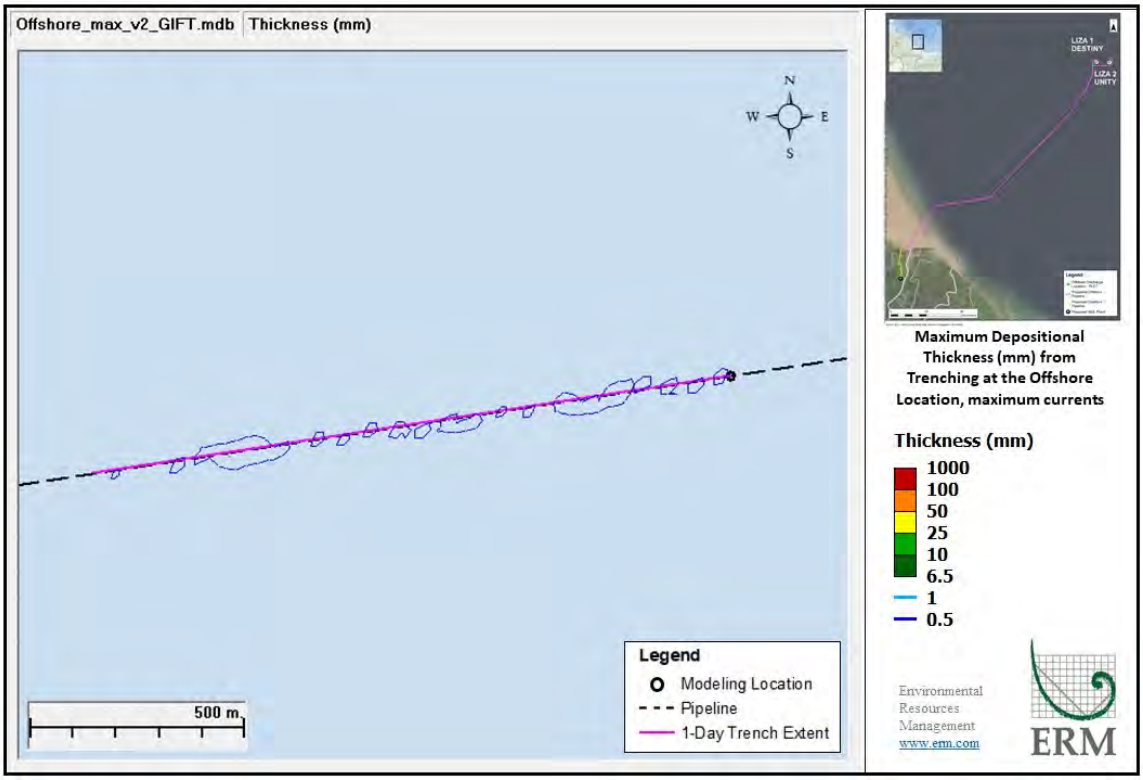


Figure 5-15: Maximum Depositional Thickness at Sea Bottom at the Shallow Modeling Location under Maximum Currents after 1 Day of Trenching

5.4.2.4. Summary

Table 5-5 summarizes the results found in the thickness analysis for the three trenching locations under minimum and maximum currents scenarios. The impact threshold of 6.5 mm was only exceeded at the shallow trenching location, limited to an area directly adjacent to the pipeline corridor of up to approximately 0.02 km².

Table 5-5: Summary of Results for Coastal, Shallow, and Offshore Trenching under Different Currents at Time of Maximum TSS Occurrence

Scenario	Maximum Bottom Thickness after 1 Day of Trenching (mm)	Area (km²) after 1 Day of Trenching with Thickness > 6.5 mm Threshold
Coastal_min	3.6	0.0
Coastal_max	3.0	0.0
Shallow_min	13.2	0.021
Shallow_max	13.2	0.018
Offshore_min	1.4	0
Offshore_max	1.0	0

6. HYDROTESTING

6.1. APPROACH

Hydrotesting is a process that will be used to test the integrity of the pipeline system prior to putting it in service for production operations. The Project will charge the lines with water to a designated testing pressure, and then will discharge the water to the environment after the testing period is complete. Currently, four alternatives are being considered for the discharge of hydrotest water:

1. (Primary Alternative)—Discharge of hydrotest water for the entire pipeline (from the NGL Plant to the pipeline end termination [PLET]) offshore at the PLET location (Figure 6-1);
2. Discharge of hydrotest water from the offshore pipeline segment (i.e., from the beach valve to the PLET) at the PLET location (Figure 6-1) and discharge of the hydrotest water for the onshore pipeline segment (i.e., between the beach valve and NGL Plant) to the stormwater pond at the NGL Plant site, from which it will be discharged into the Demerara River either directly or first to a canal (Figure 6-2). For modeling purposes, a direct discharge to Demerara River approximately 100 meters downstream of the temporary MOF is assumed;
3. Discharge of hydrotest water from the offshore pipeline segment between the beach valve and an Intermediate Point 1 (located 50 kilometers offshore along the pipeline) to the ocean at Intermediate Point 1; discharge of hydrotest water from the offshore pipeline segment between Intermediate Point 1 and the PLET to the ocean at the PLET (Figure 6-1); and discharge of hydrotest water for the onshore pipeline segment (between the beach valve and the NGL Plant) to the stormwater pond at the NGL Plant site, from which it will be discharged into the Demerara River either directly or first to a canal (Figure 6-2). For modeling purposes, a direct discharge to Demerara River approximately 100 meters downstream of the temporary MOF is assumed; and
4. Discharge of hydrotest water from the offshore pipeline segment between the beach valve and an Intermediate Point 2 (located 75 kilometers offshore along the pipeline) to the ocean at Intermediate Point 2; discharge of hydrotest water from the offshore pipeline segment between Intermediate Point 2 and the PLET to the ocean at the PLET (Figure 6-1); and discharge of hydrotest water for the onshore pipeline segment (between the beach valve and the NGL Plant) to the stormwater pond at the NGL Plant site, from which it will be discharged into the Demerara River either directly or first to a canal (Figure 6-2). For modeling purposes, a direct discharge to Demerara River approximately 100 meters downstream of the temporary MOF is assumed.

Figure 6-1: Offshore Locations for Discharge of Hydrotest Water (PLET, Intermediate Point 1, and Intermediate Point 2)

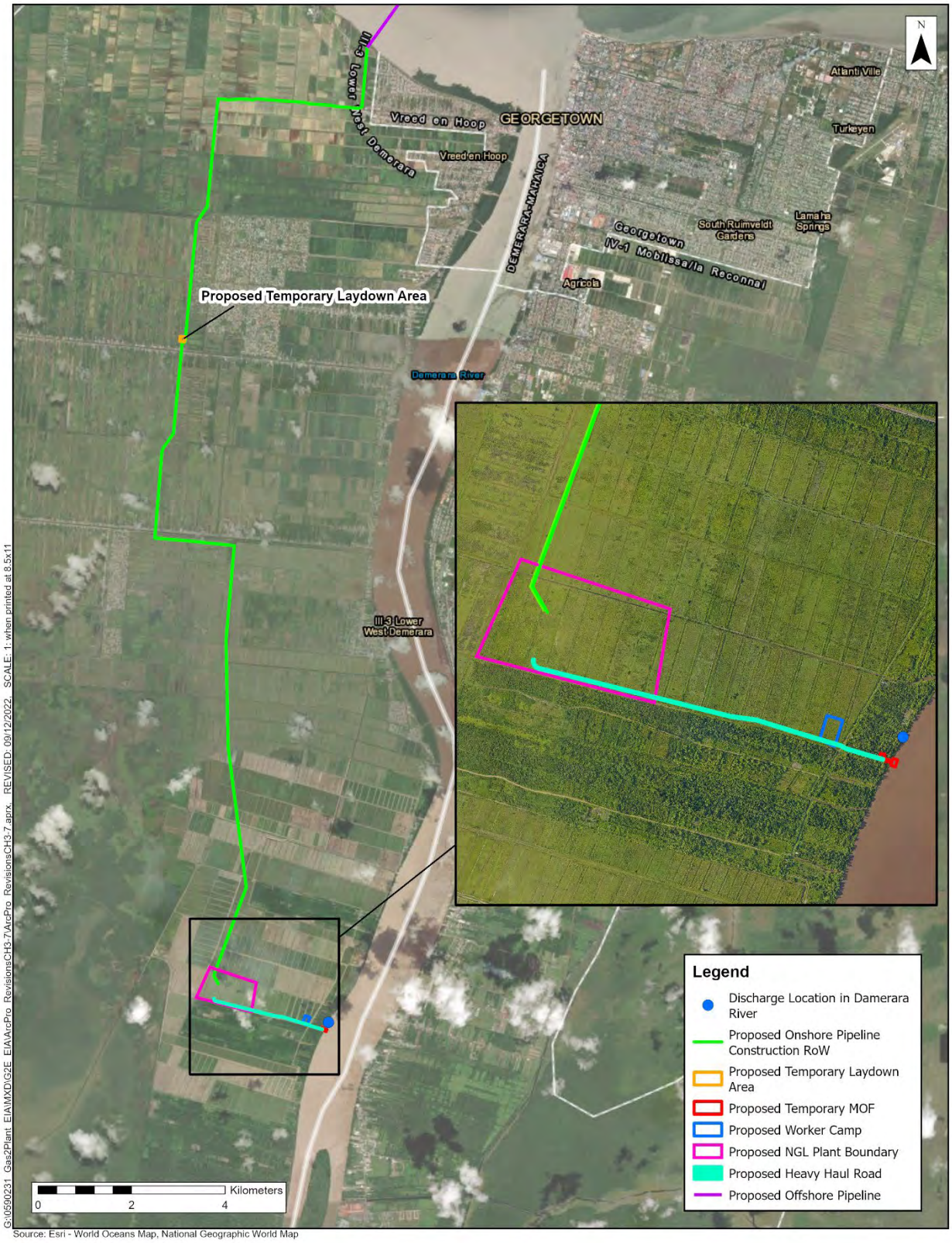


Figure 6-2: Location for Discharge of Hydrotest Water in Demerara River

The coordinates, distances offshore along the pipeline from the beach valve, and water depths at the modeled offshore discharge locations of hydrotest water (Intermediate Point 1, Intermediate Point 2, and PLET) are provided in Table 6-1. The coordinates, water depth, and approximate width of the river at the modeled discharge location of hydrotest water in the Demerara River are provided in Table 6-2.

Table 6-1: Coordinates and Water Depths of Modeled Offshore Locations for Discharge of Hydrotest Water (Intermediate Point 1, Intermediate Point 2, and PLET)

Location	Easting (m UTM 21N)	Northing (m UTM 21N)	Distance along the Pipeline Route from the Beach Valve (km)	Water Depth (meters) [a]
Intermediate Point 1	401,565	786,582	50	22
Intermediate Point 2	426,224	790,819	75	25
PLET	365,821	733,584	220	1,230

UTM = Universal Transverse Mercator
[a] 10-meter contour bathymetry data provided by EEPGL

Table 6-2: Coordinates, Water Depth, and River Width at the Modeled Location for Discharge of Hydrotest Water in Demerara River

Location	Easting (m UTM 21N)	Northing (m UTM 21N)	Water Depth (meters) [a]	Width of the River (meters)
Discharge Location in Demerara River	498,206	882,976	3.76	1,125

UTM = Universal Transverse Mercator
[a] Bathymetry data are from Navionics (Sonar Chart 2022)

A conservative non-decaying constituent was used in simulations to assess the dilution characteristics of the hydrotest water discharge plumes. These simulation results can be used to determine the conservative estimates of the plume characteristics of other constituents in the hydrotest water discharge plumes, because other constituents (oxygen scavenger and corrosion inhibitor) will follow the same mixing pattern and experience the same dilution.

The model used for the hydrotest water discharge was the U.S. Environmental Protection Agency's (USEPA) Cornell Mixing Zone Expert System (CORMIX) dilution model. CORMIX is a design tool routinely used by regulatory agencies to estimate the size and configuration of proposed and existing mixing zones resulting from wastewater discharges. CORMIX is primarily a near-field model (i.e., it applies to the region adjacent to the discharge structure in which the wastewater plume is recognizable as separate from the ambient water, and its trajectory is dominated by the discharge rate, effluent density, and geometry of the discharge structure).

The CORMIX calculation is based on defining the various hydraulic zones the effluent plume traverses in the receiving waterbody, then applying an analytical solution or empirical relationship to compute the plume trajectory and dilution rate in each zone. These analytical solutions and empirical relationships have been validated by the developers and other researchers against laboratory and field studies. CORMIX has been applied to many cases

(http://www.cormix.info) and is recognized by the USEPA and other national regulatory agencies as an appropriate model for computing trajectories, dilution rates, and mixing zone dimensions.

6.2. SCENARIO SELECTION

Understanding the mixing characteristics of the hydrotest water discharges requires an understanding of the properties of the receiving (ambient) water, discharge water, and discharge structures. The properties of the ambient water, in combination with the discharge port/structure configuration (pipe or open channel), control the near-field mixing and dilution of the discharge. Properties of the ambient water relevant to the discharge analysis include current velocity, temperature, and salinity. While the ambient current velocity (and its strength relative to the discharge/exit velocity) determines the level of initial mixing, temperature and salinity influence the behavior of the discharge plume and its relative configuration due to density differences (i.e., buoyancy effects). Significant density differences between the discharge and ambient water will impede mixing. Balancing that effect, significant differences between discharge velocity and ambient current increase entrainment of the ambient water into the discharge plume, resulting in rapid mixing. Scenarios for this analysis were selected to represent extreme density differences between the ambient and discharge waters as well as a range of ambient current velocities.

6.2.1. Ambient Water Conditions

Ambient water characteristics for four potential discharge locations (Intermediate Point 1, Intermediate Point 2, PLET, and Demerara River, as described in Section 6.1) were analyzed to determine the extreme density levels, a function of water temperature and salinity. A statistical summary (5^{th}, 50^{th}, and 95^{th} percentiles) of ambient current velocity, water temperature, and salinity at the bottom of the water column at Intermediate Point 1, Intermediate Point 2, and PLET are presented in Table 6-3, Table 6-4, and Table 6-5 respectively. Offshore hydrodynamic conditions and data sources for offshore hydrodynamic data are described in Section 2.3. Similarly, a statistical summary (5^{th}, 50^{th}, and 95^{th} percentiles) of ambient current velocity during dry and wet seasons, water temperature, and salinity in the Demerara River at the river discharge location are presented in Table 6-6. Offshore hydrodynamic conditions and their data sources are described in Section 2.3.

Table 6-3: Statistical Summary (5^{th}, 50^{th} and 95^{th} Percentiles) of Ambient Current Velocity, Water Temperature, and Salinity at Bottom of Water Column at Intermediate Point 1

Parameter/Statistics	Current Velocity (cm/s)	Salinity (ppt)	Water Temperature (C°)
5^{th} Percentile	5.05	29.23	26.48
50^{th} Percentile	15.55	33.04	27.77
95^{th} Percentile	29.48	35.05	28.98

°C = degrees Celsius; cm/s = centimeters per second; ppt = parts per thousand

Table 6-4: Statistical Summary (5th, 50th and 95th Percentiles) of Ambient Current Velocity, Water Temperature, and Salinity at Bottom of Water Column at Intermediate Point 2

Parameter/Statistics	Current Velocity (cm/s)	Salinity (ppt)	Water Temperature (C°)
5th Percentile	8.37	30.89	26.31
50th Percentile	22.46	34.38	27.43
95th Percentile	39.62	35.88	28.72

°C = degrees Celsius; cm/s = centimeters per second; ppt = parts per thousand

Table 6-5: Statistical Summary (5th, 50th and 95th Percentiles) of Ambient Current Velocity, Water Temperature, and Salinity at Bottom of Water Column at PLET

Parameter/Statistics	Current Velocity (cm/s)	Salinity (ppt)	Water Temperature (C°)
5th Percentile	2.48	34.78	4.96
50th Percentile	4.83	34.82	5.10
95th Percentile	6.76	34.87	5.32

°C = degrees Celsius; cm/s = centimeters per second; ppt = parts per thousand

Table 6-6: Statistical Summary (5th, 50th and 95th Percentiles) of Ambient Current Velocity, Water Temperature, and Salinity in the Demerara River at the River Discharge Location

Parameter/Statistics	Current Velocity in Dry Season (cm/s)	Current Velocity in Wet Season (cm/s)	Salinity [a] (ppt)	Water Temperature (C°)
5th Percentile	4.44	62.01	0.00	26.1
50th Percentile	20.16	76.95	0.00	27.8
95th Percentile	43.08	91.48	0.00	29.3

°C = degrees Celsius; cm/s = centimeters per second; ppt = parts per thousand

[a] This is considered insignificantly small.

It was assumed for the purpose of the assessment that baseline constituent concentrations in ambient waters are insignificant so that the modeled constituent concentrations in the receiving waterbody derive entirely from the hydrostatic test water discharge.

6.2.2. Discharge Water Conditions

The modeling was performed on the assumption basis that the Project will obtain hydrotest water from the Demerara River (for onshore pipeline segments) and from the ocean (for offshore pipeline segments) in different combinations of volumes for different alternatives and simulations. The properties of discharge water for discharges at Intermediate Point 1, Intermediate Point 2, and the PLET are presented in Section 6.2.1 in Table 6-3, Table 6-4, and Table 6-5, respectively. Since ambient water conditions do not change significantly within the Demerara River between the potential source location and the discharge location downstream of the temporary MOF, modeling was performed assuming that the water temperature and salinity of any hydrotest water discharged to the Demerara River will be the same as the ambient water properties at the Demerara River intake. These properties are presented in Table 6-6 in Section 6.2.1.

6.2.3. Discharge Volumes

As described in Section 6.1, four alternatives are being considered for the discharge of hydrotest water.

1. Discharge Alternative 1: Discharge of the hydrotest water for the entire pipeline (from NGL Plant to PLET) offshore at the PLET location.
2. Discharge Alternative 2:
    a. Discharge of the hydrotest water from the beach valve to the PLET at the PLET location; and
    b. Discharge of the hydrotest water from the beach valve to the NGL Plant to the onshore stormwater pond at the NGL Plant site, from which it will be discharged into the Demerara River either directly or first to a canal.
3. Discharge Alternative 3:
    a. Discharge of the hydrotest water from the beach valve to Intermediate Point 1 at Intermediate Point 1;
    b. Discharge of the hydrotest water from Intermediate Point 1 to the PLET at the PLET location; and
    c. Discharge of the hydrotest water from the beach valve to the NGL Plant to the onshore stormwater pond at the NGL Plant site, from which it will be discharged into the Demerara River either directly or first to a canal.
4. Discharge Alternative 4:
    a. Discharge of the hydrotest water from the beach valve to Intermediate Point 2 at Intermediate Point 2;
    b. Discharge of the hydrotest water from Intermediate Point 2 to the PLET at the PLET location; and
    c. Discharge of the hydrotest water from the beach valve to the NGL Plant to the onshore stormwater pond at the NGL Plant site, from which it will be discharged into the Demerara River either directly or first to a canal.

The lengths, diameters, hydrotest water volumes, and discharge durations for the pipeline segments relevant to the four alternatives are provided in Table 6-7. It was assumed that the hydrotest water will be discharged to the ocean at Intermediate Point 1, Intermediate Point 2, and PLET via a 4-inch diameter nozzle.

Table 6-7: Modeled Lengths, Diameters, Hydrotest Water Volumes, and Discharge Durations of Pipeline Segments to be Discharged for Assessed Discharge Alternatives

Alternative No.	Discharge Location	Intake Location	Starting and Ending Locations of Pipeline Segment to be Discharged	Pipeline Diameter (inches)	Pipeline Length (kilometers)	Hydrotest Water Volume (gallons)	Discharge Duration (hours)
1	PLET	PLET and/or Demerara River	From NGL Plant to PLET	12	245	4,722,778	24
2	PLET	Demerara River	From beach valve to PLET	12	220	4,240,862	24
	Demerara River	Demerara River	From beach valve to NGL Plant	12	25	481,916	24
3	Intermediate Point 1	Intermediate Point 1	From beach valve to Intermediate Point 1	12	50	963,832	6
	PLET	PLET	From Intermediate Point 1 to PLET	12	170	3,277,030	18
	Demerara River	Demerara River	From beach valve to NGL Plant	12	25	481,916	24
4	Intermediate Point 2	Intermediate Point 2	From beach valve to Intermediate Point 2	12	75	1,445,748	8
	PLET	PLET	From Intermediate Point 2 to PLET	12	145	2,795,114	16
	Demerara River	Demerara River	From beach valve to NGL Plant	12	25	481,916	24

6.2.4. Scenarios

A combination of discharge alternatives (discharge locations and associated discharge volumes), discharge properties (water temperature and salinity), and ambient properties (currents, water temperatures, and salinity) in different seasons (dry and wet seasons) were used to develop a comprehensive list of scenarios for simulation with CORMIX. The modeling parameters of each scenario in offshore discharges of Discharge Alternative 1 are presented in Table 6-8. The modeling parameters for the Demerara River discharge portions of Discharge Alternative 2, Discharge Alternative 3, and Discharge Alternative 4 are presented in Table 6-9. The modeling parameters for the offshore discharges portions of Discharge Alternative 2, Discharge Alternative 3, and Discharge Alternative 4 are presented in Table 6-10, Table 6-11, and Table 6-12, respectively.

In the case of offshore discharges of hydrotest water that was obtained from the Demerara River, the density difference between the plume and ambient waters as well as the ambient velocity significantly influences the plume behavior. Therefore, three scenarios in Discharge Alternative 1 for offshore discharges at the PLET were selected to represent low density differences between the ambient and discharge waters (with same density for both hydrotest and ambient waters assuming hydrotest water will be obtained at the PLET location) as well as a range of ambient current velocities. The densities of both ambient and hydrotest waters are the same and correspond to the 50th percentile salinity and the 50th percentile temperature at the PLET. Another three scenarios in Discharge Alternative 1 for offshore discharges at the PLET were selected to represent high density differences between the ambient and discharge waters (with low density for hydrotest water obtained from the Demerara River and high density for ambient waters at the PLET) as well as a range of ambient current velocities. The density of ambient water in these scenarios corresponds to the 50th percentile salinity and the 50th percentile temperature at the PLET. Similarly, the density of the hydrotest water corresponds to the 50th percentile salinity and the 50th percentile temperature in the Demerara River.

All six scenarios in the offshore discharge portion of Discharge Alternative 2, in which hydrotest water is obtained from the Demerara River and discharged into the ocean at the PLET, were selected to represent both low and high density differences between the ambient and discharge waters as well as a range of ambient current velocities. The low density difference for these discharges was determined using the difference between the high end of the range of hydrotest water density (corresponding to the 95th percentile salinity and the 5th percentile temperature of hydrotest water) and the low end of the range of ambient water density (corresponding to the 5th percentile salinity and the 95th percentile temperature of ambient sea water). Alternatively, the high density difference for offshore discharges was determined using the difference between the low end of the range of hydrotest water density (corresponding to the 5th percentile salinity and the 95th percentile temperature of hydrotest water) and the high end of the ambient water density (corresponding to the 95th percentile salinity and the 5th percentile temperature of ambient sea water).

Offshore discharge portions of both Discharge Alternative 3 and Discharge Alternative 4, in which hydrotest water is discharged into the ocean at the same locations where hydrotest water is obtained (at Intermediate Point 1, Intermediate Point 2, and the PLET), were selected to represent a range of ambient current velocities at their respective discharge locations. The densities of both ambient and hydrotest waters are the same and correspond to the 50th percentile salinity and the 50th percentile temperature at their respective intake/discharge locations (at Intermediate Point 1, Intermediate Point 2, and the PLET).

For the offshore discharge scenarios, the range of currents were represented with the 5th, 50th, and 95th percentile current velocities near the ocean bottom at the corresponding discharge locations, because discharges will be released near the ocean bottom.

The plumes corresponding to hydrotest water discharges in the Demerara River are significantly influenced by the ambient currents (river flows) in different seasons (dry and wet). Therefore, the scenarios reflecting discharge of hydrotest water in the Demerara River were represented

with a range of current velocities (5th, 50th and 95th percentile current velocities) during both dry and wet seasons. Unlike in the offshore discharges, hydrotest water plume behavior in the Demerara River is not dependent on the density difference, as the temperature and salinity of the hydrotest source water is expected to be very close to the ambient water properties. Therefore, median densities were used in all simulations for both the ambient and the hydrotest discharge waters (corresponding to their 50th percentile water temperature and 50th percentile salinity).

The following assumptions were used in developing these scenarios and their parameters.

1. Hydrotest water volumes are discharged at a steady rate across their respective discharged durations;
2. The diameter of the discharge pipe at the bottom of the ocean (at Intermediate Point 1, Intermediate Point 2, and the PLET) is 4 inches;
3. The diameter of the discharge pipe to the Demerara River is 9 inches;
4. The discharge pipe to the Demerara River is slightly submerged near the water surface; and
5. Depth-averaged values of ambient water properties (current velocities, water temperature, and salinity) were used in the Demerara River discharge simulations, because hydrotest water discharge plumes will fully mix over the depth within a short distance.

Table 6-8: Modeling Parameters of each Scenario in Offshore Discharges of Discharge Alternative 1

Scenario ID	**R01**	**R02**	**R03**	**R04**	**R05**	**R06**
Hydrotest Water Intake Location	**PLET**			**Demerara River**		
Discharge Location	**PLET**					
Effluent Properties						
Concentration (mg/L)	100 (assumed)					
Flow Rate (m^3/s)	0.2069					
Effluent Temperature (degree Celsius)	5.10 (50%)			29.34 (5%)		
Effluent Salinity (psu)	34.82 (50%)			0.0072 (95%)		
Effluent Density (kg/m^3)	1,027.52 (median density)			995.85 (low density)		
Ambient Receiving Water Properties						
Average Depth (meters)	1,000 (CORMIX limit)					
Depth at Discharge (meters)	1,000 (CORMIX limit)					
Current Velocity (cm/s)	2.5 (5%)	4.8 (50%)	6.8 (95%)	2.5 (5%)	4.8 (50%)	6.8 (50%)
Manning's n	0.03					
Ambient Temperature (degree Celsius)	5.10 (50%)			4.96 (5%)		
Ambient Salinity (psu)	34.82 (50%)			34.87 (95%)		
Ambient Density (kg/m^3)	1,027.52 (median density)			1,027.57 (high density)		
Discharge Point Properties						
Horizontal Angle SIGMA (degrees)	0					
Discharge Outlet–Diameter (meters)	0.1016					

Scenario ID	R01	R02	R03	R04	R05	R06
Local Depth at Discharge Outlet (meters)	999.5 (CORMIX limit 999.95)					

cm/s = centimeters per second; m^3/s = cubic meters per second; psu = practical salinity unit

Table 6-9: Modeling Parameters of each Scenario for Demerara River Discharge Portion of Discharge Alternative 2, Discharge Alternative 3, and Discharge Alternative 4

Scenario ID	R07	R08	R09	R10	R11	R12
Hydrotest Water Intake Location	**Demerara River**					
Discharge Location	**Demerara River**					
Effluent Properties						
Concentration (mg/L)	100 (assumed)					
Flow Rate (m^3/s)	0.0211					
Effluent Temperature (degree Celsius)	27.75 (50%)					
Effluent Salinity (psu)	0.0081 (50%)					
Effluent Density (kg/m^3)	996.31 (median density)					
Ambient Receiving Water Properties						
Average Depth (meters)	3.76					
Depth at Discharge (meters)	3.76					
Season	Dry			Wet		
Velocity (cm/s)	4.4 (5%)	20.2 (50%)	43.1 (95%)	62.0 (5%)	76.9 (5%)	91.5 (95%)
Manning's n	0.03					
Ambient Temperature (degree Celsius)	27.75 (50%)					
Ambient Salinity (psu)	0.0081 (50%)					
Ambient Density (kg/m^3)	996.31 (median density)					
Discharge Point Properties						
Horizontal Angle SIGMA (degrees)	0					
Discharge Outlet—Diameter (meters)	0.2286					
Local Depth at Discharge Outlet (meters)	3.76					

cm/s = centimeters per second; m^3/s = cubic meters per second; psu = practical salinity unit

Table 6-10: Modeling Parameters of each Scenario in Offshore Discharge Portion of Discharge Alternative 2

Scenario ID	R13	R14	R15	R16	R17	R18
Hydrotest Water Intake Location	**Demerara River**					
Discharge Location	**PLET**					
Effluent Properties						
Concentration (mg/L)	100 (assumed)					
Flow Rate (m^3/s)	0.1858					
Effluent Temperature (degree Celsius)	29.34 (95%)			26.05 (5%)		
Effluent Salinity (psu)	0.0072 (5%)			0.0095 (95%)		
Effluent Density (kg/m^3)	995.85 (low density)			996.78 (high density)		
Ambient Receiving Water Properties						
Average Depth (meters)	1,000 (CORMIX limit)					

Scenario ID	R13	R14	R15	R16	R17	R18
Depth at Discharge (meters)	1,000 (CORMIX limit)					
Current Velocity (cm/s)	2.5 (5%)	4.8 (50%)	6.8 (95%)	2.5 (5%)	4.8 (50%)	6.8 (50%)
Manning's n	0.03					
Ambient Temperature (degree Celsius)	4.96 (5%)			5.32 (95%)		
Ambient Salinity (psu)	34.9 (95%)			34.8 (5%)		
Ambient Density (kg/m^3)	1,027.57 (high density)			1,027.47 (low density)		
Discharge Point Properties						
Horizontal Angle SIGMA (degrees)	0					
Discharge Outlet–Diameter (meters)	0.1016					
Local Depth at Discharge Outlet (meters)	999.5 (CORMIX limit 999.95)					

cm/s = centimeters per second; m^3/s = cubic meters per second; psu = practical salinity unit

Table 6-11: Modeling Parameters of each Scenario for Offshore Discharge Portions of Discharge Alternative 3

Scenario ID	R19	R20	R21	R22	R23	R24
Hydrotest Water Intake Location	**PLET**			**Intermediate Point 1**		
Discharge Location	**PLET**			**Intermediate Point 1**		
Effluent Properties						
Concentration (mg/L)	100 (assumed)					
Flow Rate (m^3/s)	0.1914			0.1689		
Effluent Temperature (degree Celsius)	5.10 (50%)			27.77 (50%)		
Effluent Salinity (psu)	34.82 (50%)			33.04 (50%)		
Effluent Density (kg/m^3)	1027.52 (median density)			1021.00 (median density)		
Ambient Receiving Water Properties						
Average Depth (meters)	1,000 (CORMIX limit)			22		
Depth at Discharge (meters)	1,000 (CORMIX limit)			22		
Velocity (cm/s)	2.5 (5%)	4.8 (50%)	6.8 (95%)	5.1 (5%)	15.6 (50%)	29.5 (95%)
Manning's n	0.03					
Ambient Temperature (degree Celsius)	5.10 (50%)			27.77 (50%)		
Ambient Salinity (psu)	34.82 (50%)			33.04 (50%)		
Ambient Density (kg/m^3)	1027.52 (median density)			1021.00 (median density)		
Discharge Point Properties						
Horizontal Angle SIGMA (degrees)	0					
Discharge Outlet—Diameter (meters)	0.1016					
Local Depth at Discharge Outlet (meters)	999.5 (CORMIX limit 999.95)			21.5 (CORMIX limit 21.95)		

cm/s = centimeters per second; m^3/s = cubic meters per second; m/s = meters per second; psu = practical salinity unit

Table 6-12: Modeling Parameters of each Scenario in Offshore Discharge Portions of Discharge Alternative 4

Scenario ID	R25	R26	R27	R28	R29	R30
Hydrotest Water Intake Location	**PLET**			**Intermediate Point 2**		
Discharge Location	**PLET**			**Intermediate Point 2**		
Effluent Properties						
Concentration (mg/L)	100 (assumed)					
Flow Rate (m^3/s)	0.1837			0.1900		
Effluent Temperature (degree Celsius)	5.10 (50%)			27.43 (50%)		
Effluent Salinity (psu)	34.82 (50%)			34.38 (50%)		
Effluent Density (kg/m^3)	1027.52 (median density)			1022.12 (median density)		
Ambient Receiving Water Properties						
Average Depth (meters)	1,000 (CORMIX limit)			25		
Depth at Discharge (meters)	1,000 (CORMIX limit)			25		
Current Velocity (cm/s)	2.5 (5%)	4.8 (50%)	6.8 (95%)	8.4 (5%)	22.5 (50%)	39.6 (95%)
Manning's n	0.03					
Ambient Temperature (degree Celsius)	5.10 (50%)			27.43 (50%)		
Ambient Salinity (psu)	34.82 (50%)			34.38 (50%)		
Ambient Density (kg/m^3)	1027.52 (median density)			1022.12 (median density)		
Discharge Point Properties						
Horizontal Angle SIGMA (degrees)	0					
Discharge Outlet–Diameter (meters)	0.1016					
Local Depth at Discharge Outlet (meters)	999.5 (CORMIX limit 999.95)			24.5 (CORMIX limit 24.95)		

cm/s = centimeters per second; m^3/s = cubic meters per second; psu = practical salinity unit

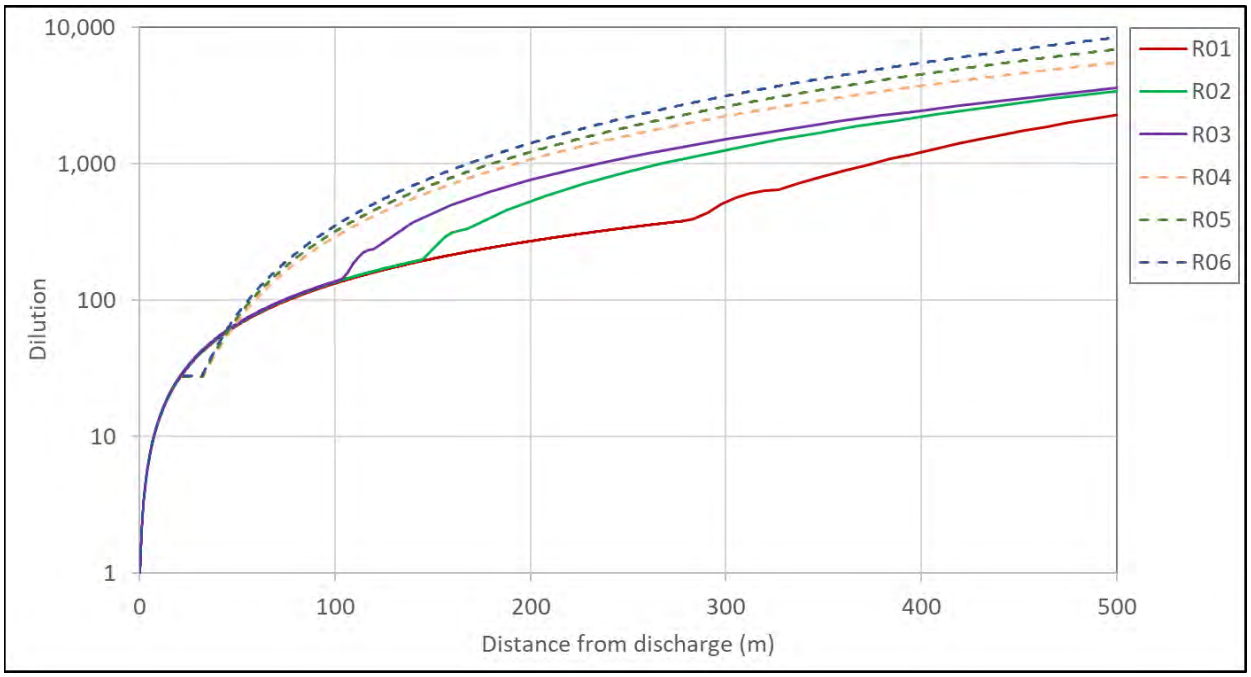
6.3. RESULTS

CORMIX simulation results for the 30 hydrotest water discharge scenarios presented in Section 6.2.4, Summary of Findings, are described below. Each CORMIX simulation provides results along the plume's centerline describing the dilution and effluent constituent concentration. For conservative constituents, which are used in this modeling analysis, the dilution value does not include any decay and, therefore, represents a conservative (high) result for any constituent that does decay, or exits the dissolved phase through processes such as evaporation or adsorption to solids. Inclusion of a decay term would result in a smaller plume. Since the dilution is always the lowest (and concentrations are always the highest) at the plume centerline, the results discussed here are shown as centerline concentrations at a particular distance directly away (i.e., down current) from the discharge.

6.3.1. Discharge Alternative 1

The simulation results for the six scenarios for Discharge Alternative 1 (entire hydrotest water volume discharged at the bottom of the ocean at the PLET) are presented in this section. The

variation of the dilution of the constituent along the plume centerline is presented on Figure 6-3. All scenarios that obtained hydrotest water at PLET (R01, R02, and R03) show a similar pattern of plume mixing and the dilution with distance up to at least 100 meters from the discharge. The discharge plume under these three scenarios experiences dilution factors of at least 133 and 2,298 at 100 and 500 meters from the point of discharge, respectively, as presented in Table 6-13. All scenarios that obtained hydrotest water from the Demerara River (R04, R05, and R06) also show a similar pattern of plume mixing and dilution, with slight variations. The discharge plume under these three scenarios experiences dilution factors of at least 292 and 5,531 at 100 and 500 meters from the point of discharge, respectively.



m = meter

Figure 6-3: Predicted Dilution of a Conservative Constituent with Distance from the Discharge Location (PLET) for Discharge Alternative 1 (Six Simulations)

Table 6-13: Predicted Dilution of a Conservative Constituent at 100 Meters and 500 Meters from the Point of Discharge for Discharge Alternative 1

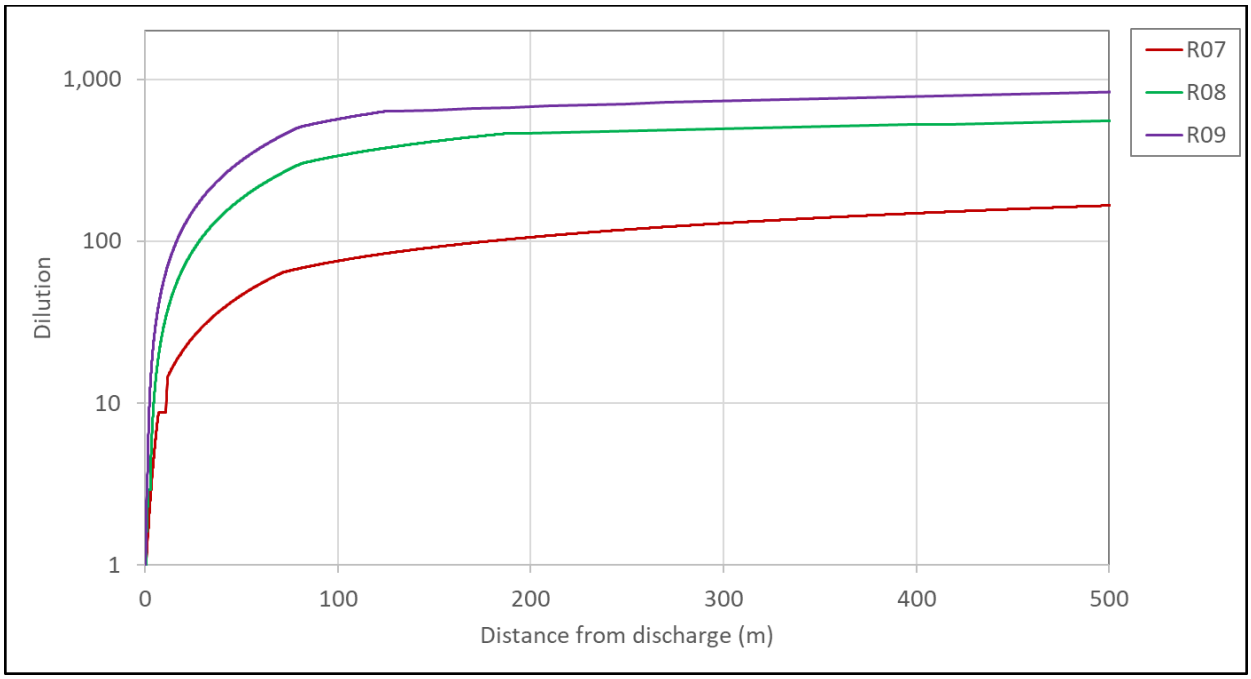
Scenario	Dilution Factor at 100 Meters	Dilution Factor at 500 Meters
R01	133	2,298
R02	136	3,410
R03	137	3,607
R04	292	5,531
R05	320	6,915
R06	352	8,431

6.3.2. Discharge Alternative 2

The simulation results for the 12 scenarios of Discharge Alternative 2 are presented in this section. This includes six scenarios for the discharge of hydrotest water from the onshore portion of the pipeline to the Demerara River, as well as the six scenarios for the discharge of hydrotest water within the offshore portion of the pipeline at the bottom of the ocean at the PLET.

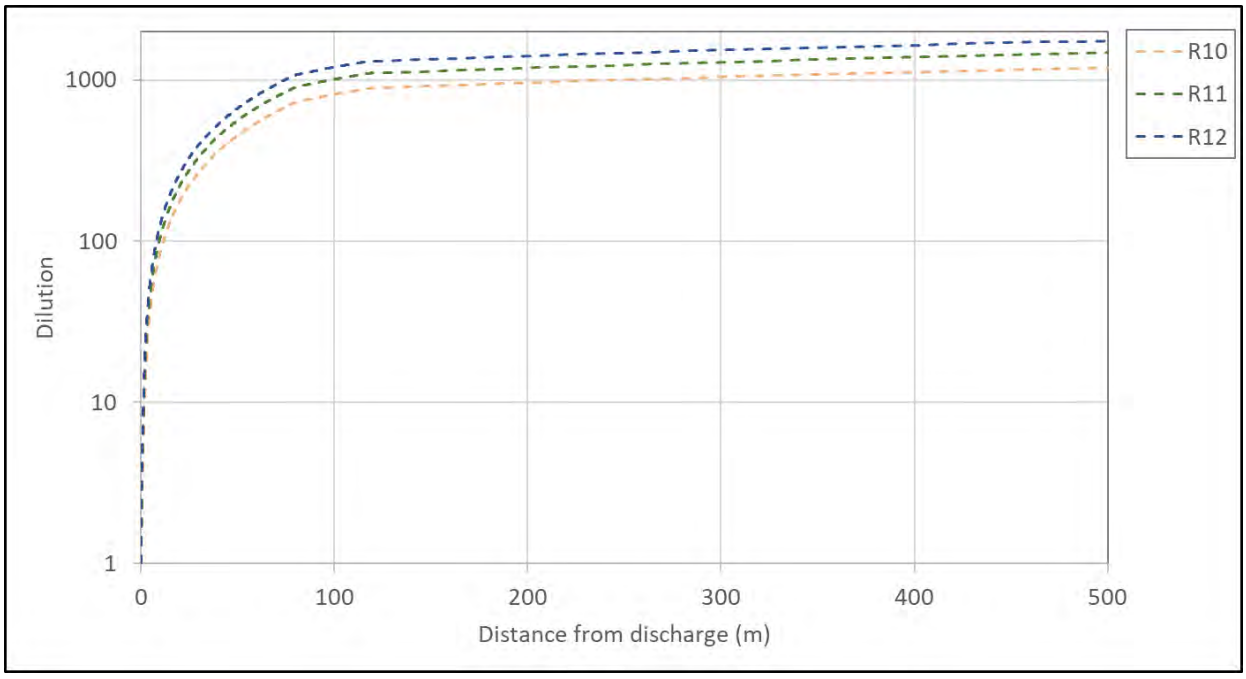
6.3.2.1. Discharges to the Demerara River

The simulation results for the six scenarios for the discharges to the Demerara River in Discharge Alternative 2, which are same as for the discharge portions to the Demerara River in Discharge Alternative 3 and Discharge Alternative 4 (discharge of hydrotest water volume within the onshore portion of the pipeline to the Demerara River), are presented in this section. The dilution patterns along the plume centerline for the discharge scenarios in dry and wet seasons are presented on Figure 6-4 and Figure 6-5, respectively. All six scenarios for the discharges to the Demerara River show a rapid increase in dilution over a short distance. The sharp increase of dilution is more significant during the wet season because high ambient river discharges and associated high velocities during the wet season dilute the discharge more quickly than during the dry season. During the dry season when ambient river flow and associated velocities are lower, the impact of ambient velocities on the dilution of the constituent is slightly more visible than during the wet season. Under the lower velocities, dilution of the constituents is slightly less compared to the dilution of the constituents under the higher velocities. Dilution rapidly reaches a factor of at least 75 within 100 meters from the point of discharge during the dry season and at least 815 within 100 meters from the point of discharge during the wet season, as presented in Table 6-14. Minimum dilution factors at 500 meters during the dry and wet season are 196 and 1,196, respectively.



m = meter

Figure 6-4: Predicted Dilution of a Conservative Constituent with Distance from the Discharge Location (Demerara River) for Discharge Alternative 2 during the Dry Season (Three Simulations)



m = meter

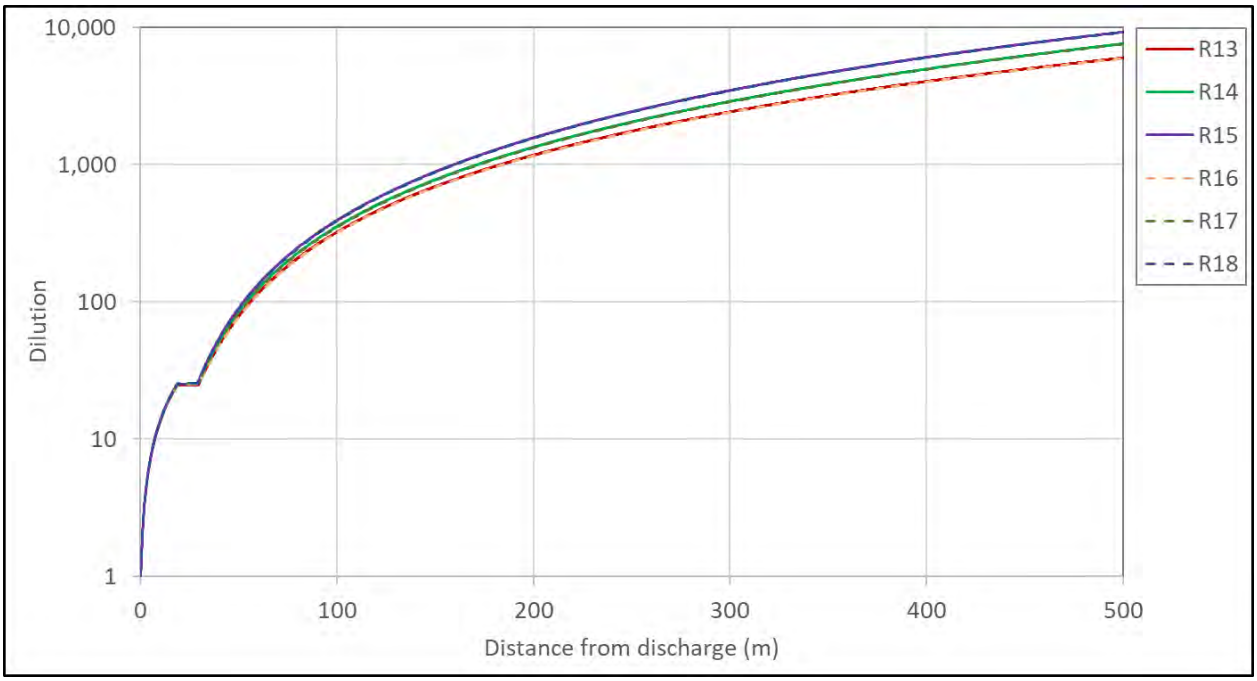
Figure 6-5: Predicted Dilution of a Conservative Constituent with Distance from the Discharge Location (Demerara River) for Discharge Alternative 2 during the Wet Season (Three Simulations)

Table 6-14: Predicted Dilution of a Conservative Constituent at 100 Meters and 500 Meters from the Point of Discharge for Discharges to the Demerara River in Discharge Alternative 2

Scenario	Dilution Factor at 100 Meters	Dilution Factor at 500 Meters
R07	75	166
R08	336	551
R09	567	836
R10	815	1,196
R11	1,011	1,479
R12	1,203	1,757

6.3.2.2. Offshore Discharges

The simulation results for the six scenarios of offshore discharges for Discharge Alternative 2 (discharge of hydrotest water volume within the offshore portion of the pipeline at the bottom of the ocean at the PLET) are presented in this section. The dilution of the discharged constituent along the plume centerline is presented on Figure 6-6. Similar to the three scenarios in which hydrotest water was obtained from the Demerara River in Discharge Alternative 1 (Scenarios R04, R05, and R06), all six scenarios in Discharge Alternative 2 show similar patterns of mixing and dilution. Dilution of the constituent in all scenarios reaches dilution factors of approximately 319 and 3,950 within 100 and 500 meters from the point of discharge, respectively, as presented in Table 6-15.



m = meter

Figure 6-6: Predicted Dilution of a Conservative Constituent with Distance from the Discharge Location (PLET) for Discharge Alternative 2 (Six Simulations)

Table 6-15: Predicted Dilution of a Conservative Constituent at 100 Meters and 500 Meters from the Point of Discharge for the Offshore Discharge in Discharge Alternative 2

Scenario	Dilution Factor at 100 Meters	Dilution Factor at 500 Meters
R13	323	6,007
R14	355	7,619
R15	394	9,281
R16	319	5,950
R17	351	7,580
R18	390	9,224

6.3.3. Discharge Alternative 3

The simulation results for the 12 scenarios of Discharge Alternative 3 are presented in this section. This includes six scenarios for the discharge of hydrotest water from the onshore portion of the pipeline to the Demerara River, as well as the six scenarios for the discharge of hydrotest water within the offshore portion of the pipeline at the bottom of the ocean at the PLET (three scenarios) and at Intermediate Point 1 (three scenarios), as described in Table 6-7.

6.3.3.1. Discharges to the Demerara River

The simulation results for the six scenarios for discharges to the Demerara River in Discharge Alternative 3 are the same as in Discharge Alternative 2. Please refer to Section 6.3.2.1, including Figure 6-4, Figure 6-5, and Table 6-14, for those simulation results.

6.3.3.2. Offshore Discharges

The simulation results for the six scenarios of offshore discharges for Discharge Alternative 3 (discharge of hydrotest water in the pipeline segments between the beach valve and Intermediate Point 1 to the ocean at Intermediate Point 1; and hydrotest water in the pipeline segments between Intermediate Point 1 and the PLET to the ocean at the PLET) are presented in this section. The dilution of the discharged constituent along the plume centerline for discharges at the PLET and Intermediate Point 1 are presented on Figure 6-7 and Figure 6-8, respectively. Similar to the three scenarios in which hydrotest water was obtained from the ocean in Discharge Alternative 1 (Scenarios R01, R02, and R03), all three scenarios in which hydrotest water is discharged at the PLET in Discharge Alternative 3 (Scenarios R19, R20, and R21) also show similar patterns of mixing and dilution. Dilution of the constituent in these three scenarios reaches a dilution factor of at least 134 within 100 meters and 2,627 within 500 meters from the point of discharge, as presented in Table 6-16. All three scenarios in which hydrotest water is discharged at Intermediate Point 1 in Discharge Alternative 3 (Scenarios R22, R23, and R24) show similar patterns of mixing and dilution up to about 360 meters from the point of discharge. In these three cases, dilution of the constituent reaches a dilution factor of at least 137 within 100 meters and 599 within 500 meters from the point of discharge.

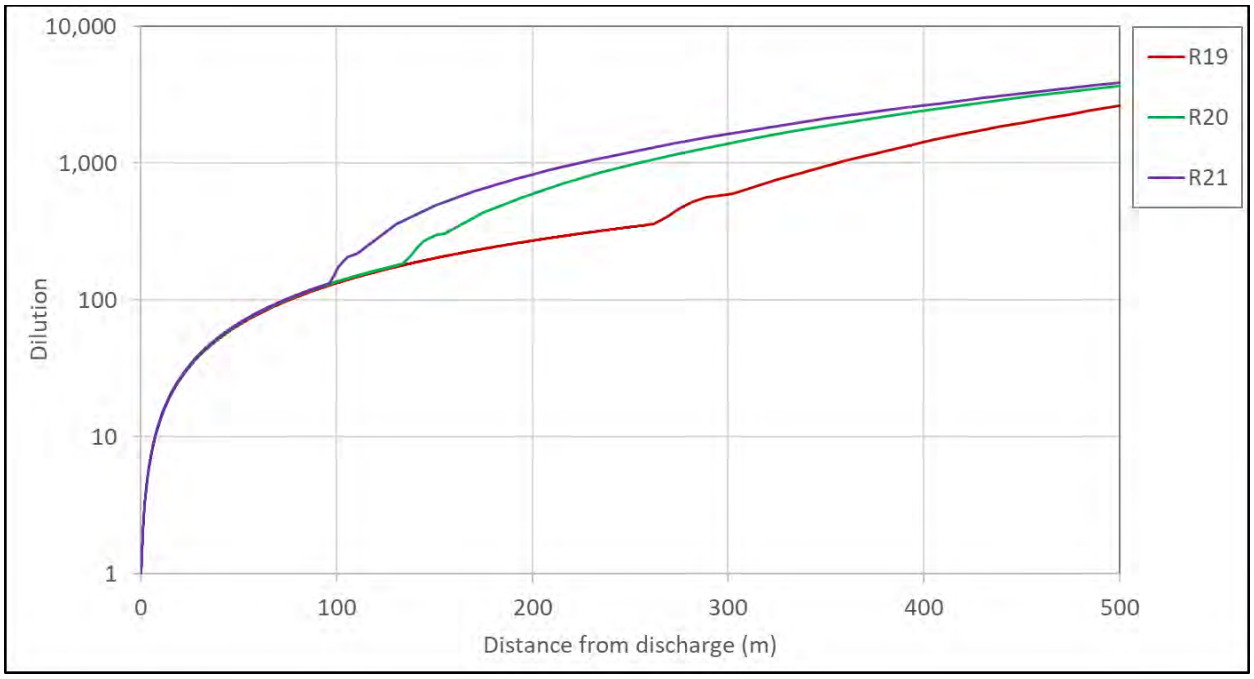


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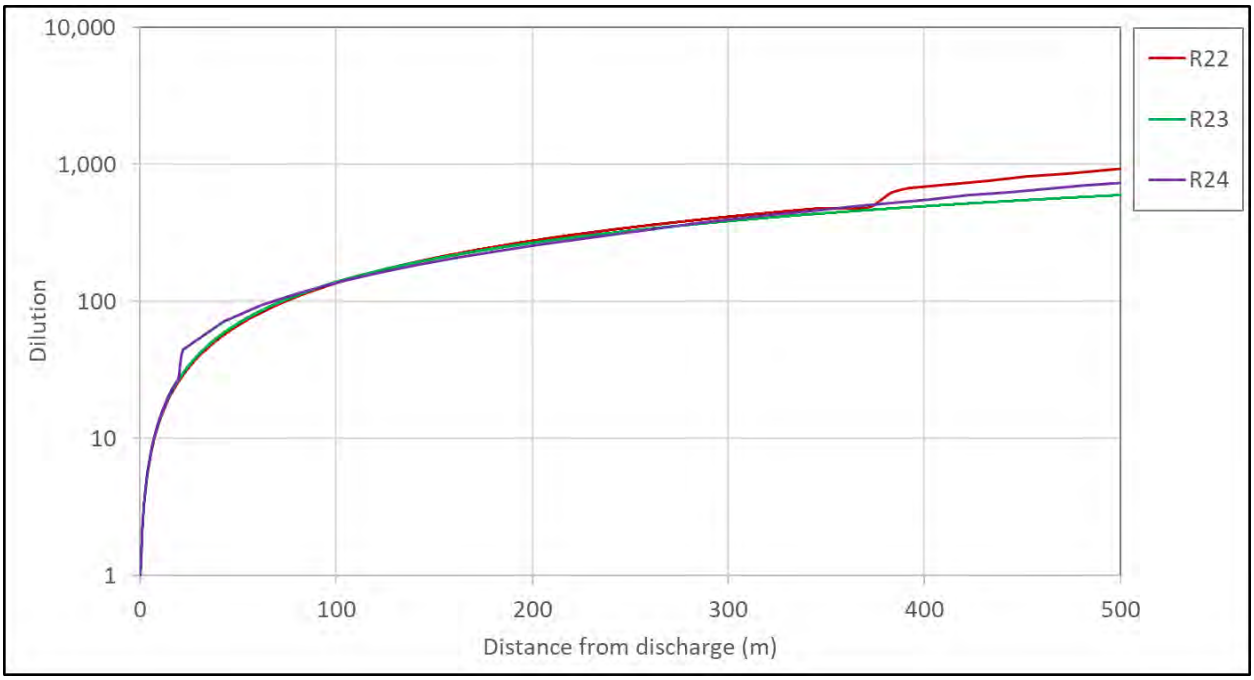
Figure 6-7: Predicted Dilution of a Conservative Constituent with Distance from the PLET Discharge Location for Discharge Alternative 3 (Three Simulations)



m = meter

Figure 6-8: Predicted Dilution of a Conservative Constituent with Distance from Intermediate Point 1 Discharge Location for Discharge Alternative 3 (Three Simulations)

Table 6-16: Predicted Dilution of a Conservative Constituent at 100 Meters and 500 Meters from the Points of Discharge for the Offshore Discharges in Discharge Alternative 3

Scenario	Dilution Factor at 100 Meters	Dilution Factor 500 Meters
R19	134	2,627
R20	136	3,710
R21	165	2,814
R22	137	934
R23	139	599
R24	137	740

6.3.4. Discharge Alternative 4

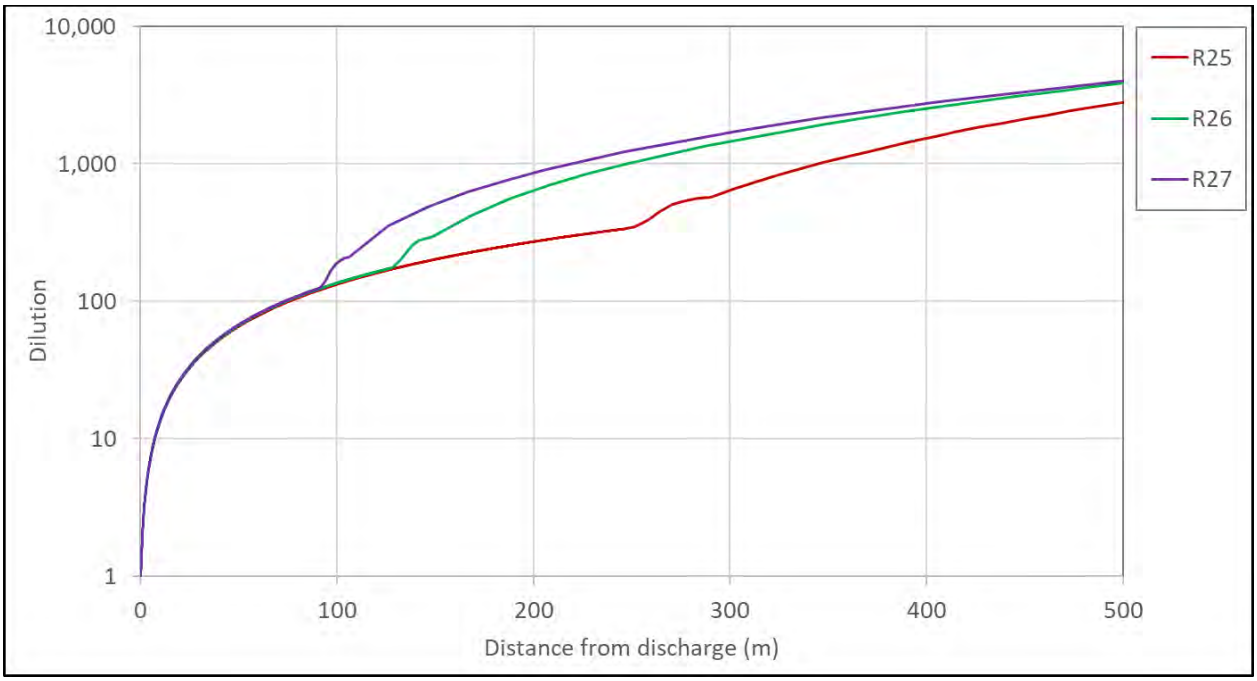
The simulation results for the 12 scenarios of Discharge Alternative 4 are presented in this section. This includes six scenarios for the discharge of hydrotest water from the onshore portion of the pipeline to the Demerara River, as well as the six scenarios for the discharge of hydrotest water within the offshore portion of the pipeline at the bottom of the ocean at the PLET (three scenarios) and at Intermediate Point 2 (three scenarios), as described in Table 6-7.

6.3.4.1. Discharges to the Demerara River

The simulation results for the six scenarios for the discharges to the Demerara River in Discharge Alternative 4 are the same as for Discharge Alternative 2, and hence are not presented here. Please refer to Section 6.3.2.1 for those results of the simulations.

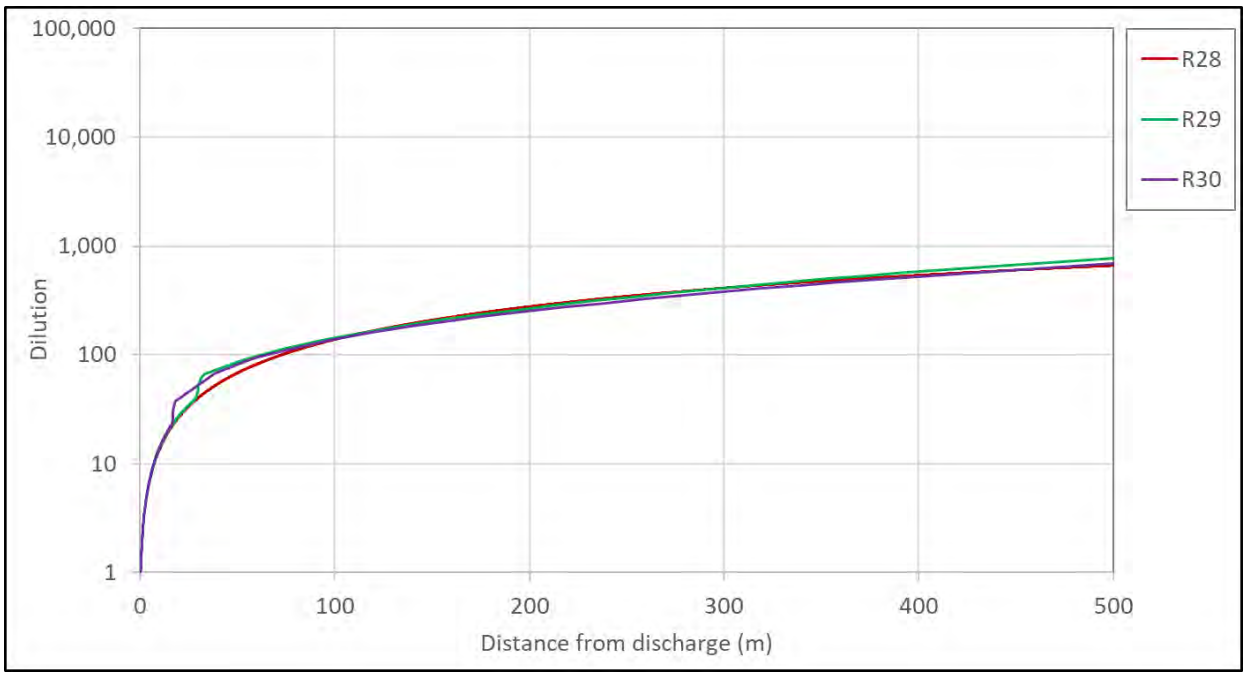
6.3.4.2. Offshore Discharges

The simulation results of the six scenarios of offshore discharges for Discharge Alternative 3 (discharge of hydrotest water in the pipeline segment between the beach valve and Intermediate Point 2 to the ocean at Intermediate Point 2 and hydrotest water in the pipeline segment between Intermediate Point 2 and the PLET to the ocean at the PLET) are presented in this section. The dilution of the discharged constituent along the plume centerline for discharges at the PLET and Intermediate Point 2 are presented on Figure 6-9 and Figure 6-10, respectively. Similar to the three scenarios in which hydrotest water was obtained from the ocean in Discharge Alternative 1 (Scenarios R01, R02, and R03), all three scenarios in which hydrotest water is discharged at the PLET in Discharge Alternative 3 (Scenarios R25, R26, and R27) show similar patterns of mixing and dilution. Dilution of the constituent in these three scenarios reaches a dilution factor of at least 134 within 100 meters and 2,815 within 500 meters from the point of discharge, as presented in Table 6-17. All three scenarios in which hydrotest water is discharged at Intermediate Point 2 in Discharge Alternative 3 (Scenarios R28, R29, and R30) show similar patterns of mixing and dilution beyond 500 meters from the point of discharge. In these three cases, dilution of the constituent reaches a dilution factor of at least 138 within 100 meters and 661 within 500 meters from the point of discharge.



m = meter

Figure 6-9: Predicted Dilution of a Conservative Constituent with Distance from the PLET Discharge Location for Discharge Alternative 4 (Three Simulations)



m = meter

Figure 6-10: Predicted Dilution of a Conservative Constituent with Distance from Intermediate Point 2 Discharge Location for Discharge Alternative 4 (Three Simulations)

Table 6-17: Predicted Dilution of a Conservative Constituent at 100 Meters and 500 Meters from the Points of Discharge for the Offshore Discharges in Discharge Alternative 4

Scenario	Dilution Factor at 100 Meters	Dilution Factor at 500 Meters
R25	134	2,815
R26	137	3,877
R27	190	4,024
R28	138	661
R29	144	777
R30	139	687

6.4. SUMMARY OF FINDINGS

The key findings of the hydrotest water discharge modeling analysis are presented below.

1. Regardless of the density difference between the hydrotest discharge and ambient waters or the different ambient current velocities under which discharge could occur, dilution factors increase rapidly over a short distance at both the offshore discharge locations and the Demerara River discharge location.
2. Dilution factors for all the offshore discharge scenarios at the PLET with the sources of hydrotest water at the PLET reach at least 133 within 100 meters and at least 2,298 within 500 meters from the point of discharge.
3. Dilution factors for all the offshore discharge scenarios at the PLET with the sources of hydrotest water at the Demerara River reach at least 292 within 100 meters and at least 5,531 within 500 meters from the point of discharge.
4. Dilution factors for the offshore discharge scenarios at Intermediate Point 1 and Intermediate Point 2 with the sources of hydrotest water at the same locations reach at least 137 and 138, respectively, at 100 meters; and 599 and 661, respectively, at 500 meters.
5. Dilution factors for the offshore discharge scenarios at 100 meters from the point of discharge with the source of hydrotest water at the Demerara River does not significantly vary based on the density (salinity and water temperature) of the source water.
6. Dilution factors for the Demerara River discharge scenarios increase more rapidly over distance during the wet season due to higher ambient river flows and associated higher velocities. During the dry season, when ambient river discharge and associated velocities are lower, the rate of increase in the dilution factor over distance is slightly less, but the plume still experiences significant mixing over a relatively short distance.

7. SITE FLOOD RISK ASSESSMENT

7.1. OBJECTIVE

The objectives of the flood risk assessment were to understand baseline flood risks in the vicinity of the Project Footprint, identify specific areas prone to flooding, and assess the potential for the Project (Figure 7-1) to increase flood risks in the vicinity of the Project Footprint.

7.2. METHODOLOGY

The assessment methodology was designed to assess the potential of increased flooding that may be caused by the Project. The methodology included the following key elements:

- Collection of relevant information for the NGL Plant site and surrounding area, including area maps and identification of land use;
- Collection of historical rainfall data (daily and/or hourly rainfall data from local meteorological department and/or publicly available data sources) and available information on the existing natural drainage system in the area;
- Review of readily available records and documents on hydrology of the area to assist in determining surface water drainage patterns for the NGL Plant site and adjacent areas;
- Estimation of the peak discharges and hyetographs for 100-year return period floods using an empirical hydrologic method and/or catchment modeled flows approach;
- Analysis and estimation of flood depths across the NGL Plant site using a modeling approach for baseline and post-development scenarios using the flood model Flo-2D Pro; and
- Potential inundation mapping using geospatial mapping software.

7.2.1. Assumptions and Limitations

Based on literature review, the Demerara River and other streams within the Study Area do not have water level gauges or discharge stations near the Project. Therefore, the hydrologic model discussed here could not be quantitatively calibrated using observed discharge values. It is also assumed that rainfall of a particular return period produces runoffs with the same return period. The limitations of estimating the peak discharges using hydrologic methods would have also influenced the hydraulic model/flood mapping directly. Additionally, no long-term tidal gauge data near the Demerara River mouth were available. Therefore, for this study, a 24-hour tidal cycle was derived from published literature.

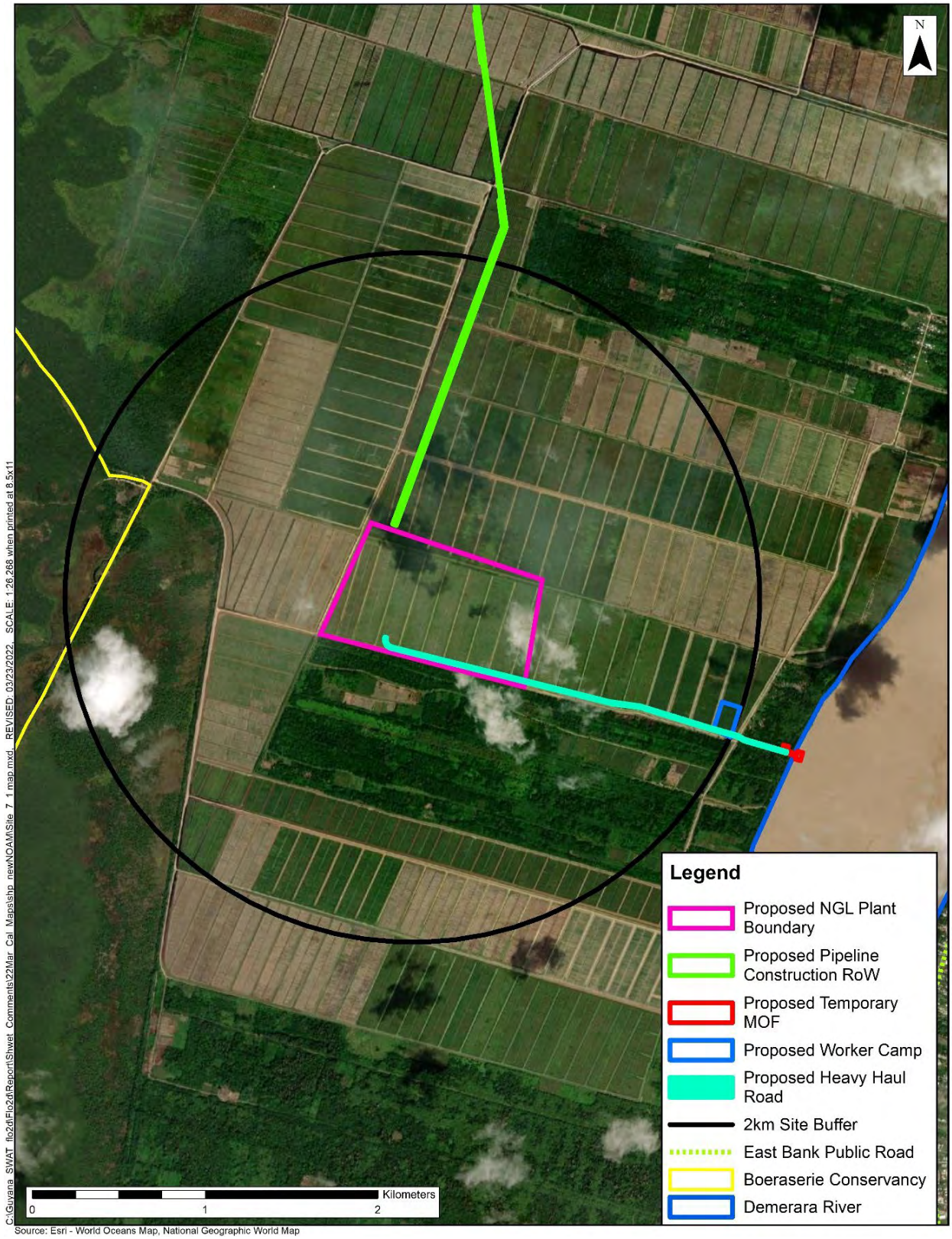


Figure 7-1: NGL Plant Site and Surrounding Area

7.2.2. Site Characteristics

The NGL Plant will be located along the west bank of Demerara River as shown on Figure 7-1.

The NGL Plant site covers an area of approximately 75 hectares and is located in a rural setting surrounded primarily by fallow cultivated land and forested tracts. The NGL Plant site is cross-cut and surrounded by a number of drainage canals. The eastern defined boundary of the Boerasirie Water Conservancy is located approximately 1.3 kilometers west and southwest of the NGL Plant site. This conservancy acts as a wetland and has large, shallow storage reservoirs designed to store water for irrigation.

7.2.3. Topography and Drainage Map

Based on the Light Detection and Ranging (LiDAR)-surveyed Digital Elevation Model (DEM) of the NGL Plant site and surrounding area (provided by EEPGL) and Google Earth Imagery, ERM identified key topographic features in an area within a 2-kilometer radius around the NGL Plant site. These key topographic features included topographic highs and lows and natural drainage features. Accuracy of these features is considered to be relatively high based on the high-resolution (1-meter horizontal resolution) of the LiDAR DEM.

The topography within the 2-kilometer buffer around the NGL Plant site varies between 4.3 meters above mean sea level (amsl) and -0.83 meters amsl, with the higher elevations occurring west of the site. Mean elevation within the 2-kilometer buffer is 1.47 meters amsl and mean elevation within the NGL Plant site is 1.38 meters amsl. Overall, the topography of the area descends gradually from west to east. The area is currently drained by several small canals that eventually drain into the Demerara River.

A topography and drainage map for the area around the NGL Plant site is presented on Figure 7-2. Overall, topography of Study Area can be characterized as generally flat, typical of the coastal plain.

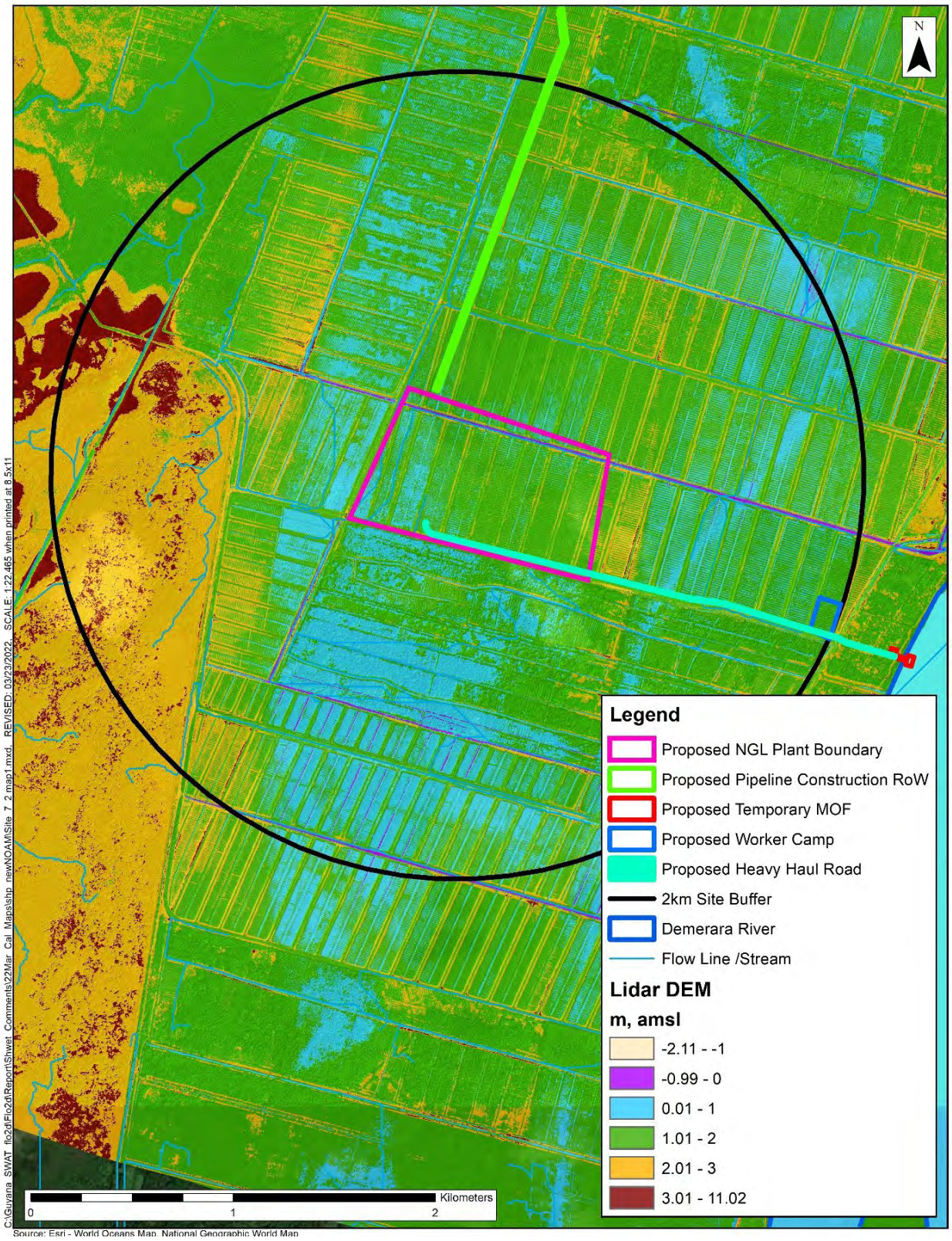
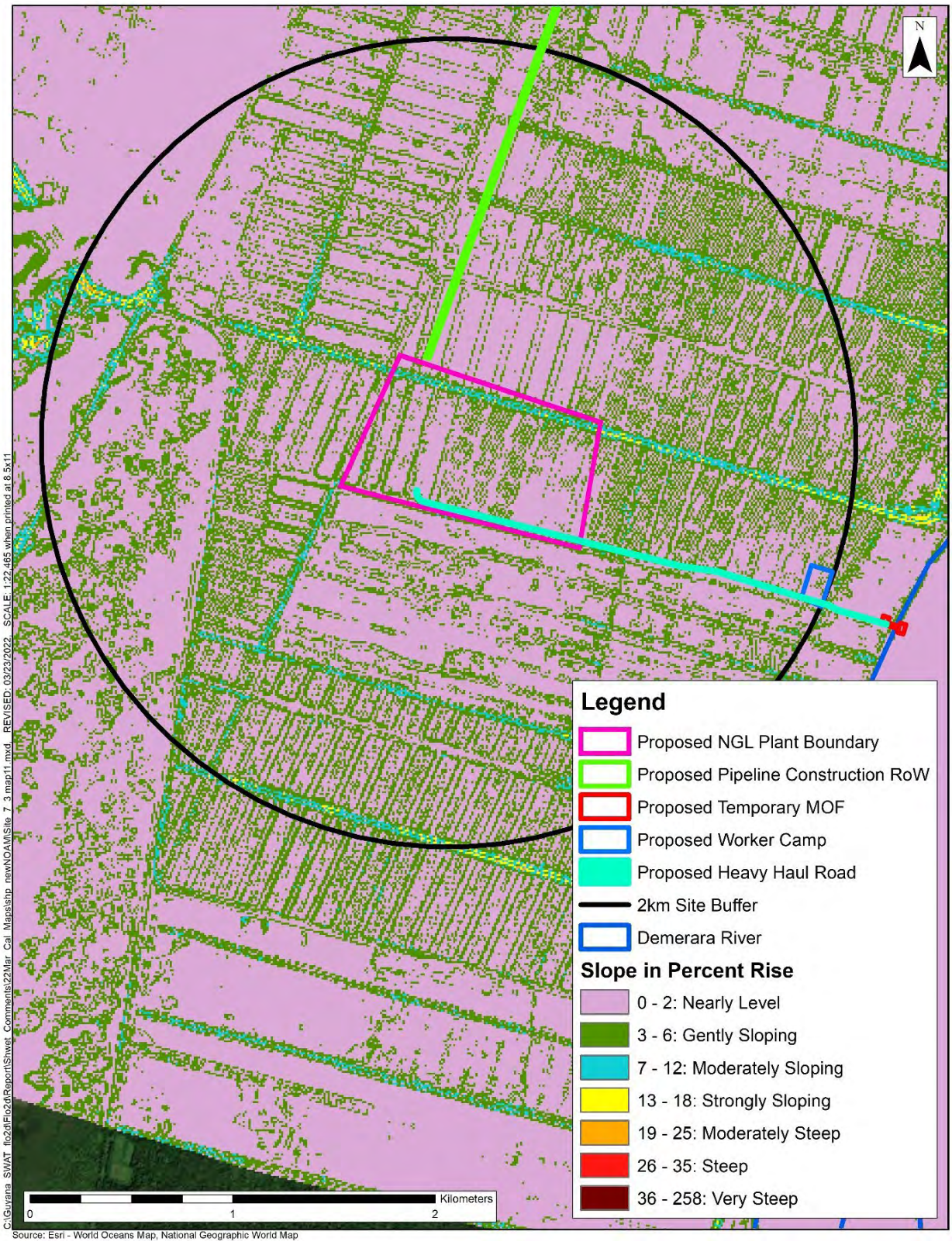


Figure 7-2: Topography and Drainage Map

7.2.4. Slope Map

As per slope mapping (i.e., of the rate of change in elevation), the area is dominated by a nearly level and gentle slope, with few scattered small pockets of moderate to strong slopes. Slope profile is found to be generally similar to the elevation profile of the larger Study Area. Low elevation and gentle-to-near-level slopes are indicative of low-lying areas, which are prone to flooding and water logging, and these can prevent rapid evacuation of stormwater during a rainfall event.

The slope map for the region within the 2-kilometer radius around the NGL Plant site is presented on Figure 7-3.

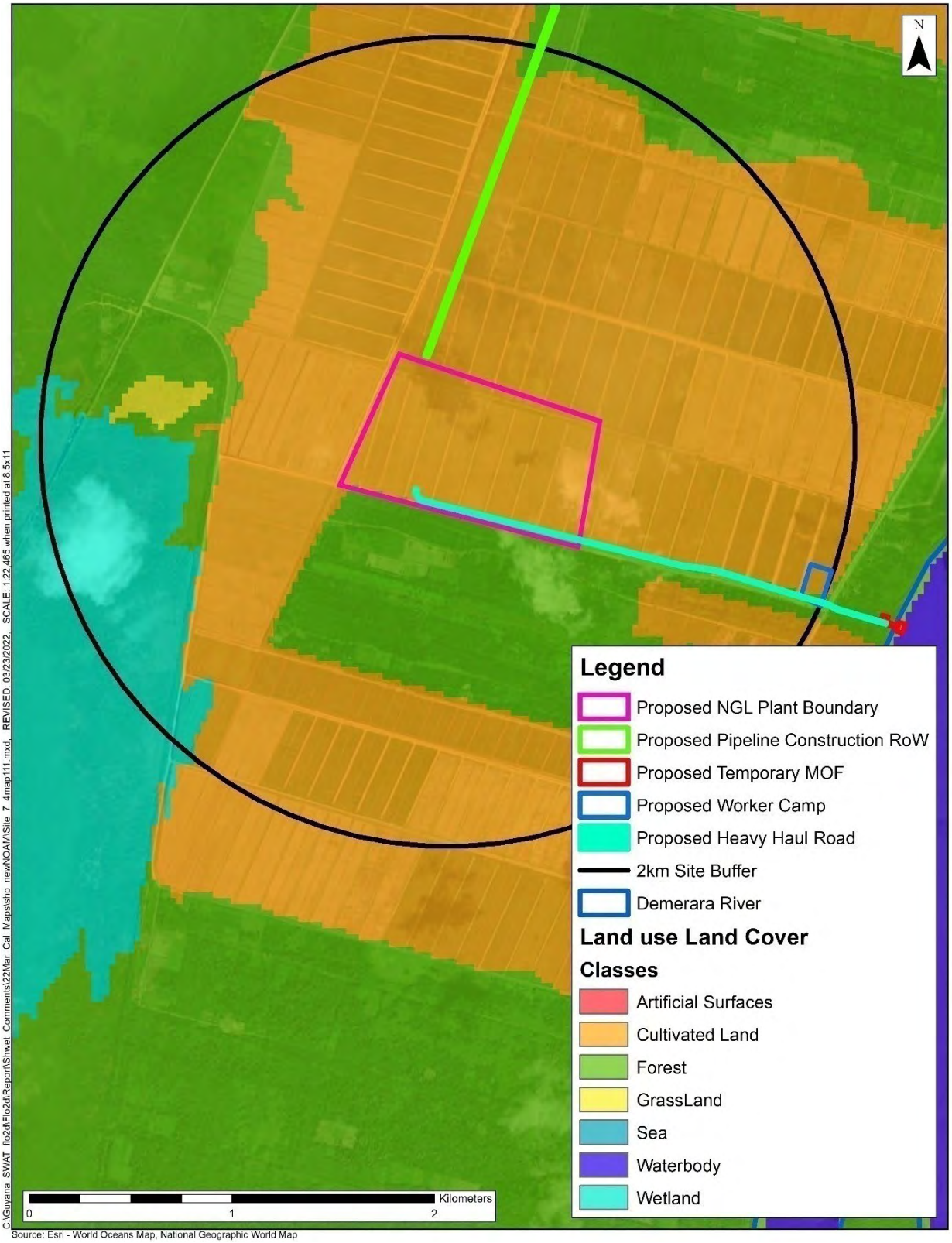


km = kilometer

Figure 7-3: Slope Map

7.2.5. Land Use / Land Cover Map

A land use / land cover map was developed using the data obtained from Globe30 Land Cover data, which is a United Nations data source. Based on the land use / land cover map of the area within the 2-kilometer buffer around the NGL Plant site, the region primarily consists of previously cultivated land, with some natural vegetated lands (forests and shrub lands) and wetlands. The land use / land cover map is presented on Figure 7-4.



km = kilometer

Figure 7-4: Land Use / Land Cover Map

7.3. EXISTING FLOOD RISK DATA

As part of the assessment, information on flooding from secondary sources was collected and summaries of this information are presented below.

7.3.1. FM Global

The FM Global flood hazard map evaluates riverine flood hazards. It is based on historical flood data and physically based hydrology and hydraulic data accounting for external factors such as rainfall, evaporation, snowmelt, and terrain.

The approximate NGL Plant site location and model boundary were overlaid on the flood hazard map for a return period of 100 years (Figure 7-5). A zoomed-in view of the NGL Plant site boundary overlaid on the map is presented on Figure 7-6. As per the flood hazard map, a large portion of the site is mapped as being under high flood hazard.

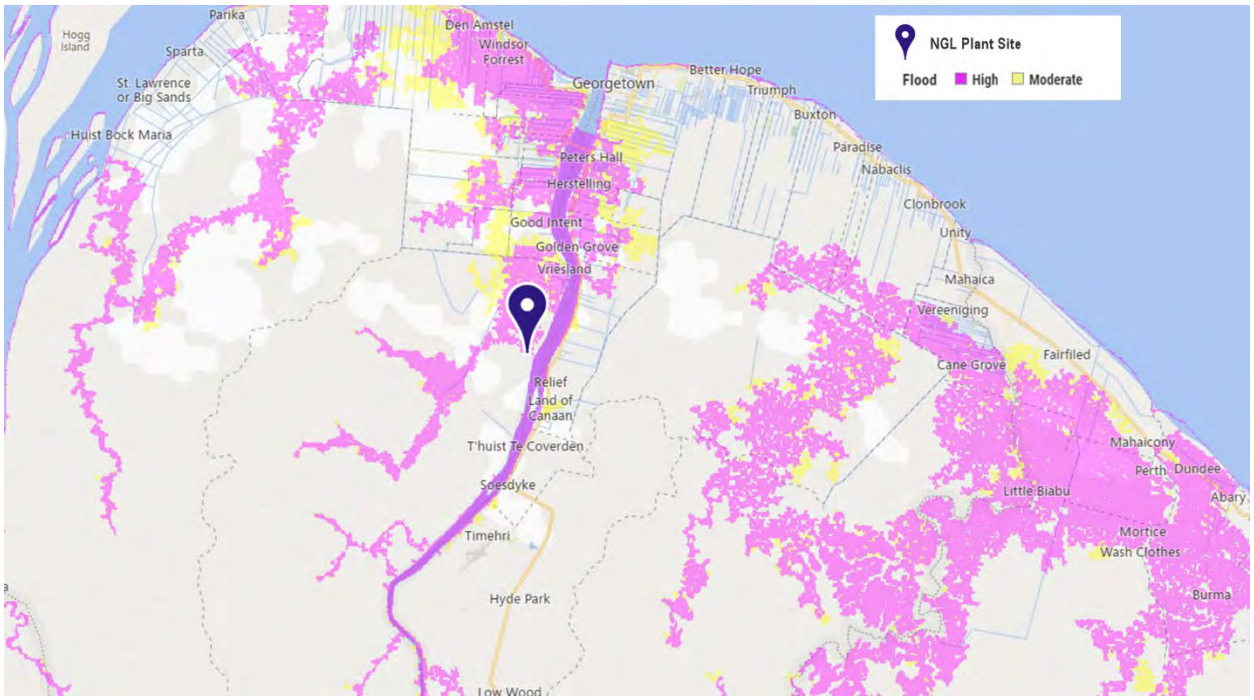


Figure 7-5: Flood Hazard Map for Model Boundary and NGL Plant Site Location—FM Global

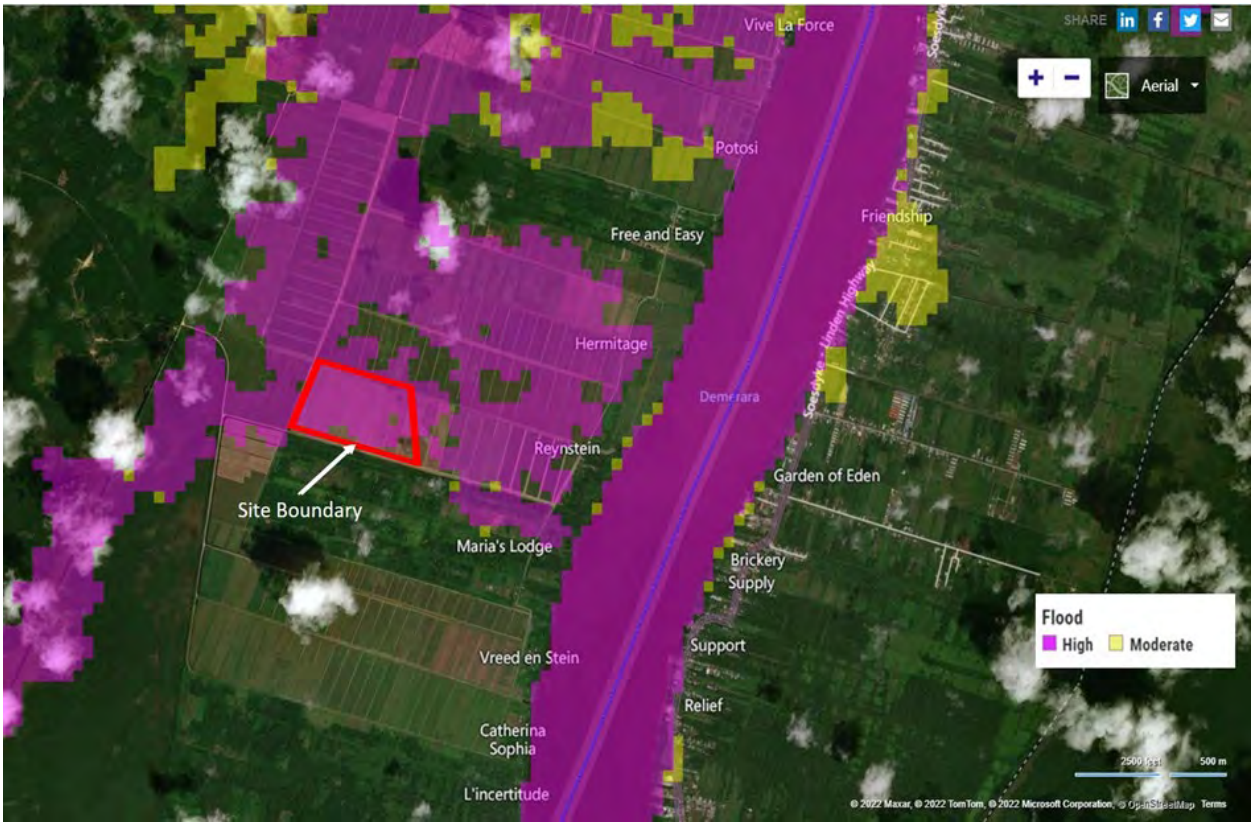


Figure 7-6: Flood Hazard Map for NGL Plant Site—FM Global

7.3.2. WRI Aqueduct Flood Tool Analysis

The World Resources Institute (WRI) Aqueduct Flood Tool provides riverine flood hazard for different return periods using the GLOFRIS model. GLOFRIS uses a global hydrological model, PCR-GLOBWB (Sutanudjaja et al. 2018), with a river and floodplain routing scheme to make long-term simulations of discharges and flood levels for several climate conditions.

The approximate model boundary was overlaid on a WRI Aqueduct flood hazard map for flooding at a 100-year return period (Figure 7-7). The map indicates a low to medium level of flood hazard within the model boundary, with higher levels in the floodplains of the Essequibo River, Demerara River, and low-lying areas along the coastline. WRI Aqueduct provides flood hazard maps for both coastal and riverine floods. Coastal flood hazard maps consider the location's exposure to flooding related to waves, tides, storm surge, or heavy rainfall. Riverine hazard maps consider location's exposure to flooding related to water overtopping the riverbanks under storm events.

A zoomed-in view of the NGL Plant site on the same flood hazard map is presented on Figure 7-8. The map indicates that the depth of inundation at the NGL Plant site for a 100-year return period riverine flooding event varies between less than 0.5 meter and 1 meter.

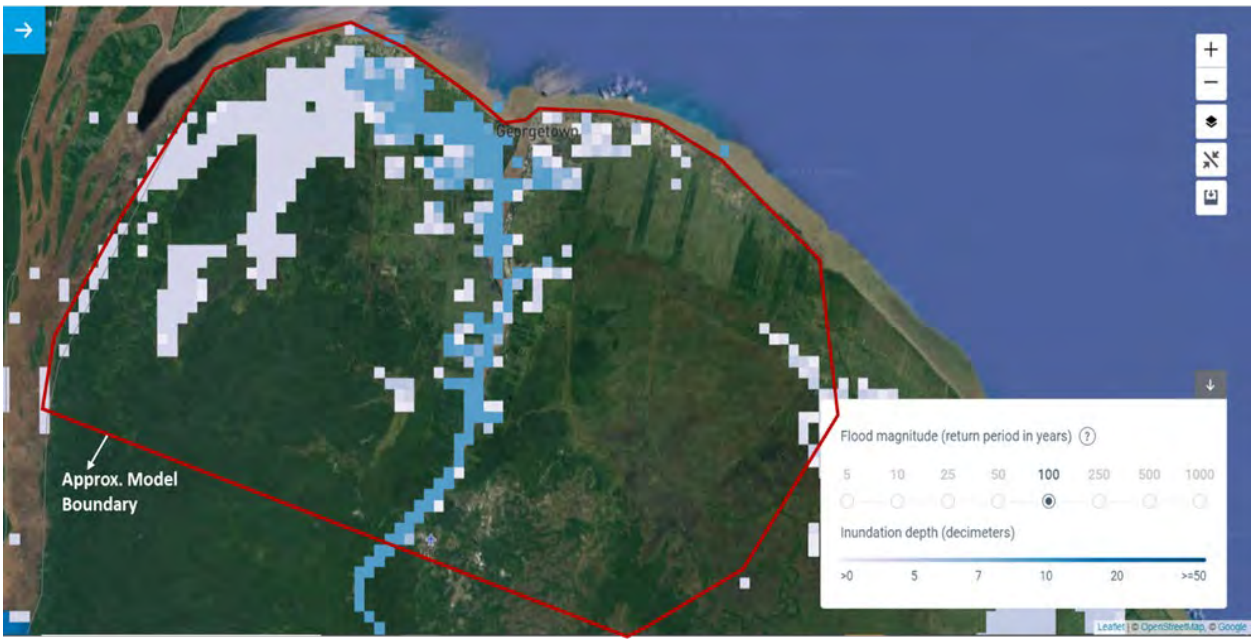


Figure 7-7: Riverine Flood Hazard Map for the Model Boundary—WRI Aqueduct

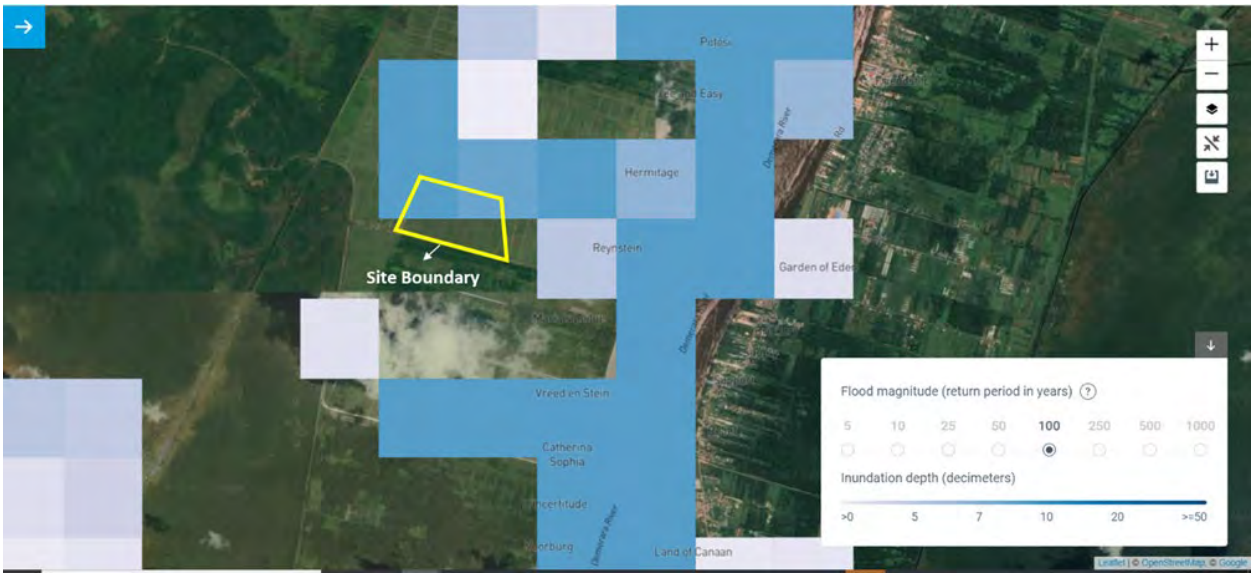


Figure 7-8: Riverine Flood Hazard Map for the NGL Plant Site—WRI Aqueduct

Evaluation of the WRI Aqueduct coastal flood hazard map for a 100-year return period (Figure 7-9) indicates a depth of inundation varying from less than 0.5 meter to greater than 2 meters along the Demerara River and its immediate floodplain. No coastal flooding is indicated within the NGL Plant site from a 100-year return period coastal flooding event (Figure 7-10).

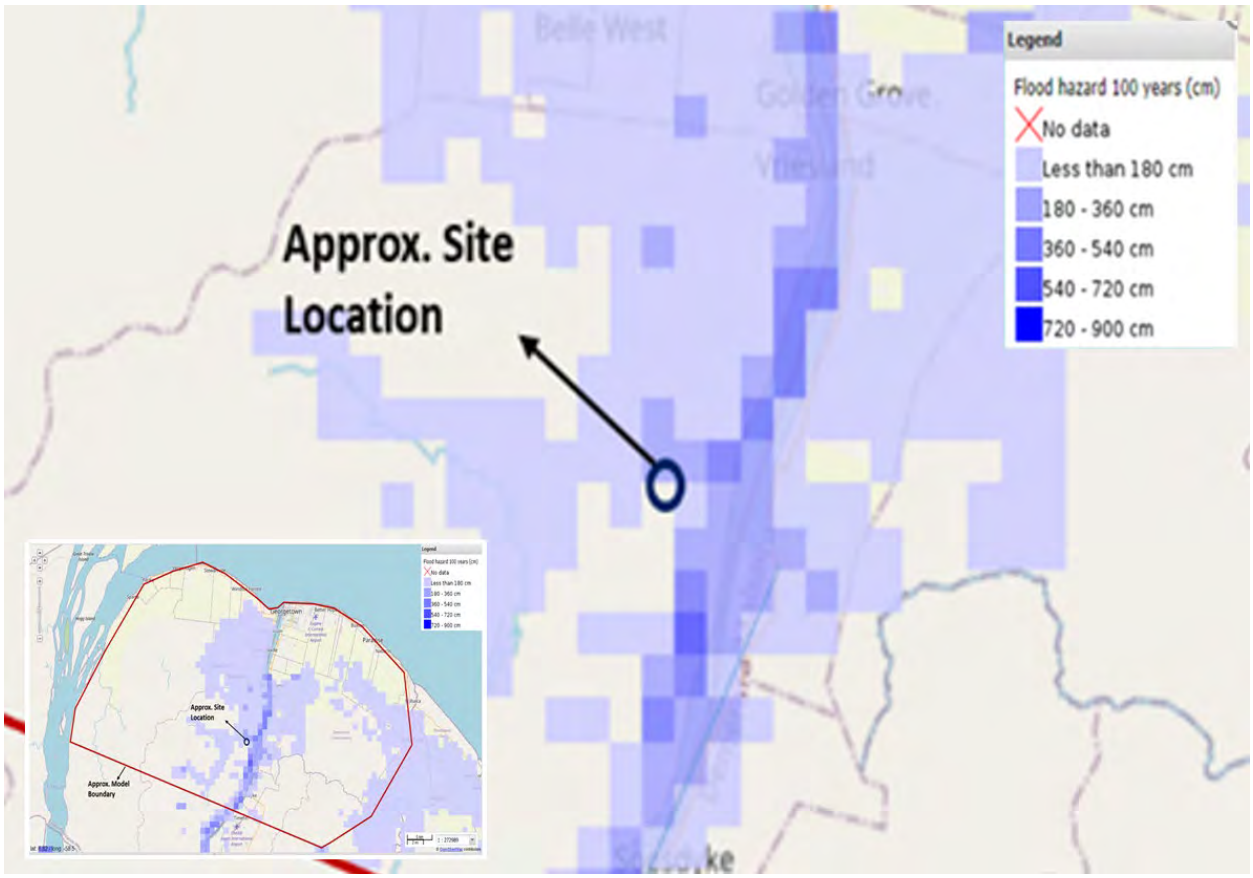
Figure 7-9: Coastal Flood Hazard Map for Model Boundary–WRI Aqueduct

Figure 7-10: Coastal Flood Hazard Map for NGL Plant Site—WRI Aqueduct

7.3.3. Global Risk Data Platform—UNEP/GRID

Figure 7-11 presents the model boundary and NGL Plant site location overlaid on a flood hazard map representing a 100-year return period flood developed by the United Nations Environmental Programme (UNEP)[2] using the Global Resource Information Database (GRID).The depth of inundation within the NGL Plant site area is less than 1.8 meters.

[2] https://preview.grid.unep.ch/index.php?preview=map&lang=eng



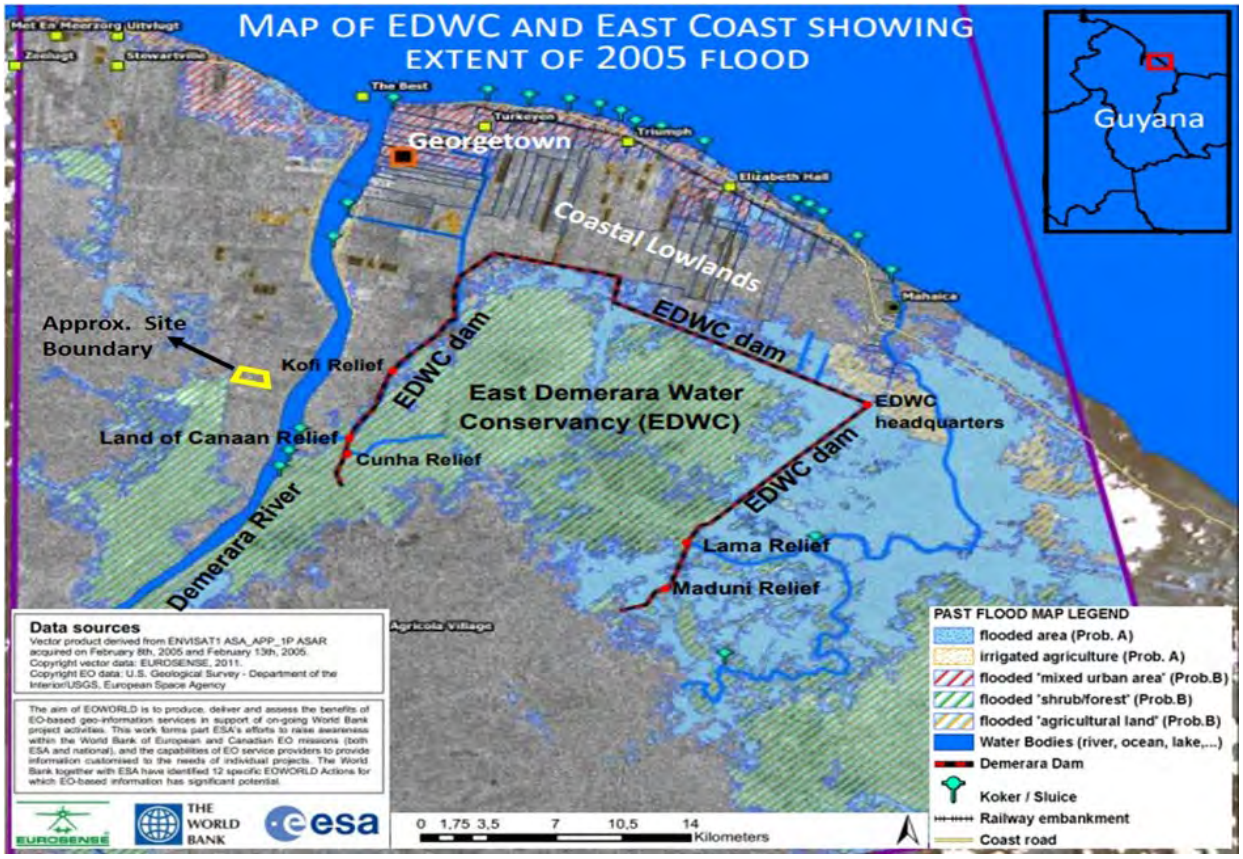
cm = centimeter

Figure 7-11: Flood Hazard Map for Model Boundary and NGL Plant Site—UNEP/GRID

7.3.4. Published Flood Risk Assessment Reports

Sayers and Partners (2019) undertook a disaster risk and climate vulnerability assessment study for Georgetown and its surrounding area. The report discusses a flood event that occurred in Guyana in January 2005. During the event, over 1 meter of rain fell (nearly five times the monthly average), with 65 centimeters of rainfall occurring in just 5 days. The extreme rainfall caused widespread flooding which affected almost half of Guyana's population.

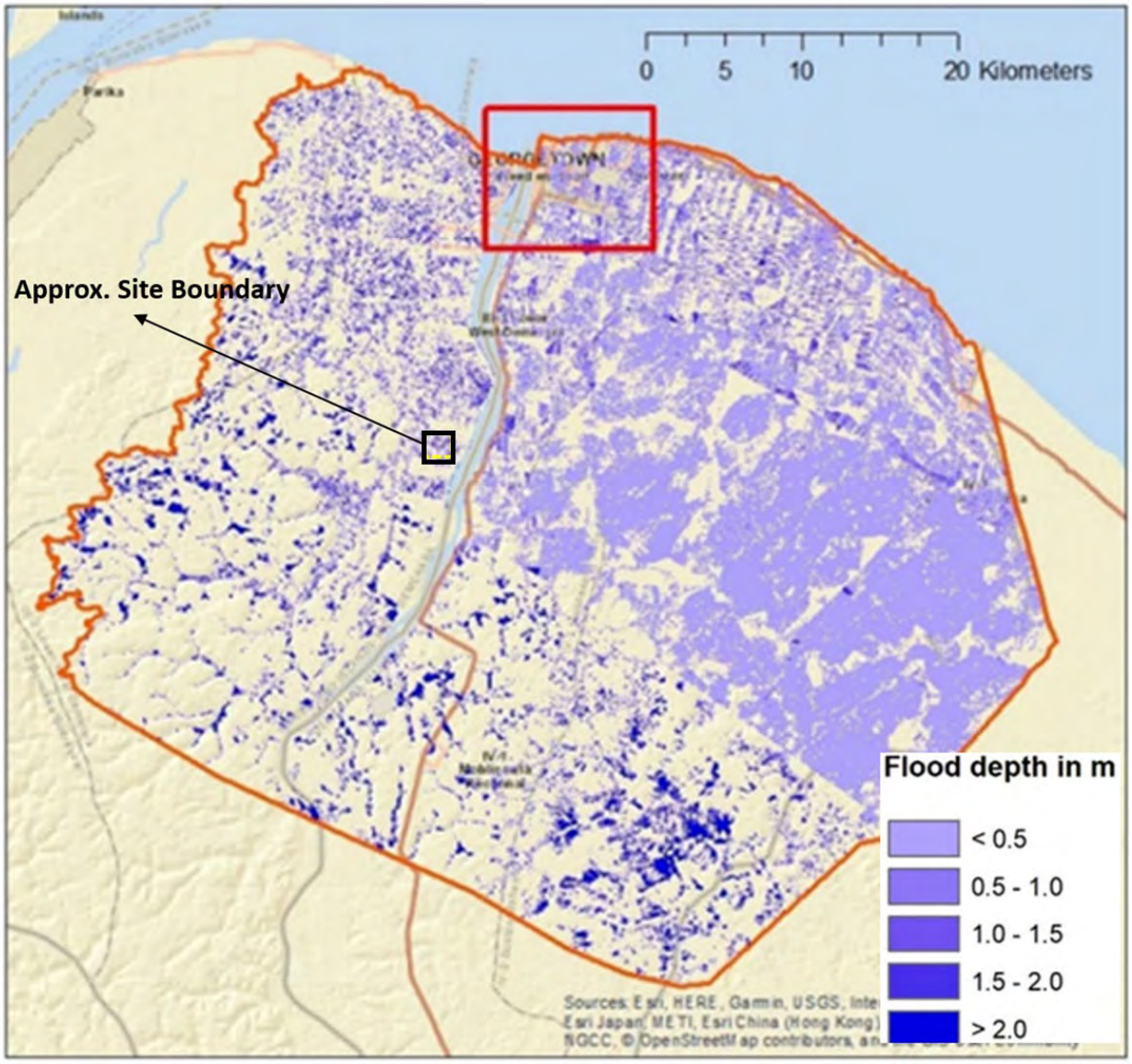
Figure 7-12 presents the approximate NGL Plant site location and model boundary overlaid on a map of the extent of the 2005 flood event, as extracted from satellite images. This map does not show that the extent of the flooding reached the NGL Plant site. However, this 2005 flood extent map is derived from available satellite imagery and may not have captured the peak inundation that could have happened in Georgetown and its surrounding area.



Source: Sayers and Partners 2019
EDWC = East Demerara Water Conservancy

Figure 7-12: Mapped Extent of 2005 Flood

The report also provides a rainfall-induced flood hazard map, which shows the predicted flood extent and depth associated with a 100-year return period event. Figure 7-13 presents the approximate NGL Plant site location and model boundary overlaid on this flood hazard map. The map indicates the depth of inundation varies between less than 0.5 meter and 1 meter at the NGL Plant site, generally consistent with other information presented above.



m = meter

Figure 7-13: Flood Hazard Map for Model Boundary and NGL Plant Site—UNEP/GRID

7.3.5. Key Findings

Based on the review of available secondary flood risk information, the following are key findings:

- As per the 100-year return period flood hazard map developed by FM Global, flood hazard for a large portion of the NGL Plant site is indicated to be high.
- As per the 100-year return period flood hazard map developed by WRI Aqueduct, the depth of inundation at the NGL Plant site varies between less than 0.5 meter and 1 meter due to riverine flooding, but no inundation due to coastal flooding is indicated in the NGL Plant site.
- As per the UNEP global risk data platform, the depth of inundation at the NGL Plant site is less than 1.8 meters for a 100-year return period flood event.

- Guyana experienced widespread flooding in January 2005. The extent of the flood event was extracted from available satellite imageries. Although no flooding was indicated on satellite imagery within the NGL Plant site area, these satellite images may have missed the peak inundation period.
- As per an available disaster risk and climate vulnerability assessment study, the depth of inundation at the NGL Plant site varies between less than 0.5 meter and 1 meter.

The information available from various sources (FM Global, WRI Aqueduct, etc.), while covering the NGL Plant site, lack the resolution necessary to appropriately assess flood risk and, in certain cases, provide inconsistent information. These sources are useful for a screening-level assessment but lack the site-specific details and features that may influence the localized flood risk. Due to these limitations, ERM performed a detailed site-specific flood risk assessment including the development of a conceptual hydrological model.

7.4. CONCEPTUAL HYDROLOGICAL MODELING

Based on the available secondary data, information collected from the published literature, and EEPGL-provided information, a conceptual hydrological model (CHM) was developed to understand the hydrology within the area in which the NGL Plant will be located. Some of the key components of a CHM are:

- Watershed or sub-catchment within which the Study Area is located; and
- Major waterbodies which are likely to impact the Study Area.

7.4.1. Watershed Delineation

For the purpose of this assessment, the watershed within which the NGL Plant site will be located was delineated. The MERIT DEM (2018) was used for detailed mapping of the watershed that drains the site and the surrounding area. LiDAR DEM data were limited in extent to only cover the NGL Plant site and its immediate surrounding area. Therefore, this dataset was not used for detailed watershed mapping.

Some of the key characteristics of the watersheds and waterbodies in the vicinity of the NGL Plant site are presented below:

- The site and its surrounding area are drained by a watershed associated with the Demerara River. This Demerara River watershed covers approximately 6,871 km^2. A map of ground surface elevations within the watershed is presented on Figure 7-14.
- The topography of the Demerara River watershed was evaluated to be gradually descending from the hilly terrain (50 to 450 meters amsl) in the south to the coastal plain in the north (zero to 3 meters amsl).
- The site is located in the down gradient and coastal area of the watershed and elevations around the site range from 1.5 to 3 meters amsl.

- Literature review indicates that Demerara's estuary is narrow and the flowrate is generally high. The resulting scouring action maintains a 5- to 6-meter-deep direct channel into the ocean.

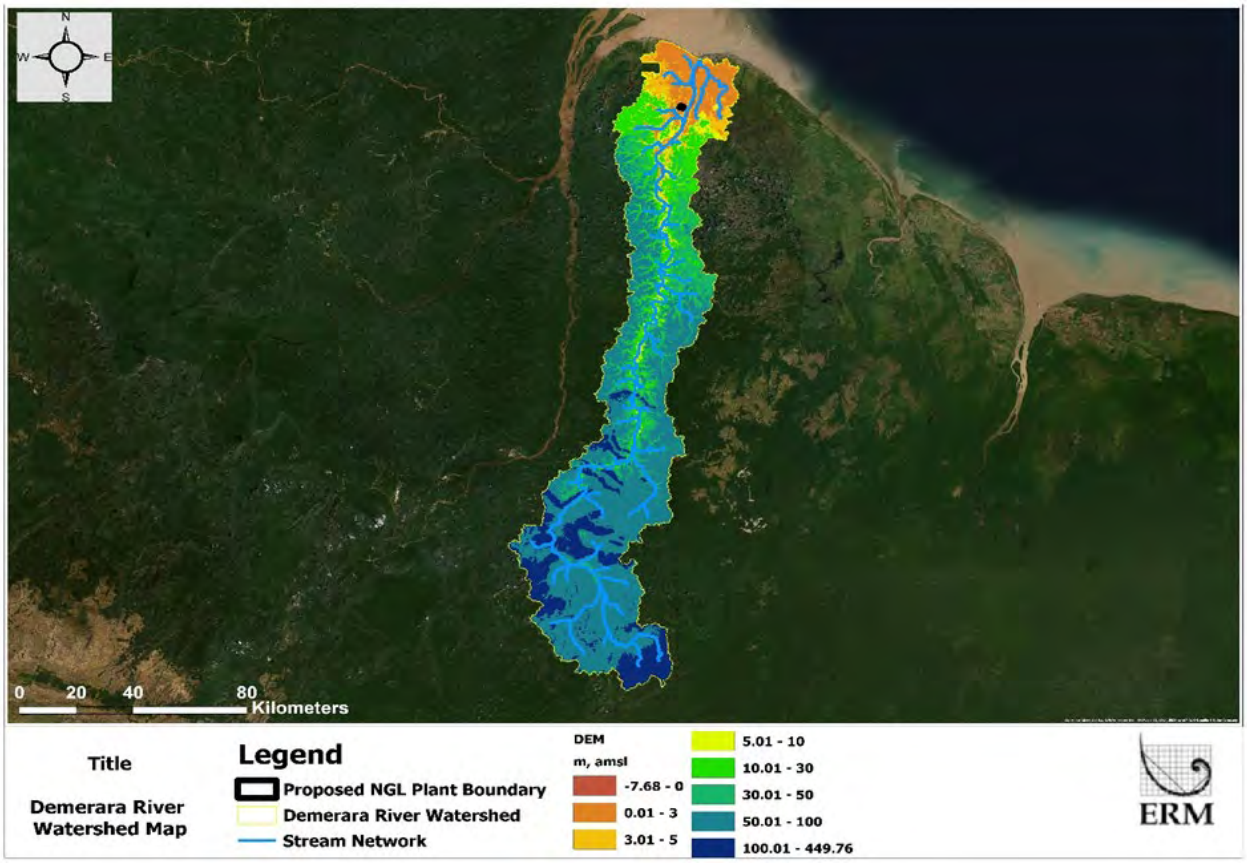


Figure 7-14: Ground Surface Elevation Map of Demerara River Watershed

7.4.2. Rainfall Data

Rainfall data were obtained from a study titled *Data Collection Survey On Drainage Capacity in Georgetown* conducted by the Japan International Cooperation Agency (JICA) for National Drainage and Irrigation Authority, Ministry of Agriculture, Guyana (2017). The JICA team conducted rainfall frequency analysis based on daily rainfall data from 1886 to 2016 at the meteorological observatory in Georgetown.

Frequency analysis of rainfall data uses probability distributions to relate the magnitude of extreme events to its frequency of occurrence (return period). The rainfall frequency analysis results are presented in Table 7-1 and Figure 7-15.

Table 7-1: Rainfall Frequency Analysis Results

Return Period (years)	Rainfall Intensity (mm/day)
2	102.7
3	116.5
5	132.4
10	153.3
50	203.0
100	225.8

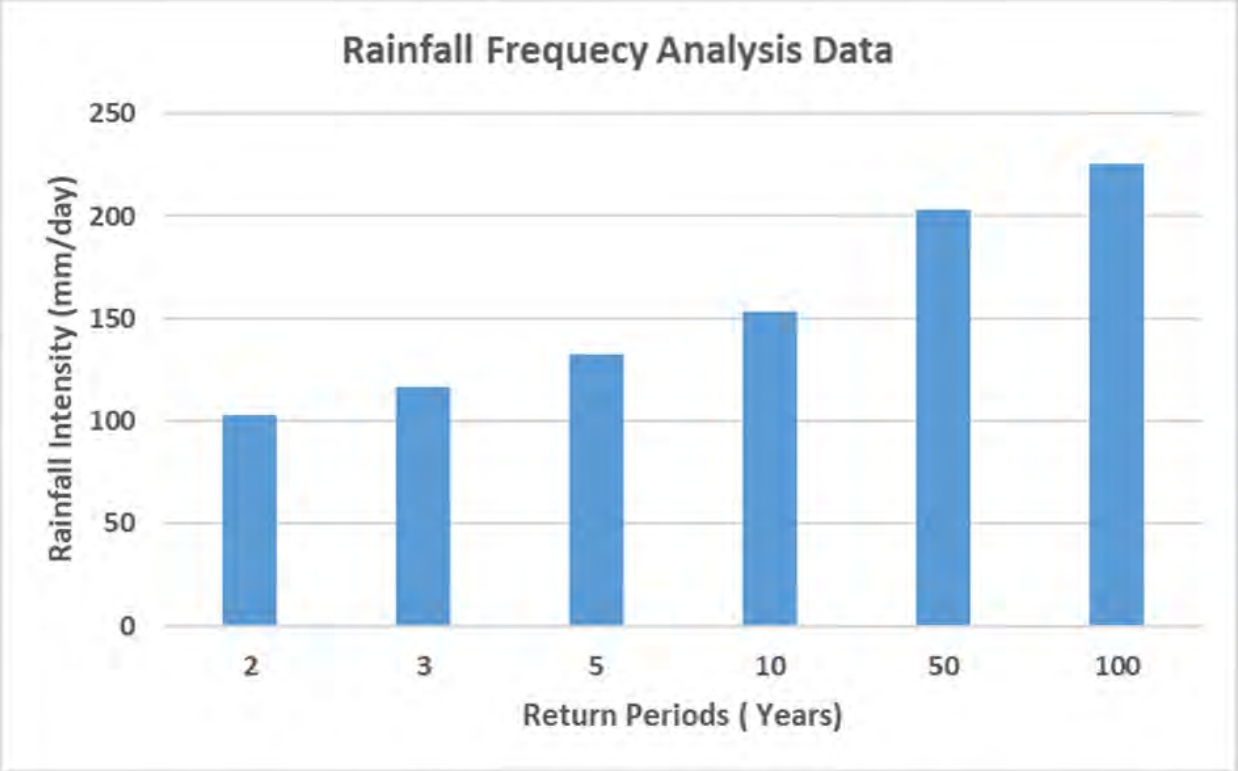


Figure 7-15: Plot Representing Computed Rainfall Intensity Against Return Period

7.4.3. Tidal/Water Level Data

The typical tidal elevation profile at the confluence of the Demerara River and the Atlantic Ocean was obtained from a study published by the Government of Guyana called *Draft Report On Conservancy Flood Management Modelling* (2005). Figure 7-16 shows the typical spring tidal profile for Georgetown and Timehri. Astronomical tides in Guyana are diurnal, with two high tides and two low tides each day.

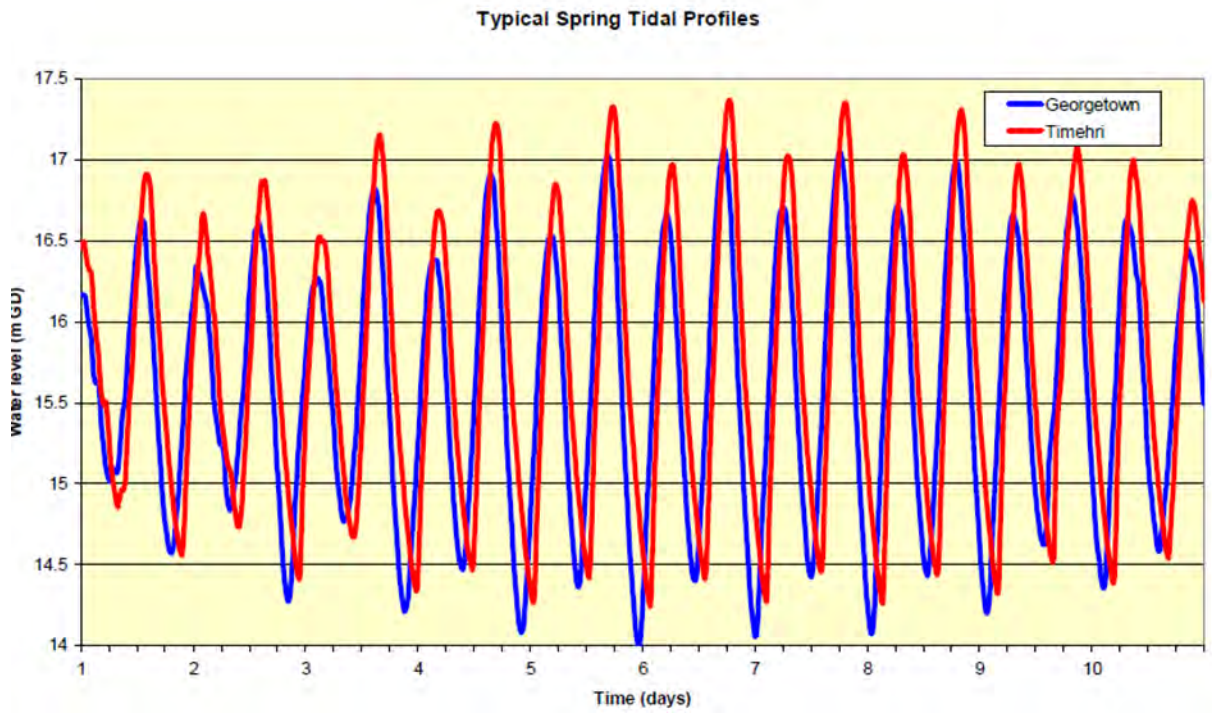
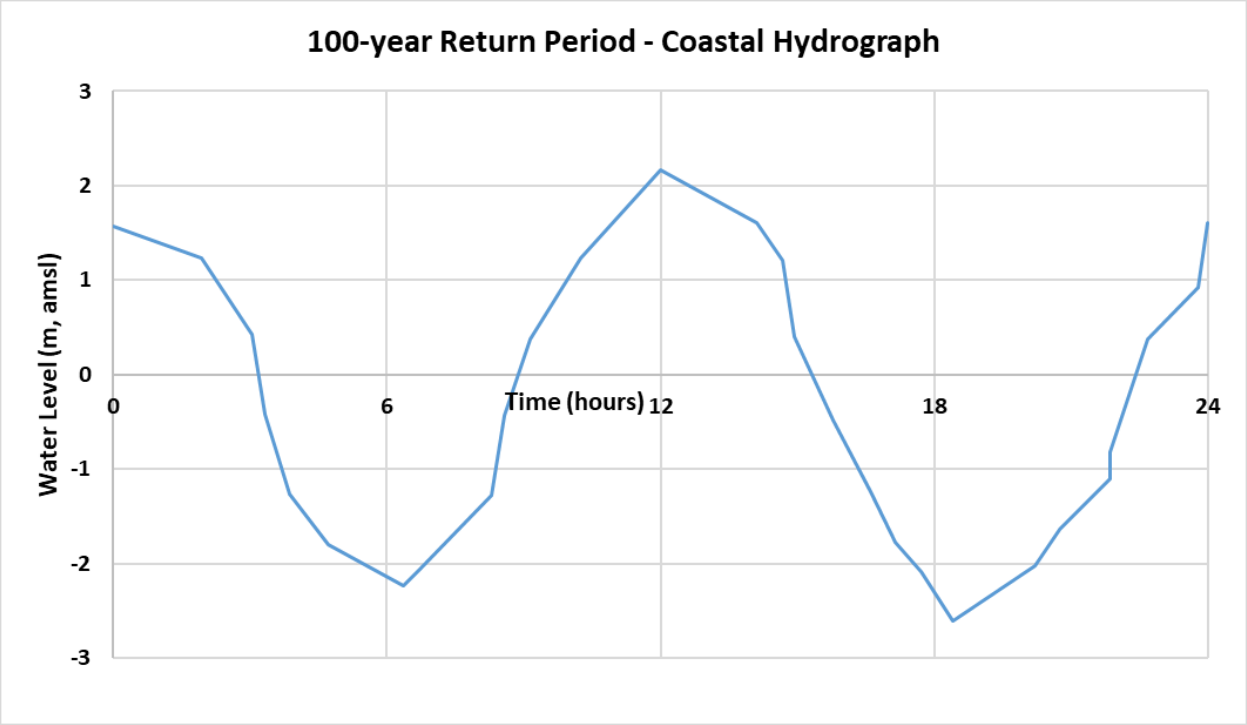


Figure 7-16: 24-Hour Tidal Cycle at Georgetown and Timehri

The 24-hour tidal cycle obtained from the above spring tidal profile was adjusted for various return periods based on extreme tidal water levels. The extreme tidal water levels at Georgetown are summarized in Table 7-2 and these levels for a 100-year return period 24-hour tidal cycle are shown on Figure 7-17.

Table 7-2: Extreme Coastal Tidal Water Levels

Return Period (years)	Tidal Water Level at Coast (meters amsl)
2	1.53
10	1.79
50	2.05
100	2.17



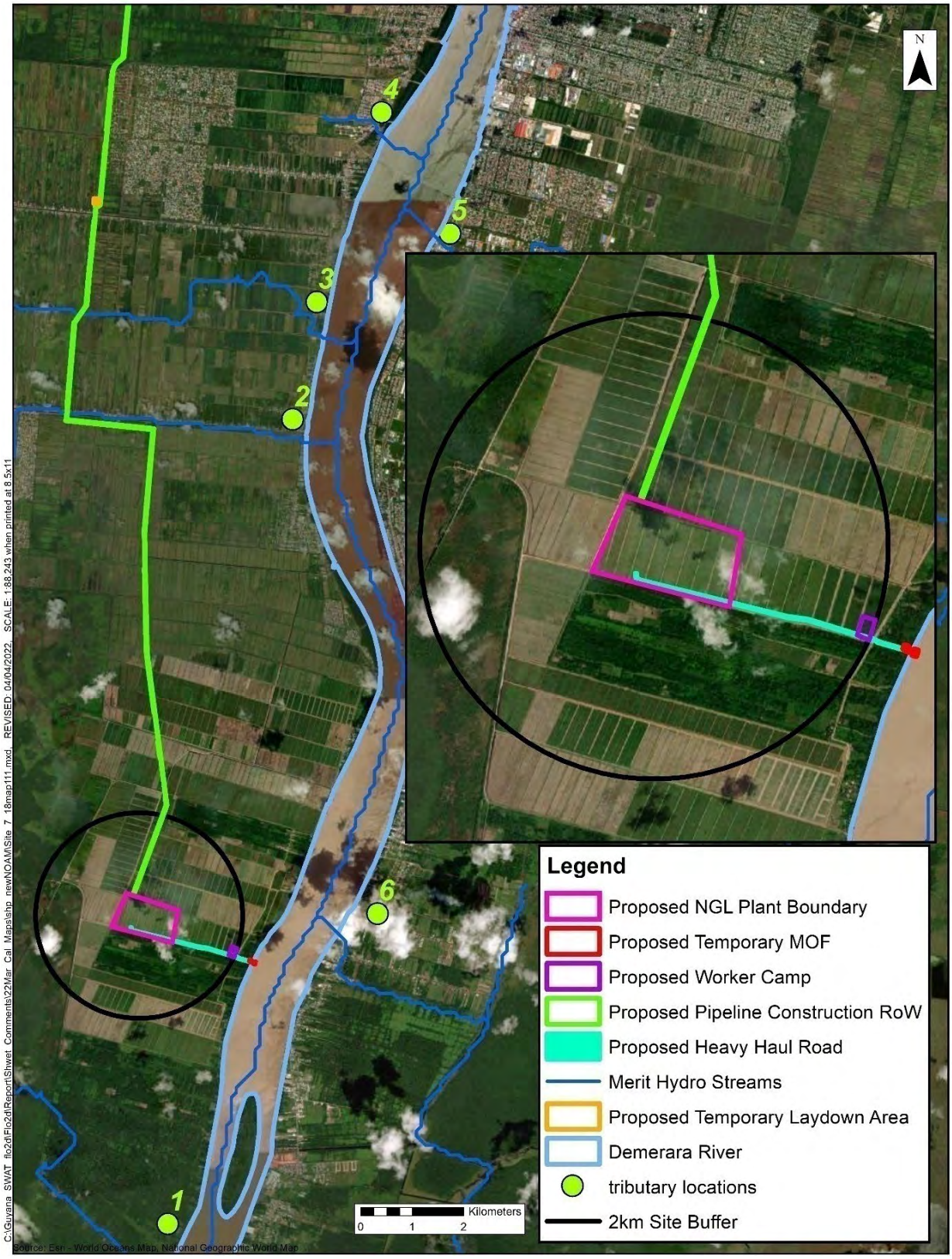
hrs = hours; m = meter; yr = year

Figure 7-17: Adjusted 24-Hour Tidal Elevations

7.4.4. Demerara River Flow Data

Demerara River daily flow data (1979 to 2019) was obtained from Global Reach-Level Flood Reanalysis (GRFR) data (Reachhydro.org Undated_b). The GRFR modeling system consists primarily of a LMS (VIC), a river routing model (RAPID), a calibration procedure, and a bias-correction (post-processing) procedure. Flow data were obtained at different locations near the Study Area as shown on Figure 7-18.

Frequency analysis was carried out using the daily flow data and Gumbel extreme value distribution (Chow et al. 1988). Table 7-3 presents the results of the flow frequency analysis.



km = kilometer

Figure 7-18: Demerara GRFR River Flow Locations

Table 7-3: Flow Frequency Analysis Results

Return Period (years)	Daily Max Flow—Location 1 (m^3/s)	Daily Max Flow—Location 6 (m^3/s)	Daily Max Flow—Location 2 (m^3/s)	Daily Max Flow—Location 3 (m^3/s)	Daily Max Flow—Location 5 (m^3/s)	Daily Max Flow—Location 4 (m^3/s)
2	960	20	67	10	36	30
5	1,243	28	95	13	48	40
10	1,431	32	113	15	56	47
25	1,668	39	136	17	66	56
50	1,844	43	153	18	73	62
100	2,019	48	170	20	81	68

m^3/s = cubic meters per second

7.5. FLOOD MODELING

7.5.1. Modeling Approach

The flood risk assessment was performed through a combination of both data analysis and modeling. Data analysis consisted of review of available literature to understand rainfall patterns, historical flooding patterns, and the frequency of high rainfall and flooding events. The modeling approach was divided into three aspects: topographic, hydrologic, and hydraulic analysis. Topographic analysis is conducted to create the elevation model for the Study Area. Hydrologic analysis is conducted to calculate the flow within the Study Area using the available rainfall data. Hydraulic analysis is conducted to assess the route of the flow in order to develop flood inundation and hazard maps. Topographic analysis was carried out using ArcGIS. Hydrologic and hydraulic analysis were carried out using Flo-2D software developed by Flo-2D Software Inc.

7.5.1.1. Topographic Analysis

The MERIT (Yamazaki et al. 2017) DEM data publicly available from Global Hydrodynamics Lab was used to develop the topographic setting of the Study Area and for the demarcation of the catchment area. Topographic analysis of the NGL Plant site and its catchment area was carried out in ArcGIS. This helps to understand the site setting, flow trajectory, slope, and gradient of the Study Area. Elevation or terrain data serve as major inputs in the Flo-2D hydrologic and hydraulic modeling.

7.5.1.2. Hydrologic Analysis

Hydrologic analysis was performed in Flo-2D. This requires a storm hyetograph for several return periods to perform a rainfall runoff calculation. The return period is the average length of time between rainfall events that equal or exceed a given magnitude. A storm hyetograph is a graphical representation of the distribution of rainfall intensity over time.

The storm hyetograph for the Study Area was derived from the rainfall data discussed earlier. A 100-year return period represents a flooding scenario where the probability of occurrence is 1 in 100 years or 1 percent in any given year. This return period was selected for flood modeling simulations. The 24-hour rainfall event corresponding to a 100-year return period is 225.8 mm. The hyetograph was prepared based on a U.S. Soil Conservation Service (SCS) hypothetical storm which is commonly used for such studies, and the centralized model rainfall (Type II) was adopted as a type of hyetograph.

The storm hyetograph used in the model is shown on Figure 7-19.

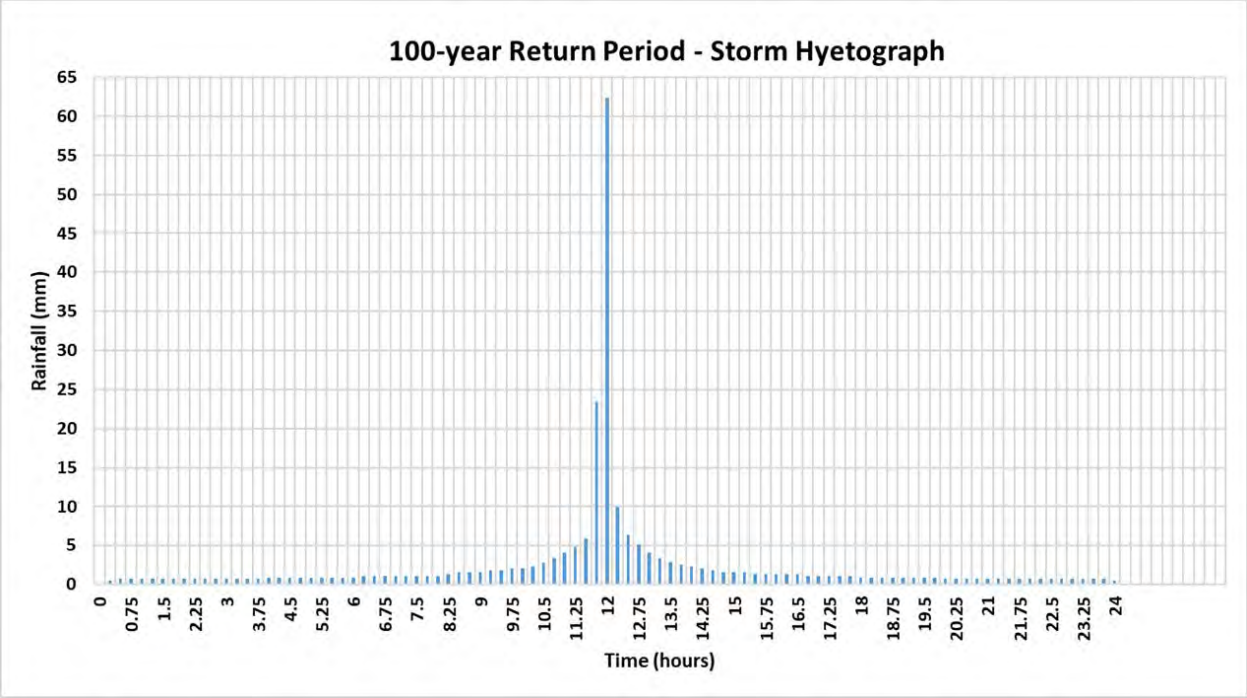


Figure 7-19: 100-year Return Period—24-hr Design Storm Hyetograph

For this study, the SCS runoff curve number method available in Flo-2D was selected to represent rainfall infiltration into the soil. The SCS curve number parameters can be assigned to allow for spatially variable rainfall runoff estimation. These parameters were specified for each cell based on the soil type and land cover. The major soil type in the Study Area is Sandy Clay Loam (Hydrologic Group—C) type based on the U.S. Department of Agriculture (USDA) soil taxonomy great groups portal. These soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure. SCS curve number infiltration parameters used for the study are shown on Figure 7-20.

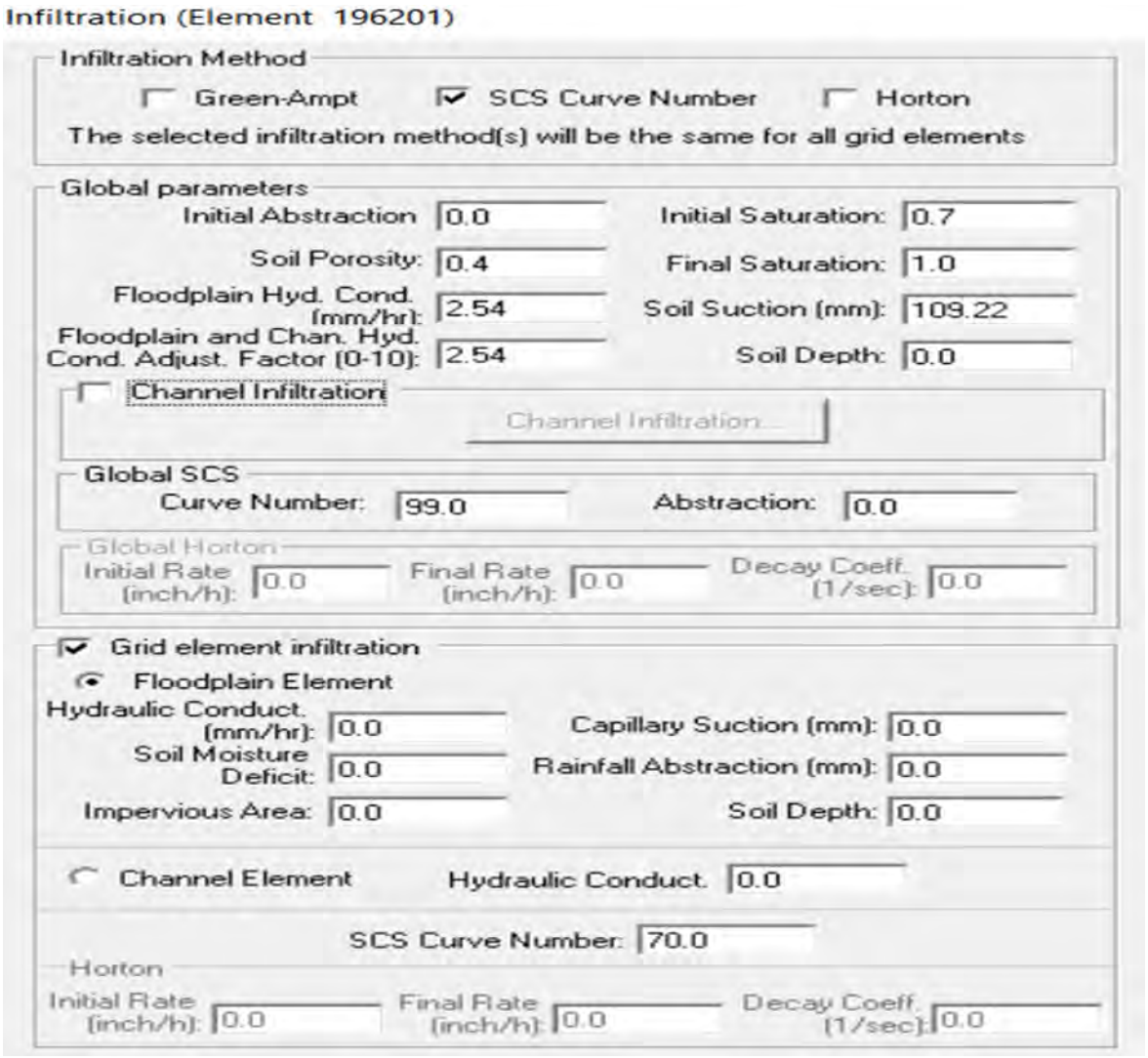


Figure 7-20: SCS Curve Number Infiltration Parameters

7.5.1.3. Hydraulic Analysis

The hydraulic analysis was performed in Flo-2D software by developing a model with the following key features:

- 90-meter grid resolution with 325,337 cells encompassing the catchment areas within the study region;
- Planned building footprints;
- Existing levee/flood wall along the coastal area;
- Land use / land cover;
- Soil type;
- Design storm hyetograph;
- Demerara River flows and tidal levels;

- Manning's n roughness coefficient; and
- Demerara River and other drainage infrastructure such as canals with sluice gates and pumps.

Several types of data listed were imported into the Study Area model grid, as summarized in Table 7-4.

Table 7-4: Types of Data Inputs and Sources for Flo-2D

Data Input	Purpose	Data Source
Topography	Water flow routing in the Study Area	DEM derived from Multi-Error-Removed Improved-Terrain Data (MERIT 2018)
Land Cover/Use	flow resistance due to friction	Land Cover data available from United Nations and Chinese data agency
Soil	Infiltration calculation	Flo-2D Reference Manual and USDA Soil System Based Portal
Climate	IDF curves and Design Storm Hyetograph Input in Model	Extracted and Processed from JICA (2017) Drainage Report
Buildings	Blockage during flood routing	Open Street datasets extracted and processed in QGIS
Drainage Infrastructures	Canals, Pumps, and Sluice gates drainage mechanism for Georgetown Area	Extracted and Processed from JICA (2017) Drainage Report
Demerara River Flows	Riverine flooding risk	Extracted from Reach Hydro (Reachhydro.org Undated_b)
Coastal/Tidal Water Level	Coastal flooding risk	Extracted and Processed from IADB 2019 Disaster Risk Report (Sayers and Partners 2019)
Coastal Flood Wall	Protection from coastal water level	ERM-surveyed Internal GIS datasets
Demerara River Bathymetry	River Storage Capacity	Extracted and Processed from Navionics Bathymetry Charts

Land cover type affects flooding, as flood water moves more rapidly over/along paved surfaces, while highly vegetated areas can absorb some of the impacts of flooding. This land cover information is represented through the Manning's "n" roughness parameter. Standard values of these were taken from Venti Chow (1988). These values are listed below in Table 7-5.

Table 7-5: Land Cover Roughness Parameters for the Flo-2D Application of the Study Area

Land Use	Manning's "n" Value
Agriculture and Cultivated Land	0.04
Forest	0.10
Commercial	0.08
Grassland/Vegetation	0.03
Waterbody	0.041
Artificial Surfaces	0.07
Wetland	0.05

The Flo-2D modeling computational domain, with a rectangular grid of 90-meter resolution and the watershed boundary is shown on Figure 7-21.

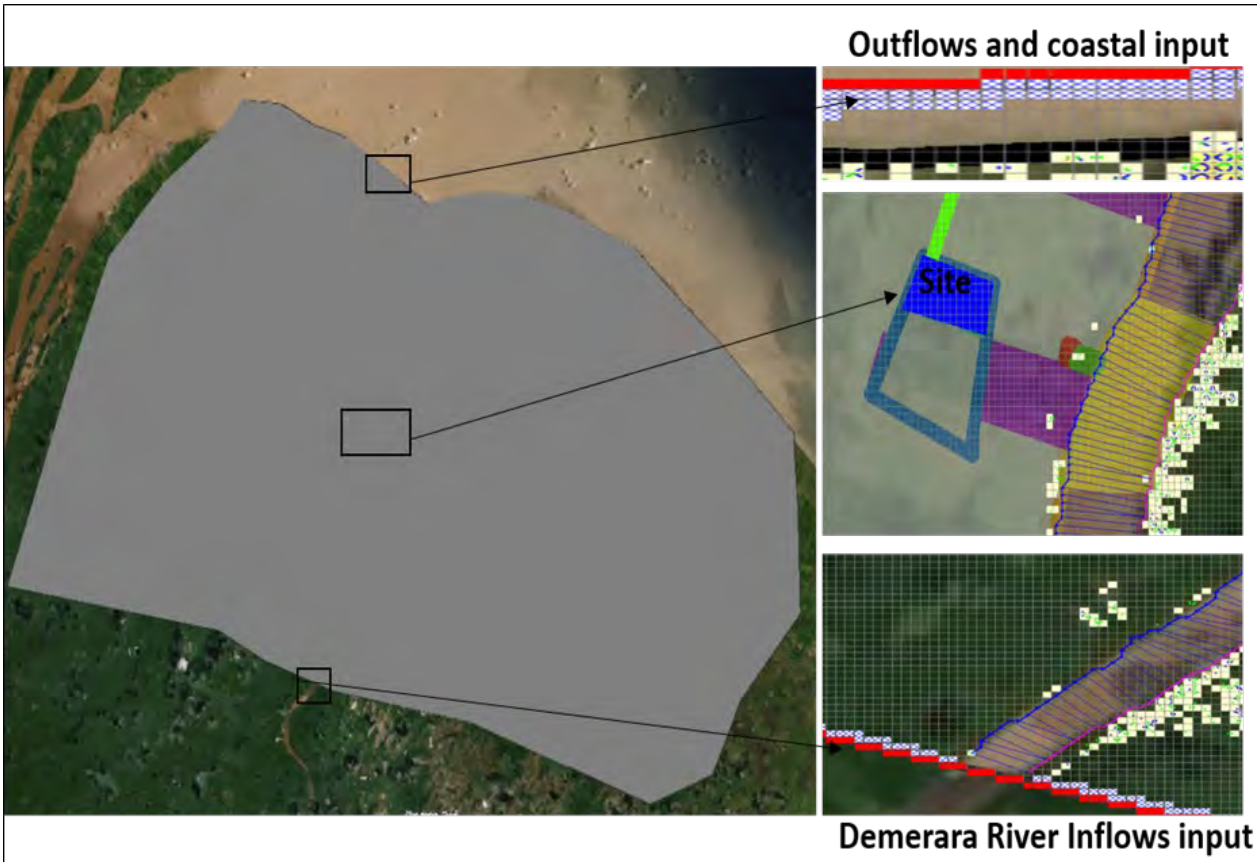


Figure 7-21: Flo-2D Modeling Domain with 90-meter Grid

7.5.1.4. Interpretation of Results

Water depth and velocity at each model grid cell are obtained as output from the Flo-2D model. Flo-2D Mapper is a post-processor program that creates maps and other plots of the Flo-2D model results including hydraulic variables, water surface elevations, duration of inundation, impact force, static pressure, specific energy, and sediment scour or deposition, among others.

Flo-2D Mapper can also generate depth and velocity versus time graphs at user-selected locations, flow depth profiles along user defined sections, flood damage plots, and hazard plots.

Flood hazard at a specific location is a function of flood intensity. Flood intensity is defined by the flow depth and velocity. Table 7-6 summarizes the criteria used to determine flood hazard levels by considering water depth and velocity parameters in Flo-2D.

Table 7-6: Definitions of Flood Intensity Used For Developing Hazard Flood Maps

Flood Intensity	Maximum Flood Depth [h] (meters)		Maximum Flood Depth [h] x Maximum Velocity [v] (m^2/s)	Hazard Level
High	h > 1.5 m	OR	v * h > 1.5 m^2/s	High
Medium	0.5 m < h < 1.5 m	OR	0.5 m^2/s < v * h < 1.5 m^2/s	Medium
Low	0.1 m < h < 0.5 m	AND	0.1 m^2/s < v* h < 0.5 m^2/s	Low

Source: Adapted from FLO-2D Reference Manual 2004

h=water depth; m= meters; m^2/s= square meters per second; v=water velocity

Referencing the table above, a flood hazard map is typically developed to show three color levels representing high (red), medium (orange), and low (yellow) hazard levels. These colors/levels correspond to specific potential hazards as shown below in Table 7-7.

Table 7-7: Flood Hazard Level Definitions

Hazard Level	Map Color	Description
High	Red	Persons are in danger both inside and outside their houses. Structures are in danger of being destroyed.
Medium	Orange	Persons are in danger outside their houses. Buildings may suffer damage and possible destruction depending on construction characteristics.
Low	Yellow	Danger to persons is low or non-existent. Buildings may suffer little damages, but flooding or sedimentation may affect structure interiors.

Maximum flood depth, velocity, and hazard maps are exported from Flo-2D and further processed in ArcGIS for enhanced resolution.

7.5.2. Modeling Scenarios

This section describes the scenarios simulated as part of the hydraulic and flood inundation mapping to understand the flood risk to the NGL Plant site and its surrounding area.

7.5.2.1. Scenario 1: Baseline Scenario (100-Year Return Period)

As part of this scenario, a baseline flood scenario was modeled in Flo-2D to simulate the flooding and inundation pattern within the area due to pluvial (high intensity low duration storm events), riverine (streams overtopping its banks), and coastal flooding. Modeling simulations were undertaken for a 100-year return period. Baseline inundation and flood hazard maps for present conditions for a 100-year return period are presented on Figure 7-22 and Figure 7-23.

Maximum flow depth within the NGL Plant site area for this scenario was modeled at 0.10 to 0.62 meter, with a mean value of 0.29 meter. Maximum flow depths in the 2-kilometer buffer area surrounding the NGL Plant site were modeled at 0.1 to 1.36 meters, with a mean value of 0.3 meter. Maximum flow depths in the Demerara River were modeled to vary from 4.1 to 6.8 meters. Maximum flow depth along the onshore pipeline corridor for this scenario was modeled at 0.1 to 1.36 meters, with a mean value of 0.34 meters.

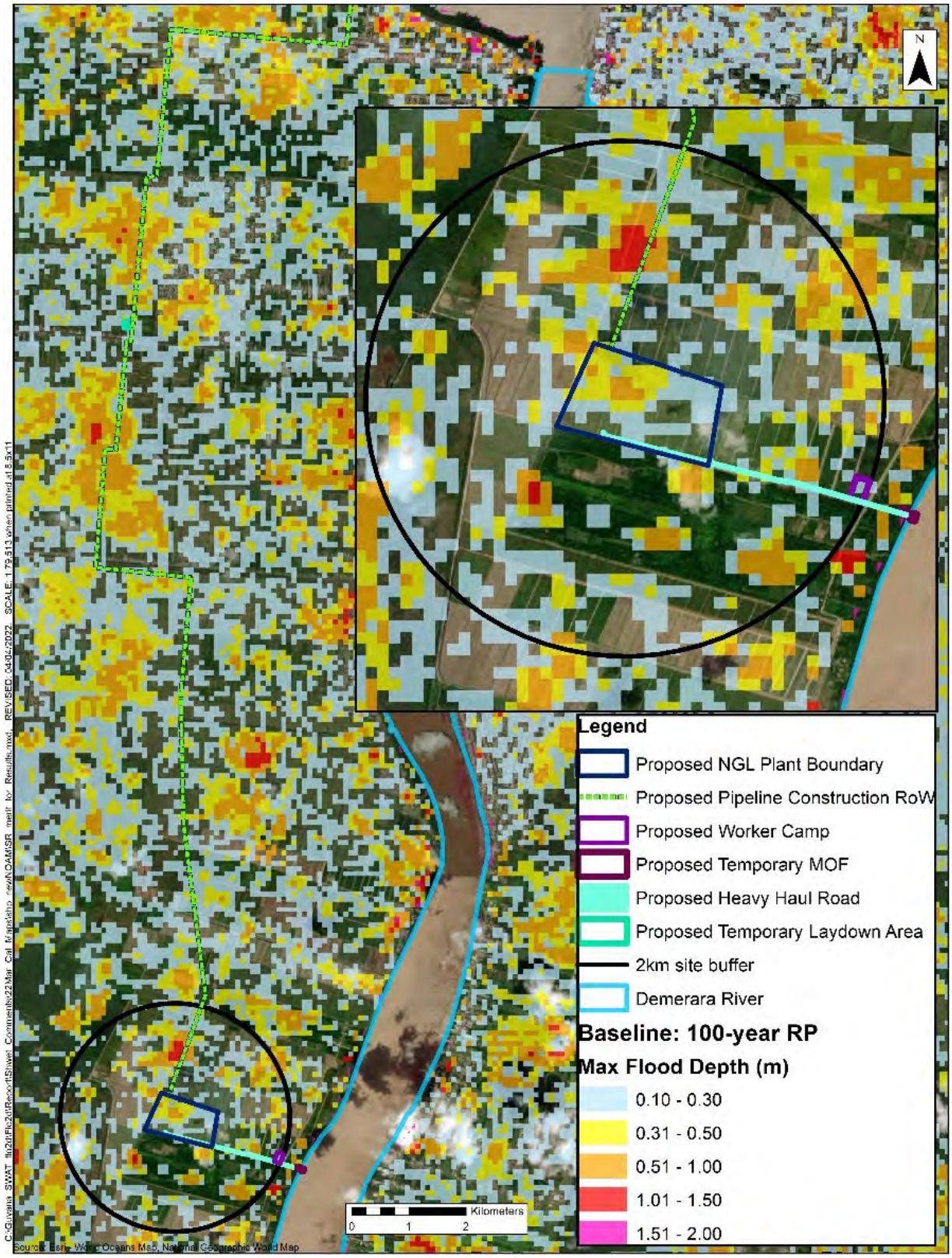
As described above, hazard maps are classified based on maximum depth and velocity. Flood hazard at the NGL Plant site and its surrounding area were classified as low to medium. Flood hazard along the proposed onshore pipeline corridor was also classified as low to medium.

7.5.2.2. Scenario-2: Flood Inundation Mapping for Post-Development (100-Year Return Period)

As part of this scenario, the elevations in NGL Plant site were assumed to be raised by 2 meters. Additionally, the proposed dredged area in the Demerara River was incorporated into the model. Modeling simulation was undertaken for a 100-year return period. Post-development inundation and flood hazard maps for a 100-year return period are presented on Figure 7-24 and Figure 7-25.

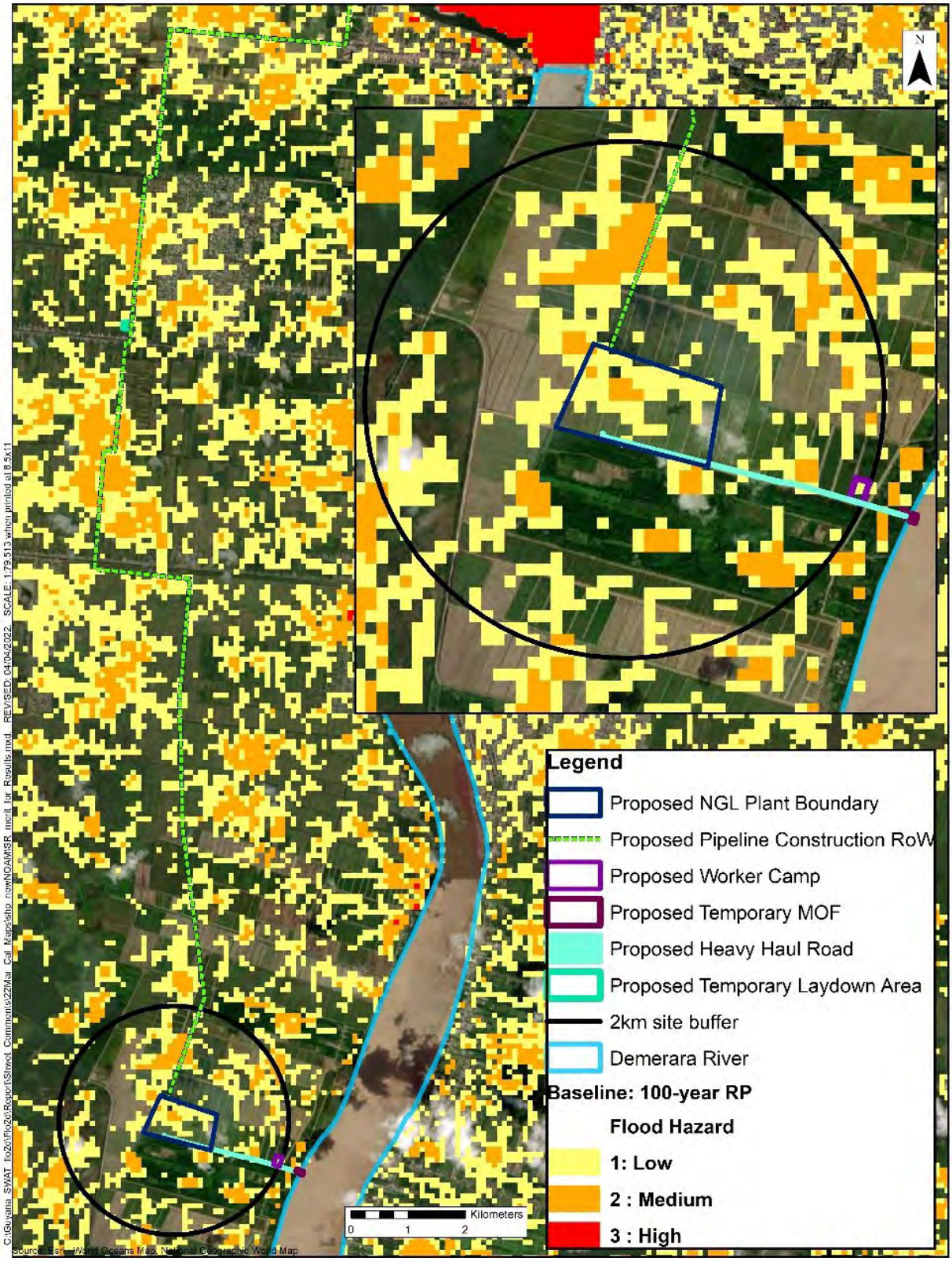
The NGL Plant site was observed to not be inundated in this scenario. Maximum flow depths in the areas surrounding the site were observed to vary from 0.1 to 1.37 meters, with a mean value of 0.31 meter. Maximum flow depths in the Demerara River were found to vary from 4.1 to 8.7 meters. Maximum flow depth along the proposed onshore pipeline corridor for this scenario was modeled as 0.1 to 1.37 meters, with a mean value of 0.33 meter.

Flood hazard ratings in the areas around the NGL Plant site were classified as low to medium. Flood hazard ratings along the proposed onshore pipeline corridor were also classified as low to medium.



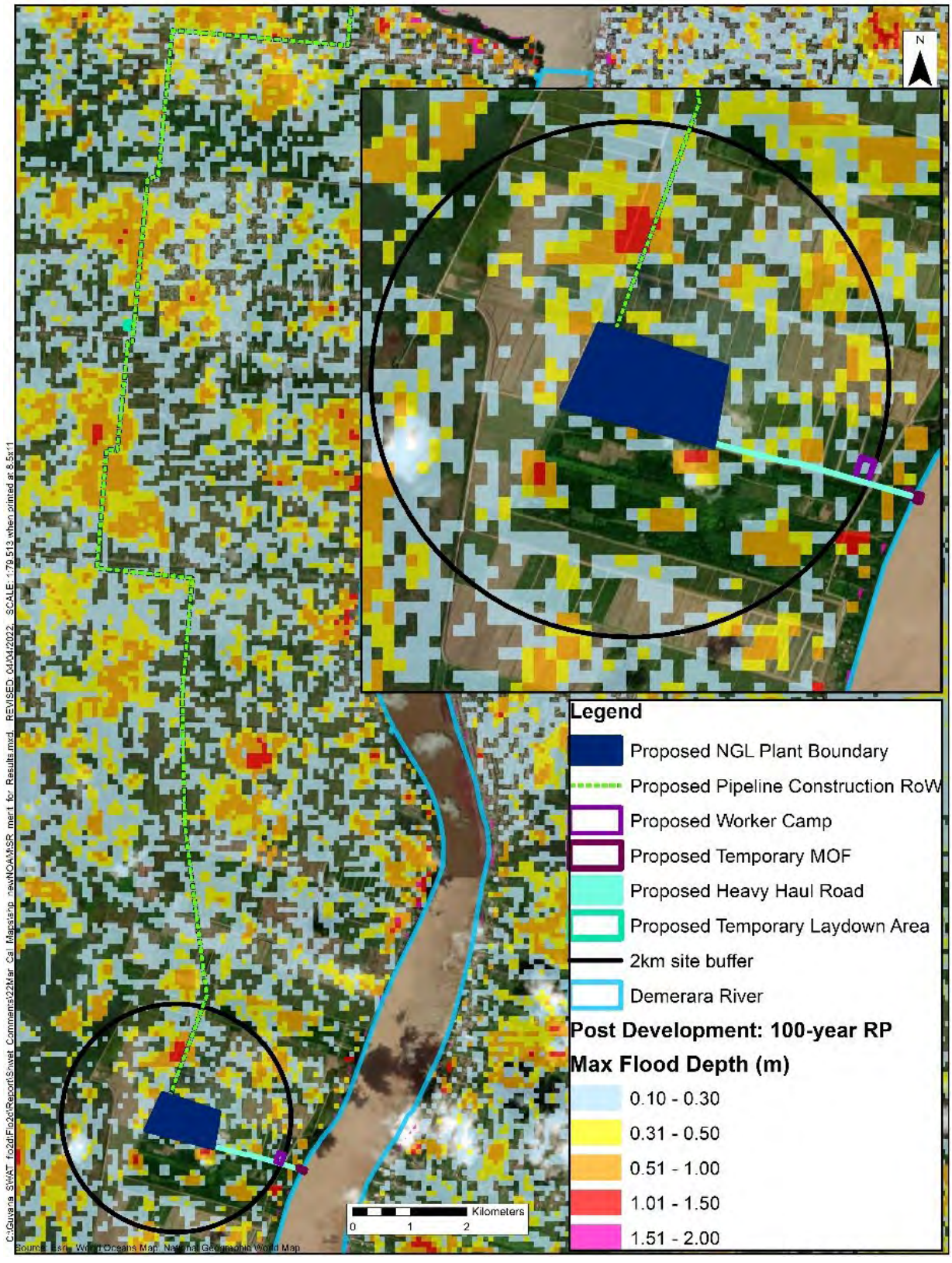
m = meter

Figure 7-22: Scenario 1: Maximum Flood Depth for Baseline 100-Year Return Period



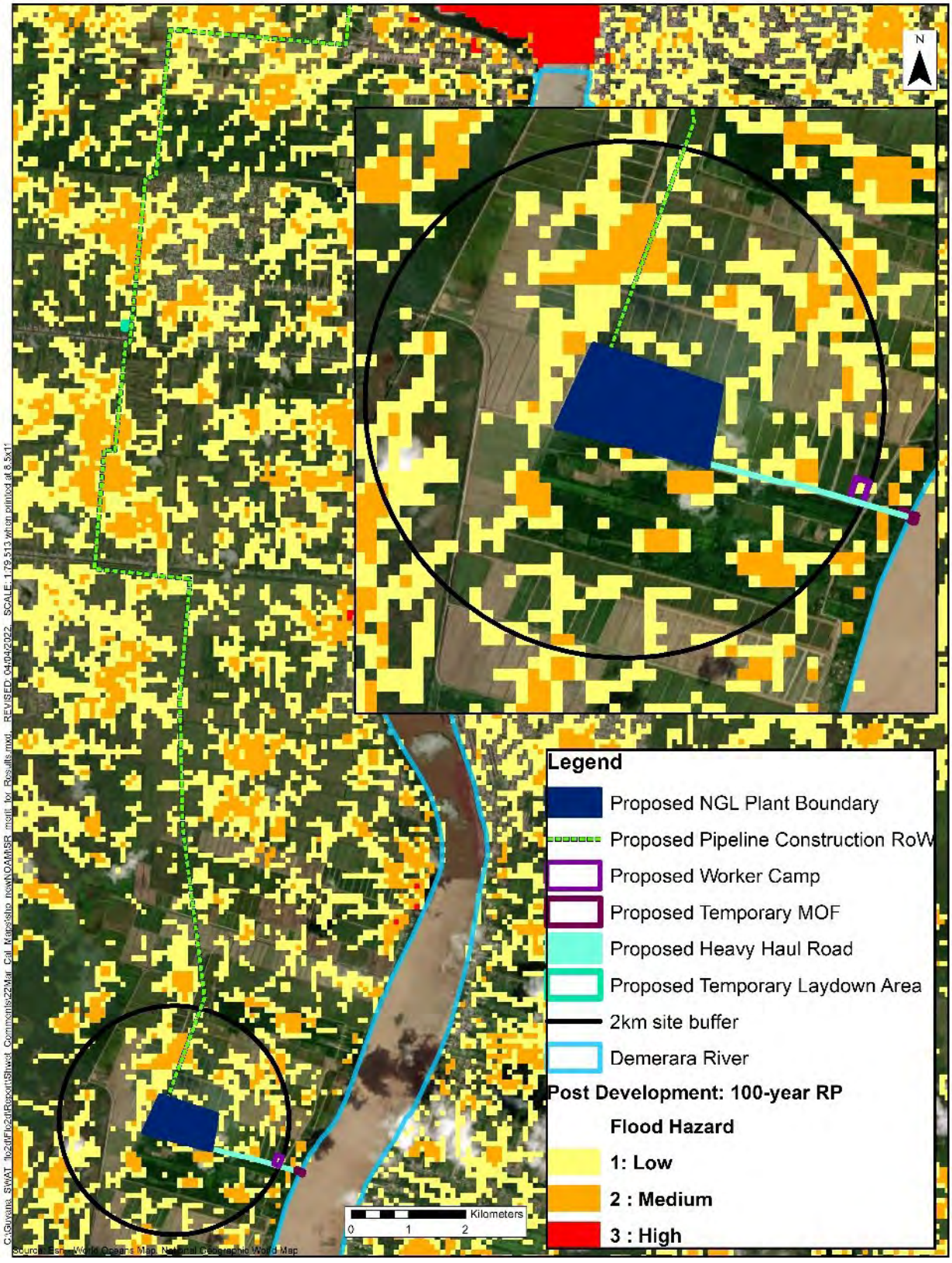
km = kilometer; RP = return period; yr = year

Figure 7-23: Scenario 1: Flood Hazard for Baseline 100-Year Return Period



km = kilometer; m = meter; RP = return period; yr = year

Figure 7-24: Scenario 2: Max Flood Depth for Post-Development 100-Year Return Period



km = kilometer; RP = return period; yr = year

Figure 7-25: Scenario 2: Flood Hazard for Post-Development 100-Year Return Period

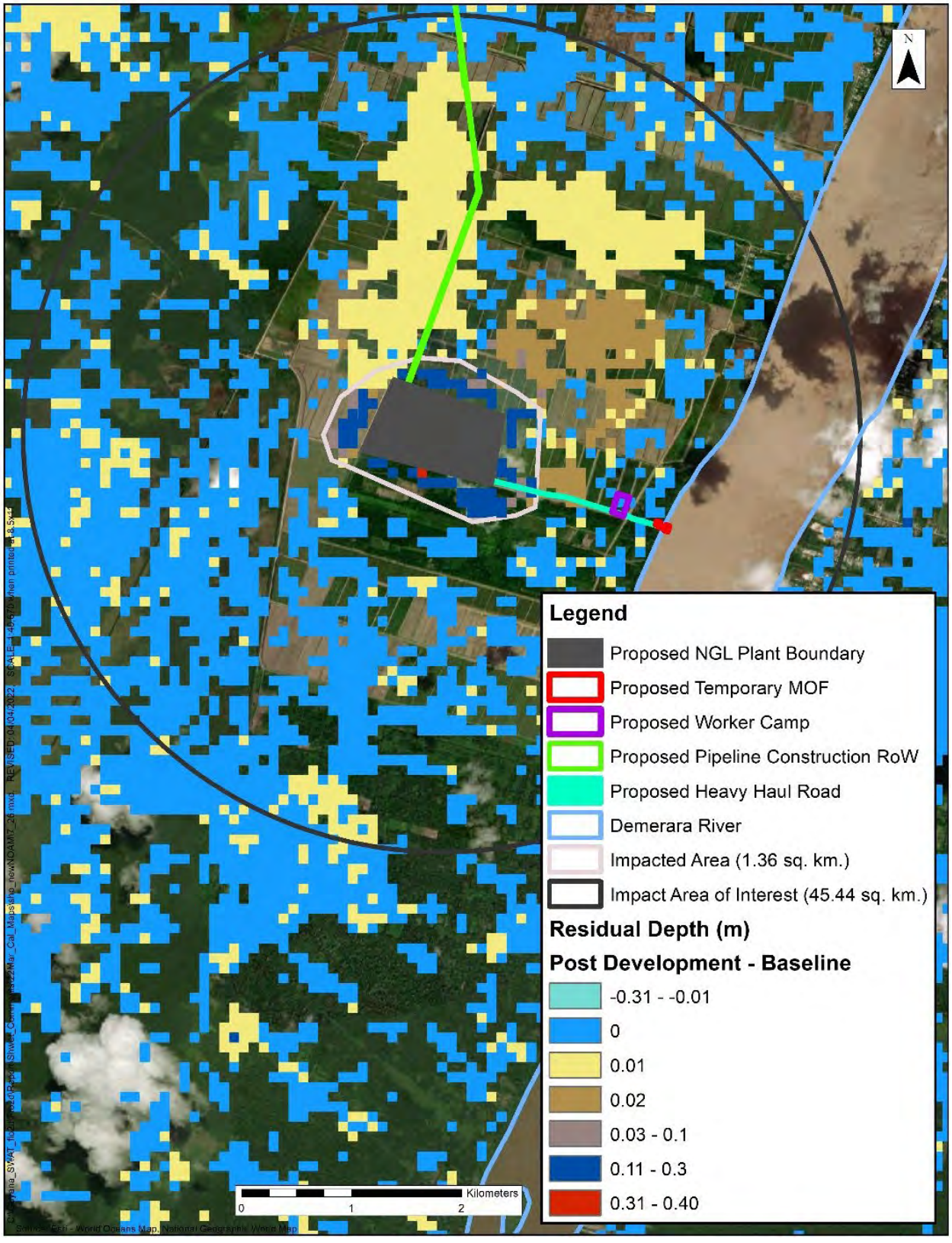
7.5.3. Project Impact Analysis

To assess the potential impact on flooding associated with the Project, a residual flood risk map was prepared. This map was prepared by subtracting the baseline flood depth levels from the post-development scenario depths flood levels and is presented on Figure 7-26.

The residual flood risk map shows the Project-related increases in potential flood depth in areas close to the NGL Plant site boundary. This area is shown by the red polygon on the map. The average increase in flood depth in this area is on the order of 0.15 meter; the predicted increase in flood depth is negligible (0.001 to 0.02 meter) in areas located farther away from the NGL Plant site. This increase in flood depth with the Project is associated with flow obstruction and diversion. The areas of impact at various flooding inundation depth levels for the baseline and post development scenario are listed in Table 7-8 and Figure 7-27.

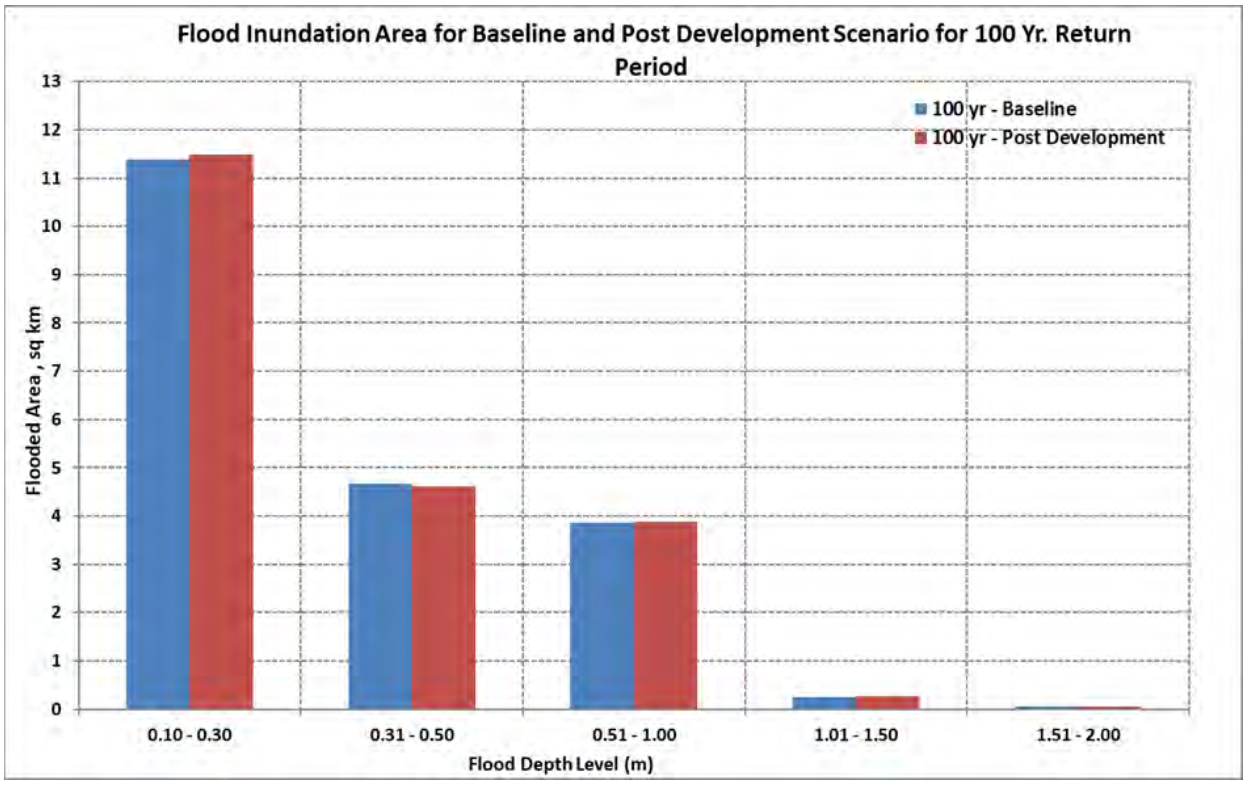
Table 7-8: Inundation Area Tabular Comparison for Impact Area of Interest

Inundation Depth Levels (meters)	100-year Baseline Scenario Inundation Area (km^2)	100-year Post-Development Scenario Inundation Area (km^2)
0.10–0.30	11.386	11.484
0.31–0.50	4.674	4.617
0.51–1.00	3.856	3.872
1.01–1.50	0.246	0.262
1.51–2.00	0.053	0.053
Total Flooded Area	20.216	20.288



sq km = square kilometer; m = meter

Figure 7-26: Residual Flood Risk Map



m = meter; sq km = square kilometer; yr = year

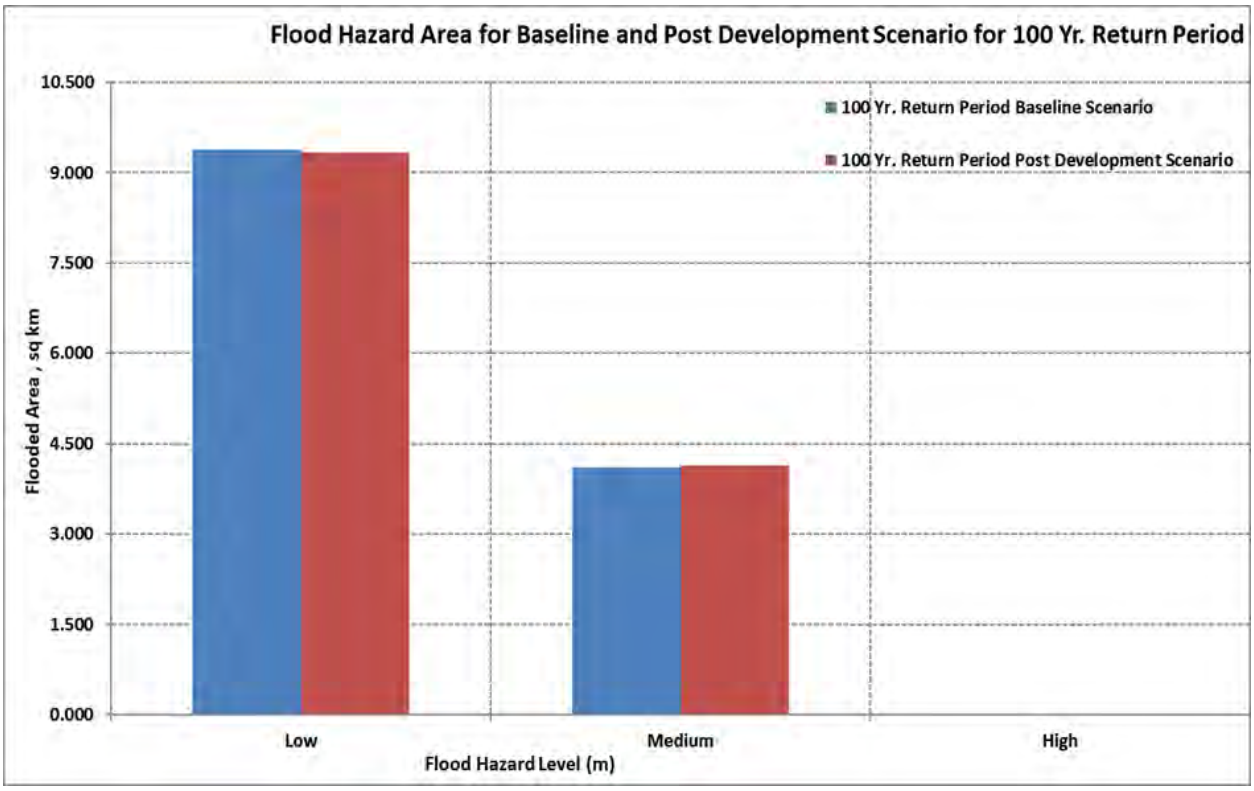
Figure 7-27: Graphical Comparison of Baseline and Post-Development Inundation Areas

Comparison of inundation area suggests that the areas do not change significantly between the baseline and post-development scenarios across all flood depth levels. In comparison with the baseline scenario, post development scenarios show a 0.072-square-kilometer (or 7.2-hectare) increase in the inundated area as a result of the Project.

The areas with the various flood hazard levels for the baseline and post-development scenarios are listed in Table 7-9 and shown on Figure 7-28.

Table 7-9: Flood Hazard Level Comparison between Baseline and Post-Development Scenarios

Flood Hazard Level	100-year Baseline Scenario Area (km^2)	100-yr Post-Development Scenario Area (km^2)
Low	9.385	9.328
Medium	4.110	4.143
High	0.000	0.000
Total Hazard Area	13.495	13.470



m = meter; sq km = square kilometer; yr = year

Figure 7-28: Flood Hazard Area Comparison Between Baseline and Post-Development Scenarios

Flood hazard area comparisons demonstrate that the areas corresponding to a medium flood hazard rating increase slightly in the post-development scenario, while areas corresponding to a low flood hazard rating decrease slightly. There are no high flood hazard areas modeled under both baseline and post-development scenarios. Overall, the development of the Project is expected to have a negligible impact on the overall flood risks in the area.

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APPENDIX D

Geology and Hydrogeology Reports

Resubmitted without changes

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ExxonMobil

Gas to Energy Environmental Impact Assessment Study

Groundwater Quality Baseline Study Report

March 2022

ERM The business of sustainability

CONSULTANTS INC.

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LIST OF ABBREVIATIONS

AC	Actual Coordinates
AOI	Area of influence
ATV	All-Terrain Vehicle
BGS	Below Ground Surface
EC	Estimated Coordinates
EEPGL	Esso Exploration and Production Guyana Limited
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
FPSO	Floating, Production, Storage, and Offloading
FSO	Field Safety Officer
GPS	Global Positioning System
GW	Groundwater
MOF	Materials Offloading Facility
NGL	Natural Gas Liquids
NTU	Nephelometric Turbidity Units
NWC	National Water Council
PPE	Personal Protective Equipment
ROW	Right of Way
VOA	Volatile Organic Compound Analysis

1. INTRODUCTION

1.1 Purpose

This Groundwater Study Report (Report) provides the results of the field sampling program to evaluate shallow groundwater resources ("the study") in support of an Environmental Impact Assessment (EIA) to be conducted for Esso Exploration and Production Guyana Limited's (EEPGL's) proposed Gas to Energy Project ("the Project"). This report provides the following: study objectives, background information on the groundwater resources, description of the work conducted in the study, presentation of field data collected as part of the study, presentation of the analytical results and a summary of findings.

1.2 Study Objective

The objective of the study was to collect data that can inform the assessment of potential Project impacts, and the development of appropriate mitigation measures to address these potential impacts, as warranted. The specific objectives were:

1. Evaluate the conditions of the groundwater table present within the low conductivity clays of the Project Area of Influence (AOI) that may require dewatering during excavation to support installation of the proposed pipeline or building foundations at the proposed NGL plant.
2. Evaluate the conditions of the sand aquifers below the proposed NGL plant that may support groundwater withdrawals for potential industrial or domestic use.

2. GROUNDWATER RESOURCES IN GUYANA

Guyana is famous for its large network of rivers, streams, reservoirs and drainage canals, accounting for the abundance of surface and groundwater resources in the country. These sources of water are used for the sustenance of the agriculture sector, domestic uses and for a variety of industrial purposes. Particularly, the groundwater system in Guyana comprises three main coastal aquifers. The characteristics of these aquifers were detailed by the US Army Corps of Engineers Mobile District & Topographic Engineering Center (1998).

Within the Project Area of Influence (AOI), groundwater is contributed to the canals and streams from water-bearing sands within the Demerara Clay. The Demerara Clay is a poorly-drained soil developed from fluvio-marine sediments in association with the Canje clays. It occurs at low elevations and is characterized by a thin (< 30 centimeters) peaty surface layer over a dark grey clay topsoil over a grey to greenish grey soft clay subsoil. These soils have been assigned Land Capability Subclass (IIIt) due to their high concentrations of toxic acid-sulphate salts; in that, they are marginal soils for agriculture use with severe limitations. They can be cultivated with difficulty, but generally should be left in their natural condition.

In Region 3, the Upper Sands aquifer, underlies the younger Demerara clays which were found to be of poor quality, saline and with a high iron content. This aquifer is approximately 30 to 60 meters deep and ranges in thickness from 15 to 120 meters; it is the shallowest of the three aquifers of the coastal aquifer system. The aquifer is composed of quartz grains, which represent former beach dune deposits. Within approximately 15 kilometers of the coast, groundwater in this formation is confined by the Demerara Clay. From about 15 to 35 kilometers inland to the outcrop of the White Sands Formation, the older Coropina Formation, also a marine clay, acts as the confining unit.

3. SCOPE AND METHODOLOGY

3.1 Logistics and Safety

A combination of international and local Guyanese staff were used to support the field sampling effort and provide health and safety oversight during the implementation of the study. The table below outlines the study team utilized in rotation throughout the study period.

Table 1: Groundwater sampling team

Name	Designation	Nationality	Company
Lalita Gopaul	Environmentalist	Guyanese	E&A Consultants Inc.
Delshah Hamid	Environmentalist	Guyanese	E&A Consultants Inc.
Esther Ugraj	Environmentalist	Guyanese	E&A Consultants Inc.
Oudho Homenauth	Soil Scientist	Guyanese	E&A Consultants Inc.
Shawn Griffith	Geologist	Guyanese	E&A Consultants Inc.
Nicholas Nagessar	Labourer	Guyanese	E&A Consultants Inc.
Nico Pineros	Field Safety Officer	Colombian	ERM
Nicholas Chin	Field Safety Officer	Guyanese	ERM

All work was completed safely without incidents, and in accordance with a Project task-specific health and safety plan.

3.2 Scope of Work

The scope of work sought to evaluate the conditions of the groundwater table present within the low conductivity clays at the proposed NGL plant and pipeline route by installing temporary shallow well points (i.e., piezometers) to facilitate collection of water quality samples. Along the pipeline route, groundwater samples were collected from four shallow piezometers. The selected points were derived to ensure that a suitable number of samples from the study area were collected and that they were distributed as evenly as possible. Due to access limitations, the proposed location GW-1 was eliminated and the location of point GW-2 was adjusted to provide coverage along the proposed pipeline corridor. Water samples were collected at three shallow piezometers (NGL-1, NGL-2 and NGL-3) and two deep wells (Piez-105 and Piez-106) across the NGL site. No samples were collected within the MOF site boundary due to access constraints. The number of samples collected in each area are detailed in Table 2. Sampling locations are displayed on Figure 1.

Table 2: Summary of Sample Locations Collected

Location	Water Samples	Locations
NGL Site	3 Shallow + 2 Deep	Collected three shallow (NGL-1, NGL-2, NGL-3) and 2 deep (Piez-105, Piez-106)
Onshore Pipeline	4 Shallow	Collected GW-2, GW-3, GW-4, GW-5
Total Number of Samples	9	

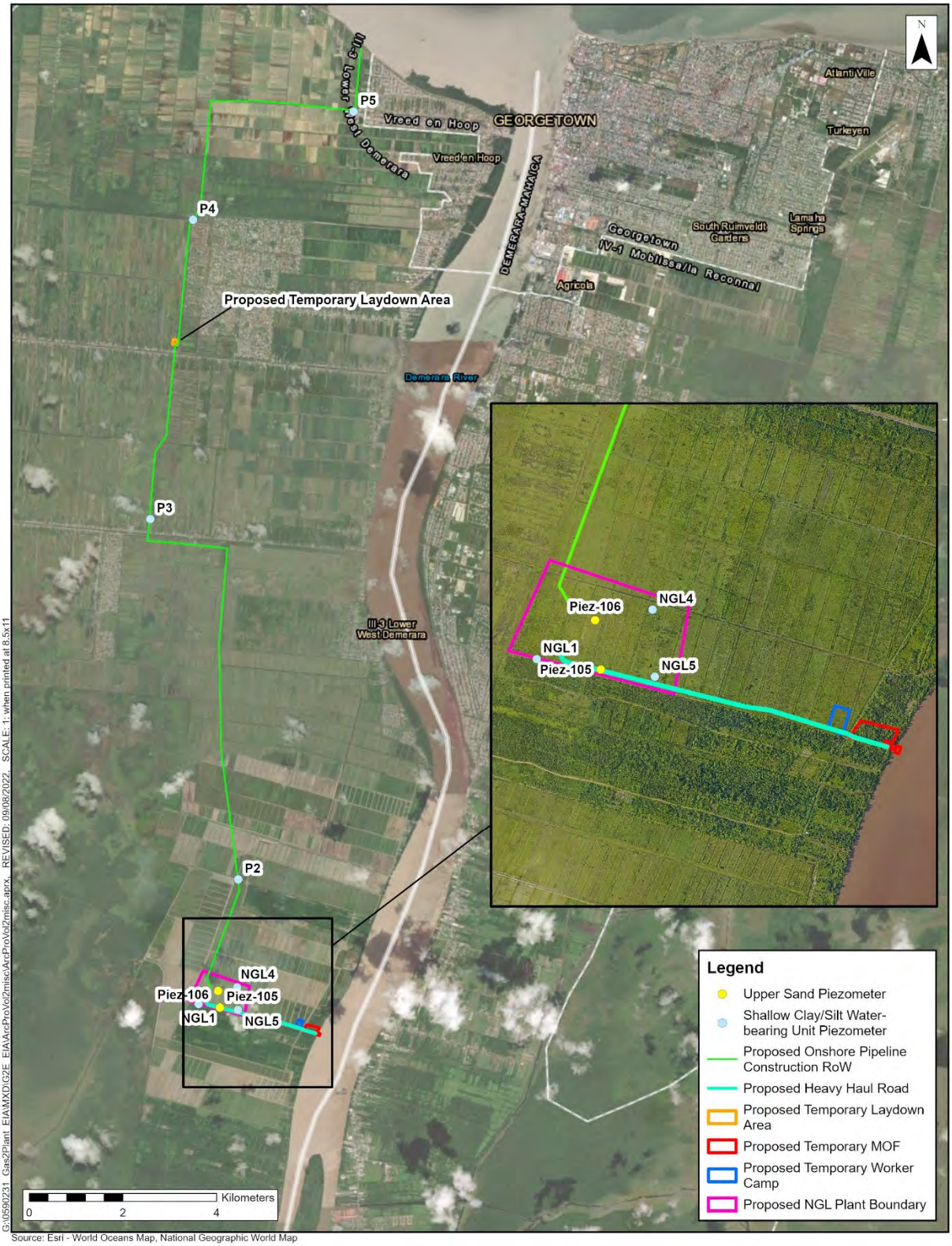

Figure 1: Sampling Locations

3.3 Methodology

This section describes the methodology for the installation of shallow piezometers, the collection of water quality samples from the shallow and deep piezometers, and the submittal of samples for laboratory analysis. This activity was carried out between 12 November 2021 and 26 January 2022.

3.3.1 Shallow Piezometer Installation

Following the completion of the borehole for soil characterization and sampling, the shallow groundwater piezometer was installed. A hand auger of 3.5 inches in diameter was used to core the boreholes to approximately 0.5 meters (m) past the first indication of groundwater; this depth was used since groundwater is typically located at a depth of approximately 1.5 – 3 m (5 - 10 feet) below ground surface (bgs) in the Project area. The lithology was logged by a soil scientist on site, in general accordance with the Unified Soil Classification System as presented in Appendix B and detailed in the Soil Quality Baseline Report. Soil cores were also inspected for any presence of contamination (e.g., staining, odors, and volatile organics vapors). Once the borehole was extended to the target depth a machine-slotted PVC pipe with a diameter of 2 inches and slots of 1.1 millimeter in width was driven into the borehole with the screened interval beneath the groundwater's surface to allow the flow of water through the 1.5 m screen section and into the temporary piezometer.

Following groundwater sampling, the PVC pipe was removed from the ground and the boreholes were backfilled using the removed soil cuttings.

3.3.2 Purging Shallow Piezometers for Sample Collection

Groundwater samples from the shallow piezometers were obtained using a clean dedicated bailer. Prior to initiating the purge, the amount of water standing in the water column (water inside the well riser and screen) was determined. The diameter of the well was determined and the water level and total depth of the well was measured and recorded (Table 3).

Table 3: Well Construction

Location	Location ID	GPS Coordinates	Elevation (ft)	Well Diameter (inch)	Total Depth of Well (ft)	Water Level (ft)	Volume of Water (gal)
Pipeline	GW-P05	6.8117470, -58.2080863	2	1.53	10.17	2.55	0.223
Pipeline	GW-P04	6.7907336, -58.2390132	10	1.53	7.87	4.53	0.098
Pipeline	GW-P03	6.7329442, -58.2472157	9	1.53	9.84	6.04	0.365
Pipeline	GW-P02	6.6633491, -58.2300426	8	1.53	10.61	9.39	0.117
NGL Property	G-P5	6.642618, -58.230178	10	1.53	7.56	3.74	0.37
NGL Property	G-P4	6.63830, -58.23005	15	1.53	7.83	3.22	0.442
NGL Property	G-P1	6.639429, -58.237620	16	1.53	7.97	5.28	0.258

Specific methodology for obtaining these measurements was found in SESD Operating Procedure for Groundwater Level and Well Depth Measurement (SESDPROC-105).
The volume of water to be purged was determined using the equation:

$$V = 0.156\ d^2h$$

Where: h = depth of water in feet

d = diameter of well in inches

V = volume of water in liters

Three well volumes were removed and water collected in the bailer was emptied into secondary containers to test for the field parameters pH, specific conductivity, temperature and turbidity on site. Measurement of pH and specific conductivity were made using a Premium Series PC60 5-in-1 portable pre-calibrated meter. The probe was rinsed in deionized water, blot dried, then dipped into the water sample collected into the meter's container and stirred gently. The meter probe was then held still and when the readings had stabilized the pH and specific conductivity values displayed were recorded. The temperature of the three well volumes of groundwater was measured once per well volume by submerging the thermometer two-thirds below the surface of the water in the container. The thermometer was allowed to adjust to the water temperature for one minute before the stabilized reading was then recorded. Turbidity was measured using pre-calibrated Hach 2100Q IS Portable Turbidimeter. The vial was rinsed three times using the groundwater from the sample to be tested and then filled with the sample. The vile was dried and cleaned, placed into the sample chamber of the turbidity meter, and after the status bar was completed, the nephelometric turbidity units (NTU) reading was recorded. Once the turbidity had stabilized over three to five consecutive measurements (below 10 NTU), pH remained constant within 0.1 Standard Unit (SU), and specific conductance varied no more than approximately 5 percent, the samples were ready to be bottled.

3.3.3 Purging Deep Piezometers for Sample Collection

Purging of the deep piezometers was performed following the U.S. Environmental Protection Agency low-flow groundwater sampling procedures (USEPA, 1996) using a peristatic pump and clean dedicated sample tubing. The procedures for low-flow purging and sampling used for the wells were as follows:

1. Prior to purging, the depth to water in the piezometers was measured to the nearest 0.1 centimeter.
2. Polyethylene tubing was used to purge the wells. The tubing was lowered slowly into the well, with the intake placed in the middle of the saturated or open screen interval.
3. When beginning to purge, the pump rate will be operated at its lowest setting in order to minimize disturbance of the water column.
4. The depth to water was measured frequently (e.g., every minute for the first few minutes, and every 5 minutes thereafter) to ensure that less than 0.1 m of drawdown occurs.
5. When purging the wells, the water level was not allowed to drop below the screened interval.
6. Using a flow-through cell or other apparatus, measurements of field parameters [pH, temperature, conductivity and turbidity] were collected at 5 minute intervals during purging of the monitoring well, until stabilization occurred. The flow cell was emptied as necessary to prevent turbidity build-up in the flow cell.

7. Stabilization was deemed to have occurred when three consecutive readings of parameters were within the levels specified below:

   - ± 0.1 units for pH;
   - ± 10% for temperature;
   - ± 3% for conductivity; and
   - ± 10% for turbidity.

VOCs were sampled by allowing the tubing to fill and pump rate was significantly reduced. The flow was then reversed to channel the water out of the small tubing and used to fill the volatile organic compound analysis (VOA) vials. Extra care was taken to avoid completely filling the tubing to prevent contact with the flexible pump head tubing. The method was repeated until all the VOC's sample containers were filled.

3.3.4 Sample Collection

Following stabilization of field parameters during purging of the piezometers, water collected in the bailer was emptied into sample jars supplied by the laboratory. Each sample was labeled with the name of sample collector, date of sampling and the time the actual sample was collected in the bottles. The sample jars were immediately sealed with mylar tape, covered in bubble wrap, sealed in Ziploc bags and placed in a cooler on wet ice. The chain-of-custody (COC) record was fully completed in duplicate by the environmentalist designated by the task manager as responsible for sample shipment to the appropriate laboratory for analysis. Samples that required a rapid turnaround in the laboratory, the environmentalist made note of same on the chain-of-custody "Remarks" section of the custody record. Bottle lot numbers for all sample bottles were also recorded on the COC form. When the team received the laboratory containers from the logistics company on 1 November 2021, the environmentalist checked to ensure the seals on bottles were intact.

After collection of the sample for laboratory analysis, all reusable equipment was cleaned to minimize the possibility of cross contamination. Sampling equipment were decontaminated using the following procedure:

- Initially wipe equipment of all foreign matter;
- Scrubbing equipment with brushes in a non-phosphate detergent solution;
- Double rinsing equipment with potable bottled water; and
- Allowing equipment to dry.

All decontamination water generated during sampling was discharged to the ground surface away from any storm drain or water body.

3.3.5 Documentation

Field notebooks were used to document daily site and task logs according to existing standard operating procedures in the Study Scope. The site log was the responsibility of the environmentalist and included the following information:

- Levels of personnel protection employed;
- Sampling GPS location, diameter of well, well depth, water level, volume of water in well;
- pH, temperature, conductivity and turbidity of sample;
- date, time, sampling personnel, and type of sampling;

- Sample numbers, shipping arrangements, and recipient laboratory;
- Photographic information and field observation, as appropriate; and
- A description of any unusual circumstances or project-related difficulties incurred.

Upon identification of the point for the extraction of the groundwater sample, the GPS coordinates were recorded in the field notebook using live coordinates from Google Earth application.

A digital camera was used to allow the photographic record to be possibly integrated into a Geographical Information System (GIS). Photographs were taken to show the soil extracted from each borehole. Photographs are included in Appendix A.

4. GROUNDWATER SAMPLING RESULTS

4.1 Field Parameters

The measured field parameters from the study sampling are summarized in Tables 4 and 5. The samples were analyzed for total solids and results were reported on a dry weight basis. Four well measurements were taken for each sample location; including well diameter, total depth of well, water level and volume of water. Water levels were measured from ground surface for both shallow and deep wells, and ranged from 2.55 to 9.39 feet below ground surface. Measured pH levels ranged from 3.70 to 6.84. On average, pH measurements from the pipeline were slightly more acidic than from the NGL property. Location GW-P04 recorded the highest average temperature of 30.9°C, while the lowest temperature of 25.5°C was recorded in samples collected in NGL Site at G-P5. Turbidity readings were measured, however, were over-ranged due to the sediment content within the wells.

Table 4: Results from Groundwater Sampling (Shallow Samples)

Location	Location ID	Sample No.	Prior to Initiating the Purge				Sample Parameters	
			Well Diameter (inch)	Total Depth of Well (ft)	Water Level (ft)	Volume of Water (gal)	pH	Temperature (°C)
Pipeline	GW-P05	1	1.53	10.17	2.55	0.223	6.76	29.7
		2					6.75	30.4
Pipeline	GW-P04	1	1.53	7.87	4.53	0.098	5.55	30.3
		2					5.78	30.6
		3					5.60	31.3
		4					5.60	31.4
Pipeline	GW-P03	1	1.53	9.84	6.04	0.365	3.70	30.0
		2					3.99	32.0
		3					3.84	32.1
		4					3.76	29.4
		5					3.82	29.4
Pipeline	GW-P02	1	1.53	10.61	9.39	0.117	6.74	28
		2					6.83	27.8
		3					6.84	28.2
NGL Property	G-P5	1	1.53	7.56	3.74	0.37	6.04	27.8
		2					6.13	27.2
		3					6.07	27.6
NGL Property	G-P4	1	1.53	7.83	3.22	0.442	6.47	28.6
		2					6.52	29.1
		3					6.48	29.3

Location	Location ID	Sample No.	Prior to Initiating the Purge				Sample Parameters	
			Well Diameter (inch)	Total Depth of Well (ft)	Water Level (ft)	Volume of Water (gal)	pH	Temperature (°C)
NGL Property	G-P1	1	1.53	7.97	5.28	0.258	6.40	29.2
		2					6.51	28.7
		3					6.41	28.3
		4					6.43	28.0

Table 5: Results from Groundwater Sampling (Deep Samples)

Location	Location ID	Sample No.	Prior to Initiating the Purge				Sample Parameters		
			Well Diameter (inch)	Total Well Depth (ft)	Water Level (cm)	Volume of Water (gal)	pH	Temperature (°C)	Conductivity (µS)
NGL Property	NGL-Piez-105		4	100	**Initial: 88.0**	63.71			
		1			86.8		6.85	27.5	669
		2			85.6		6.78	27.5	639
		3			84.4		6.76	28.0	573
		4			83.2		6.74	27.9	648
		5			82.0		6.74	28.4	651
	NGL-Piez-106		4	64.99	**Initial: 85.2**	37.93			
		1			84.0		7.92	27.2	748
		2			82.7		7.38	27.2	737
		3			81.5		7.32	27.3	732
		4			80.1		6.84	27.3	739
		5			78.9		6.83	27.4	747

4.2 Laboratory Analysis

Groundwater samples were submitted by ERM to a certified laboratory in the United States for analysis of water quality and contaminants of potential concern (ALS Environmental in Houston, Texas), including:

- General analytes and Metals using the USEPA 6020 method
- Organic Compounds including Volatiles and Semi-volatile Polynuclear Aromatic Hydrocarbons (PAHs) using the USEPA 8260 and USEPA 8270 methods
- Pesticides and Polychlorinated Biphenyls (PCBs) using the USEPA 8081 and 8082 methods
- Herbicides using the USEPA 8151 method

The laboratory reports will be provided with the EIA report.

5. REFERENCES

U.S. Army Corps of Engineers (USACE). 1998. Water Resources Assessment of Guyana. Mobile District & Topographic Engineering Center. December 1998.

United States Environmental Protection Agency (USEPA). 2013. Groundwater Sampling, SESDPROC-301-R3. Jonathan Vail. Region 4, USEPA, Science and Ecosystem Support Division. March 6, 2013, Page 26.

United States Environmental Protection Agency (USEPA). 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures. Prepared by Robert W. Puls and Michael J. Barcelona. Office of Solid Waste and Emergency Response. EPA/540/S-95/504, April 1996.

APPENDIX A - PHOTOLOG

Photos from Field Work

Photo 1: GW-05, Safety Moment at Crane West Coast Demerara

(Sunny Weather Condition) on Nov 15, 2021 6:39hrs. Photo taken by Delshah Hamid.

Photo 2: Traversing by foot to NGL 1

NGL Plant Site (Cloudy/Sunny Weather Condition) on December 02, 2021 at 08:09hrs. Photo taken by Alexander Ally.

Photo 3: Traversing via boat to NGL 1

NGL Plant Site (Cloudy/Sunny Weather Condition) on December 02, 2021 at 06:41hrs. Photo taken by Andrew Ally.

Photo 4: Traversing by ATV to NGL 5

NGL Plant Site (Sunny Weather Condition) on November 23, 2021 at 09:40hrs. Photo taken by Lalita Gopaul.

Photo 5: Removing soil cores from borehole

GW-03 along the proposed project pipeline (Sunny Weather Condition) on November 12, 2021 at 08:45hrs. Photo taken by Lalita Gopaul.

Photo 6: Soil core from borehole

GW-03 along the proposed project pipeline (Sunny Weather Condition) on November 12, 2021 at 09:29hrs. Photo taken by Lalita Gopaul.

Photo 7: Installing temporary piezometer

GW-04 along the proposed project pipeline (Sunny Weather Condition) on November 13, 2021 at 08:34hrs. Photo taken by Delshah Hamid.

Photo 8: Using a bailer to extract groundwater samples

NGL 4 at NGL Plant Site (Sunny Weather Condition) on November 23, 2021 at 11:44hrs. Photo taken by Lalita Gopaul.

Photo 9: Using a peristaltic pump to extract deep groundwater samples

NGL-Piez-105 at NGL Plant Site (Sunny Weather Condition) on November 23, 2021 at 11:44hrs. Photo taken by Lalita Gopaul.

Photo 10: Labelling groundwater samples

NGL 1 at NGL Plant Site (Cloudy/Sunny Weather Condition) on December 02, 2021 at 11:12 hrs. Photo taken by Alexander Ally.

Photo 11: Sealing and packaging groundwater samples

GW-05 along the proposed pipeline route (Cloudy/Sunny Weather Condition) on November 15, 2021 at 07:35 hrs. Photo taken by Lalita Gopaul.

Photo 12: Measuring Turbidity of groundwater samples

GW-05 along the proposed pipeline route (Cloudy/Sunny Weather Condition) on November 15, 2021 at 07:18 hrs. Photo taken by Lalita Gopaul.

Photo 13: Measuring pH of groundwater samples

GW-05 along the proposed pipeline route (Cloudy/Sunny Weather Condition) on November 15, 2021 at 07:19 hrs. Photo taken by Lalita Gopaul.

Photo 14: Measuring temperature of groundwater samples

GW-05 along the proposed pipeline route (Cloudy/Sunny Weather Condition) on November 15, 2021 at 07:21 hrs. Photo taken by Lalita Gopaul.

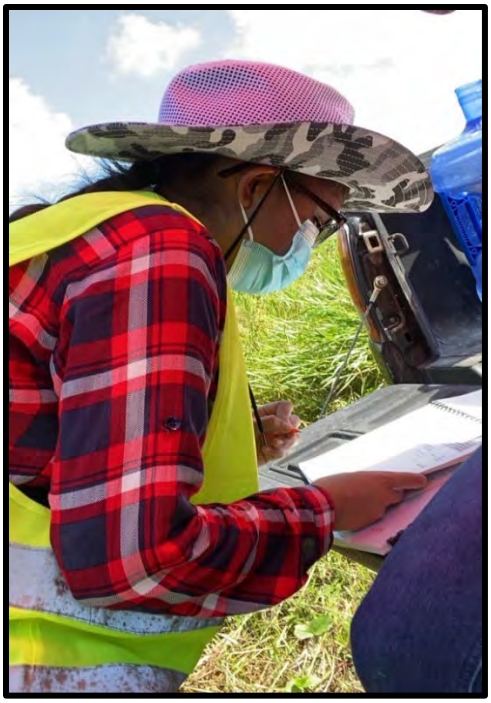

Photo 15: Completing daily task logs

GW-04 along the proposed pipeline route (Cloudy/Sunny Weather Condition) on November 13, 2021 at 10:34 hrs. Photo taken by Lalita Gopaul.

Photo 16: Backfilled sealed borehole:

GW-03 along the proposed pipeline route

(Cloudy/Sunny Weather Condition) on November 12, 2021 at 10:44 hrs. Photo taken by Lalita Gopaul.

Photo 17: Packaging samples for shipment

Packaging samples in coolers for shipment

(Indoor conditions) on January 27, 2022 at 09:02 hrs. Photo taken by Sharadha Sonaram.

APPENDIX B - SOIL BORING LOGS AND ASSOCIATED LITHOLOGY

Sampling Type	Location	Location ID	GPS Coordinates	Lithology	Date Sampled	Weather/ Condition
Shallow Sampling	Pipeline	GW-P05	Estimated: 6.81208173257,-58.2077920803 Actual: 6.8117470, -58.2080863	Blocky to massive structure clay Dark Brown (10YR 4/1) to grey (10YR 5/1) clay Slightly sticky and slightly plastic to sticky and plastic clay	11/15/2021	Sunny/ Cloudy
	Pipeline	GW-P04	Estimated: 6.78722551195,-58.24021333131 Actual: 6.7907336, -58.2390132	Massive Structure Clay Grey (10YR 5/1) to dark grey (10YR 4/1) clay Slightly sticky and slightly plastic clay	11/13/2021	Sunny/ Cloudy
	Pipeline	GW-P03	Estimated: 6.731144, -58.247266 Actual: 6.7329442, -58.2472157	Medium Granular to weak blocky structure Very dark gray (10YR 3/1) to gray (10YR 6/1) clay Plastic and slightly sticky to plastic and sticky	11/12/2021	Sunny/ Cloudy
	Pipeline	GW-P02	Estimated: 6.68964666213,-58.2333912135 Actual: 6.6633491, -58.2300426	Structure-less clay Pale brown (10YR 6/3) to pale brown (10YR 6/3) with light gray (10YR 7/1) clay Sticky and plastic; easily moulded clay	11/20/2021	Rainy/ Sunny/ Cloudy
	NGL Property	NGL 5	Estimated: 6.64146534817,-58.2294084687 Actual: 6.642618, -58.230178	Slightly prismatic to structure-less clay Dark grayish brown (10YR 4/2) to light gray (10YR 7/2) with yellow (10YR 7/8) mottles clay. Slightly sticky and plastic.	11/23/2021	Cloudy/ Sunny
	NGL Property	NGL 4	Estimated: 6.63903740562,-58.2302736117 Actual: 6.63830, -58.23005	Fine blocky structure to structureless clay Dark gray (10YR 4/1) to dark gray (10YR 4/1) with yellow (10YR 8/8) mottles clay Very sticky clay	11/23/2021	Cloudy/ Sunny
	NGL Property	NGL 1	Estimated: 6.64141768574,-58.237119226 Actual: 6.639429, -58.237620	Blocky clay Brown (10YR 5/3) with yellowish brown (10YR 5/8) mottles Slightly sticky and plastic clay	12/2/2021	Cloudy/ Sunny
Deep Sampling	NGL Property	NGL-Piez-105	Actual: 6.638766, -58.2334746	N/A	1/26/2022	Cloudy/ Rainy
	NGL Property	NGL-Piez-106	Actual: 6.6419396, -58.2338438	N/A	1/26/2022	Cloudy/ Rainy

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Laboratory Analytical Reports

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December 21, 2021

Herbert Pirela
ERM
180 Admiral Cochrance Dr
Suite 400
Annapolis, MD 21401

Work Order: **HS21111356**

Laboratory Results for: **Gas to Energy Environmental Impact Assessment Study**

Dear Herbert Pirela,

ALS Environmental received 3 sample(s) on Nov 22, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111356

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21111356-01	GW-P05	Groundwater		15-Nov-2021 07:15	22-Nov-2021 15:55	☐
HS21111356-02	GW-P04	Groundwater		13-Nov-2021 09:48	22-Nov-2021 15:55	☐
HS21111356-03	GW-P03	Groundwater		12-Nov-2021 10:17	23-Nov-2021 16:05	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111356

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

ECD Organics by Method SW8082

Batch ID: 172830

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Batch ID: 172971

Sample ID: MBLK-172971

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

ECD Organics by Method SW8081

Batch ID: 172970

Sample ID: GW-P03 (HS21111356-03)

• Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: LCS-172970

• The multi-response compounds toxaphene and chlordane were not included in the spiking solution for the LCS/LCSD.

Sample ID: MBLK-172970

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

Batch ID: 172829

Sample ID: GW-P04 (HS21111356-02)

• Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: LCS-172829

• The multi-response compounds toxaphene and chlordane were not included in the spiking solution for the LCS/LCSD.

Sample ID: MBLK-172829

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

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Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111356

ECD Organics by Method SW8151

Batch ID: 172969

Sample ID: GW-P03 (HS21111356-03)

- Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: LCS-172969

- LCSD double spike with surrogate and target analytes. All Reported samples are non detect. Unable to re-extract batch due to limited sample provided by client.

Sample ID: MBLK-172969

- Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

Batch ID: 172828

Sample ID: GW-P04 (HS21111356-02)

- Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: LCSD-172828

- LCS/LCSD RPD exceeded the laboratory acceptance limit. Recovery met acceptance criteria.
- LCSD double spike with surrogate and target analytes. All Reported samples are non detect. Unable to re-extract batch due to limited sample provided by client.

Sample ID: MBLK-172828

- Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

GCMS Semivolatiles by Method SW8270

Batch ID: 172827

Sample ID: GW-P04 (HS21111356-02)

- Sample extracted or prepared outside of hold time.

Batch ID: 172924

Sample ID: LCSD-172924

- The RPD between the LCS and LCSD was outside of the control limit.

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Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111356

GCMS Volatiles by Method SW8260

Batch ID: R396668

Sample ID: GW-P03 (HS21111356-03)

- Analyzed out of hold times due to samples received over the instruments capacities.

Sample ID: HS21111059-13MS

- MS and MSD are for an unrelated sample

Batch ID: R396583

Sample ID: GW-P04 (HS21111356-02)

- Analyzed out of hold times due to samples received over the instruments capacities.

Sample ID: HS21111000-22MS

- MS and MSD are for an unrelated sample

Metals by Method SW6020A

Batch ID: 173216

Sample ID: HS21111627-06MS

- MS and MSD are for an unrelated sample

Metals by Method SW7470A

Batch ID: 173148

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E120.1

Batch ID: R397104

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9060

Batch ID: R397217

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R396651

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111356

WetChemistry by Method SW9056

Batch ID: R397215

Sample ID: GW-P03 (HS21111356-03)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Sample ID: GW-P04 (HS21111356-02)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Sample ID: GW-P05 (HS21111356-01)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Batch ID: R397214

Sample ID: GW-P03 (HS21111356-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Batch ID: R396401

Sample ID: GW-P04 (HS21111356-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: GW-P05 (HS21111356-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.
- The reporting limit is elevated due to dilution for high concentrations of non-target analytes. (Nitrogen, Nitrate (As N))

WetChemistry by Method E365.3

Batch ID: 173275

Sample ID: HS21111248-01MS

- MS and MSD are for an unrelated sample

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P05 Lab ID:HS21111356-01
Collection Date: 15-Nov-2021 07:15 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: AKP
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
1,1,2,2-Tetrachloroethane	U		0.50	1.0	ug/L	1	29-Nov-2021 17:47
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.50	1.0	ug/L	1	29-Nov-2021 17:47
1,1,2-Trichloroethane	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
1,2,3-Trichlorobenzene	U		0.40	1.0	ug/L	1	29-Nov-2021 17:47
1,2,4-Trichlorobenzene	U		0.50	1.0	ug/L	1	29-Nov-2021 17:47
1,2-Dibromo-3-chloropropane	U		1.0	1.0	ug/L	1	29-Nov-2021 17:47
1,2-Dibromoethane	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
1,2-Dichlorobenzene	U		0.50	1.0	ug/L	1	29-Nov-2021 17:47
1,2-Dichloroethane	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
1,2-Dichloropropane	U		0.50	1.0	ug/L	1	29-Nov-2021 17:47
1,3-Dichlorobenzene	U		0.40	1.0	ug/L	1	29-Nov-2021 17:47
1,4-Dichlorobenzene	U		0.40	1.0	ug/L	1	29-Nov-2021 17:47
2-Butanone	U		0.50	2.0	ug/L	1	29-Nov-2021 17:47
2-Hexanone	U		1.0	2.0	ug/L	1	29-Nov-2021 17:47
4-Methyl-2-pentanone	U		0.70	2.0	ug/L	1	29-Nov-2021 17:47
Acetone	**6.5**		**2.0**	**2.0**	**ug/L**	1	29-Nov-2021 17:47
Benzene	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
Bromochloromethane	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
Bromodichloromethane	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
Bromoform	U		0.40	1.0	ug/L	1	29-Nov-2021 17:47
Bromomethane	U		0.40	1.0	ug/L	1	29-Nov-2021 17:47
Carbon disulfide	U		0.60	2.0	ug/L	1	29-Nov-2021 17:47
Carbon tetrachloride	U		0.50	1.0	ug/L	1	29-Nov-2021 17:47
Chlorobenzene	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Chloroethane	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Chloroform	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
Chloromethane	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
cis-1,2-Dichloroethene	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
cis-1,3-Dichloropropene	U		0.10	1.0	ug/L	1	29-Nov-2021 17:47
Cyclohexane	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Dibromochloromethane	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Dichlorodifluoromethane	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Ethylbenzene	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Isopropylbenzene	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
m,p-Xylene	U		0.50	2.0	ug/L	1	29-Nov-2021 17:47
Methyl acetate	U		1.0	1.0	ug/L	1	29-Nov-2021 17:47

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P05 Lab ID:HS21111356-01
Collection Date: 15-Nov-2021 07:15 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: AKP
Methyl tert-butyl ether	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
Methylcyclohexane	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Methylene chloride	U		1.0	2.0	ug/L	1	29-Nov-2021 17:47
o-Xylene	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Styrene	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Tetrachloroethene	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Toluene	**0.71**	J	**0.20**	**1.0**	**ug/L**	1	29-Nov-2021 17:47
trans-1,2-Dichloroethene	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
trans-1,3-Dichloropropene	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
Trichloroethene	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
Trichlorofluoromethane	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Vinyl chloride	U		0.20	1.0	ug/L	1	29-Nov-2021 17:47
Xylenes, Total	U		0.30	1.0	ug/L	1	29-Nov-2021 17:47
Surr: 1,2-Dichloroethane-d4	*98.9*			*70-126*	*%REC*	*1*	*29-Nov-2021 17:47*
Surr: 4-Bromofluorobenzene	*94.9*			*81-113*	*%REC*	*1*	*29-Nov-2021 17:47*
Surr: Dibromofluoromethane	*96.5*			*77-123*	*%REC*	*1*	*29-Nov-2021 17:47*
Surr: Toluene-d8	*98.4*			*82-127*	*%REC*	*1*	*29-Nov-2021 17:47*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P05 Lab ID:HS21111356-01
Collection Date: 15-Nov-2021 07:15 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**				Prep:SW3510 / 22-Nov-2021		Analyst: GEY
1-Methylnaphthalene	U		0.010	0.10	ug/L	1	07-Dec-2021 19:17
2-Methylnaphthalene	U		0.019	0.10	ug/L	1	07-Dec-2021 19:17
Acenaphthene	U		0.027	0.10	ug/L	1	07-Dec-2021 19:17
Acenaphthylene	U		0.015	0.10	ug/L	1	07-Dec-2021 19:17
Anthracene	U		0.014	0.10	ug/L	1	07-Dec-2021 19:17
Benz(a)anthracene	U		0.050	0.10	ug/L	1	07-Dec-2021 19:17
Benzo(a)pyrene	U		0.020	0.10	ug/L	1	07-Dec-2021 19:17
Benzo(b)fluoranthene	U		0.023	0.10	ug/L	1	07-Dec-2021 19:17
Benzo(g,h,i)perylene	U		0.014	0.10	ug/L	1	07-Dec-2021 19:17
Benzo(k)fluoranthene	U		0.019	0.10	ug/L	1	07-Dec-2021 19:17
Chrysene	U		0.021	0.10	ug/L	1	07-Dec-2021 19:17
Dibenz(a,h)anthracene	U		0.024	0.10	ug/L	1	07-Dec-2021 19:17
Fluoranthene	U		0.010	0.10	ug/L	1	07-Dec-2021 19:17
Fluorene	U		0.030	0.10	ug/L	1	07-Dec-2021 19:17
Indeno(1,2,3-cd)pyrene	U		0.022	0.10	ug/L	1	07-Dec-2021 19:17
Isophorone	U		0.025	0.20	ug/L	1	07-Dec-2021 19:17
Naphthalene	U		0.020	0.10	ug/L	1	07-Dec-2021 19:17
Phenanthrene	U		0.021	0.10	ug/L	1	07-Dec-2021 19:17
Pyrene	U		0.019	0.10	ug/L	1	07-Dec-2021 19:17
Surr: 2,4,6-Tribromophenol	*81.6*			*34-129*	*%REC*	*1*	*07-Dec-2021 19:17*
Surr: 2-Fluorobiphenyl	*76.5*			*40-125*	*%REC*	*1*	*07-Dec-2021 19:17*
Surr: 2-Fluorophenol	*73.8*			*20-120*	*%REC*	*1*	*07-Dec-2021 19:17*
Surr: 4-Terphenyl-d14	*100*			*40-135*	*%REC*	*1*	*07-Dec-2021 19:17*
Surr: Nitrobenzene-d5	*77.9*			*41-120*	*%REC*	*1*	*07-Dec-2021 19:17*
Surr: Phenol-d6	*70.7*			*20-120*	*%REC*	*1*	*07-Dec-2021 19:17*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P05 Lab ID:HS21111356-01
Collection Date: 15-Nov-2021 07:15 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3510 / 22-Nov-2021		Analyst: JBA
4,4´-DDD	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
4,4´-DDE	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
4,4´-DDT	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
Aldrin	U		0.0012	0.0012	ug/L	1	09-Dec-2021 02:23
alpha-BHC	**0.011**		**0.0012**	**0.0012**	**ug/L**	1	09-Dec-2021 02:23
alpha-Chlordane	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
beta-BHC	**0.0069**		**0.0012**	**0.0012**	**ug/L**	1	09-Dec-2021 02:23
Chlordane	U		0.025	0.025	ug/L	1	09-Dec-2021 02:23
delta-BHC	U		0.0012	0.0012	ug/L	1	09-Dec-2021 02:23
Dieldrin	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
Endosulfan I	U		0.0012	0.0012	ug/L	1	09-Dec-2021 02:23
Endosulfan II	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
Endosulfan sulfate	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
Endrin	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
Endrin aldehyde	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
Endrin ketone	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
gamma-BHC	U		0.0012	0.0012	ug/L	1	09-Dec-2021 02:23
gamma-Chlordane	U		0.0025	0.0025	ug/L	1	09-Dec-2021 02:23
Heptachlor	**0.0017**	P	**0.0012**	**0.0012**	**ug/L**	1	09-Dec-2021 02:23
Heptachlor epoxide	**0.0038**		**0.0012**	**0.0012**	**ug/L**	1	09-Dec-2021 02:23
Methoxychlor	U		0.012	0.012	ug/L	1	09-Dec-2021 02:23
Toxaphene	U		0.025	0.025	ug/L	1	09-Dec-2021 02:23
Surr: Decachlorobiphenyl	*96.5*			*55-145*	*%REC*	*1*	*09-Dec-2021 02:23*
Surr: Tetrachloro-m-xylene	*106*			*52-142*	*%REC*	*1*	*09-Dec-2021 02:23*
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3510C/3665A / 22-Nov-2021		Analyst: JBA
Aroclor 1016	U		0.0125	0.0125	ug/L	1	23-Nov-2021 18:47
Aroclor 1221	U		0.0125	0.0125	ug/L	1	23-Nov-2021 18:47
Aroclor 1232	U		0.0125	0.0125	ug/L	1	23-Nov-2021 18:47
Aroclor 1242	U		0.0125	0.0125	ug/L	1	23-Nov-2021 18:47
Aroclor 1248	U		0.0125	0.0125	ug/L	1	23-Nov-2021 18:47
Aroclor 1254	U		0.0125	0.0125	ug/L	1	23-Nov-2021 18:47
Aroclor 1260	U		0.0125	0.0125	ug/L	1	23-Nov-2021 18:47
PCBs (Total)	U		0.0125	0.0125	ug/L	1	23-Nov-2021 18:47
Surr: Decachlorobiphenyl	*86.9*			*54-140*	*%REC*	*1*	*23-Nov-2021 18:47*
Surr: Tetrachloro-m-xylene	*67.7*			*53-137*	*%REC*	*1*	*23-Nov-2021 18:47*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P05 Lab ID:HS21111356-01
Collection Date: 15-Nov-2021 07:15 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
CHLORINATED HERBICIDES BY SW8151A		**Method:SW8151**			Prep:SW8151 / 22-Nov-2021		Analyst: JBA
2,4,5-T	U		0.0500	0.200	ug/L	1	01-Dec-2021 22:13
2,4,5-TP (Silvex)	U		0.0500	0.200	ug/L	1	01-Dec-2021 22:13
2,4-D	U		0.0600	0.200	ug/L	1	01-Dec-2021 22:13
2,4-DB	U		0.0800	0.400	ug/L	1	01-Dec-2021 22:13
Dalapon	U		0.0700	0.200	ug/L	1	01-Dec-2021 22:13
Dicamba	U		0.0500	0.200	ug/L	1	01-Dec-2021 22:13
Dichlorprop	U		0.0800	0.400	ug/L	1	01-Dec-2021 22:13
Dinoseb	U		0.0500	0.300	ug/L	1	01-Dec-2021 22:13
MCPA	U		8.10	30.0	ug/L	1	01-Dec-2021 22:13
MCPP	U		8.10	30.0	ug/L	1	01-Dec-2021 22:13
Surr: DCAA	*116*			*50-130*	*%REC*	*1*	*01-Dec-2021 22:13*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 06-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	07-Dec-2021 17:50
Arsenic	**0.127**		**0.000400**	**0.00200**	**mg/L**	1	07-Dec-2021 17:50
Beryllium	**0.0143**		**0.000200**	**0.00200**	**mg/L**	1	07-Dec-2021 17:50
Cadmium	**0.000434**	J	**0.000200**	**0.00200**	**mg/L**	1	07-Dec-2021 17:50
Chromium	**0.0615**		**0.000400**	**0.00400**	**mg/L**	1	07-Dec-2021 17:50
Copper	**0.0478**		**0.00100**	**0.00200**	**mg/L**	1	07-Dec-2021 17:50
Iron	**419**		**0.600**	**10.0**	**mg/L**	50	08-Dec-2021 12:06
Lead	**0.323**		**0.000600**	**0.00200**	**mg/L**	1	07-Dec-2021 17:50
Manganese	**13.3**		**0.0350**	**0.250**	**mg/L**	50	08-Dec-2021 12:06
Nickel	**0.126**		**0.000600**	**0.00200**	**mg/L**	1	07-Dec-2021 17:50
Potassium	**50.7**		**0.0180**	**0.200**	**mg/L**	1	07-Dec-2021 17:50
Selenium	**0.00765**		**0.00110**	**0.00200**	**mg/L**	1	07-Dec-2021 17:50
Silver	U		0.000200	0.00200	mg/L	1	07-Dec-2021 17:50
Thallium	U		0.000200	0.00200	mg/L	1	07-Dec-2021 17:50
Zinc	**0.626**		**0.00200**	**0.00400**	**mg/L**	1	07-Dec-2021 17:50
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 03-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	03-Dec-2021 12:54
SPECIFIC CONDUCTANCE BY E120.1, 1982		**Method:E120.1**					Analyst: MZD
Specific Conductance	**14,600**		**50.0**	**50.0**	**umhos/cm**	10	07-Dec-2021 12:13
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**9.35**		**0.200**	**0.500**	**mg/L**	1	07-Dec-2021 14:20
PH BY SW9040C		**Method:SW9040C**					Analyst: SH
pH	**6.69**	H	**0.100**	**0.100**	**pH Units**	1	30-Nov-2021 15:00
Temp Deg C @pH	**20.8**	H	**0**	**0**	**DEG C**	1	30-Nov-2021 15:00
ANIONS BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate (As N)	**0.908**	H	**0.150**	**0.500**	**mg/L**	5	23-Nov-2021 11:30

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P05 Lab ID:HS21111356-01
Collection Date: 15-Nov-2021 07:15 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
NITRATE/NITRITE BY IC BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate-Nitrite	**1.76**	J	**0.600**	**4.00**	**mg/L**	20	08-Dec-2021 11:20
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**					Analyst: JAC
Organic Carbon, Total	**33.8**		**0.500**	**1.00**	**mg/L**	1	08-Dec-2021 14:07

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RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P04 Lab ID:HS21111356-02
Collection Date: 13-Nov-2021 09:48 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: AKP
1,1,1-Trichloroethane	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
1,1,2,2-Tetrachloroethane	U	H	0.50	1.0	ug/L	1	29-Nov-2021 18:09
1,1,2-Trichlor-1,2,2-trifluoroethane	U	H	0.50	1.0	ug/L	1	29-Nov-2021 18:09
1,1,2-Trichloroethane	U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
1,1-Dichloroethane	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
1,1-Dichloroethene	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
1,2,3-Trichlorobenzene	U	H	0.40	1.0	ug/L	1	29-Nov-2021 18:09
1,2,4-Trichlorobenzene	U	H	0.50	1.0	ug/L	1	29-Nov-2021 18:09
1,2-Dibromo-3-chloropropane	U	H	1.0	1.0	ug/L	1	29-Nov-2021 18:09
1,2-Dibromoethane	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
1,2-Dichlorobenzene	U	H	0.50	1.0	ug/L	1	29-Nov-2021 18:09
1,2-Dichloroethane	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
1,2-Dichloropropane	U	H	0.50	1.0	ug/L	1	29-Nov-2021 18:09
1,3-Dichlorobenzene	U	H	0.40	1.0	ug/L	1	29-Nov-2021 18:09
1,4-Dichlorobenzene	U	H	0.40	1.0	ug/L	1	29-Nov-2021 18:09
2-Butanone	**4.4**	H	**0.50**	**2.0**	**ug/L**	1	29-Nov-2021 18:09
2-Hexanone	U	H	1.0	2.0	ug/L	1	29-Nov-2021 18:09
4-Methyl-2-pentanone	U	H	0.70	2.0	ug/L	1	29-Nov-2021 18:09
Acetone	**13**	H	**2.0**	**2.0**	**ug/L**	1	29-Nov-2021 18:09
Benzene	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
Bromochloromethane	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
Bromodichloromethane	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
Bromoform	U	H	0.40	1.0	ug/L	1	29-Nov-2021 18:09
Bromomethane	U	H	0.40	1.0	ug/L	1	29-Nov-2021 18:09
Carbon disulfide	U	H	0.60	2.0	ug/L	1	29-Nov-2021 18:09
Carbon tetrachloride	U	H	0.50	1.0	ug/L	1	29-Nov-2021 18:09
Chlorobenzene	U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Chloroethane	U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Chloroform	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
Chloromethane	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
cis-1,2-Dichloroethene	U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
cis-1,3-Dichloropropene	U	H	0.10	1.0	ug/L	1	29-Nov-2021 18:09
Cyclohexane	U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Dibromochloromethane	U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Dichlorodifluoromethane	U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Ethylbenzene	U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Isopropylbenzene	U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
m,p-Xylene	U	H	0.50	2.0	ug/L	1	29-Nov-2021 18:09
Methyl acetate	U	H	1.0	1.0	ug/L	1	29-Nov-2021 18:09

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RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P04 Lab ID:HS21111356-02
Collection Date: 13-Nov-2021 09:48 Matrix:Groundwater

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: AKP
Methyl tert-butyl ether		U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
Methylcyclohexane		U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Methylene chloride		U	H	1.0	2.0	ug/L	1	29-Nov-2021 18:09
o-Xylene		U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Styrene		U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Tetrachloroethene		U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Toluene		U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
trans-1,2-Dichloroethene		U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
trans-1,3-Dichloropropene		U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
Trichloroethene		U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
Trichlorofluoromethane		U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Vinyl chloride		U	H	0.20	1.0	ug/L	1	29-Nov-2021 18:09
Xylenes, Total		U	H	0.30	1.0	ug/L	1	29-Nov-2021 18:09
Surr: 1,2-Dichloroethane-d4	*98.6*				*70-126*	*%REC*	*1*	*29-Nov-2021 18:09*
Surr: 4-Bromofluorobenzene	*93.7*				*81-113*	*%REC*	*1*	*29-Nov-2021 18:09*
Surr: Dibromofluoromethane	*97.8*				*77-123*	*%REC*	*1*	*29-Nov-2021 18:09*
Surr: Toluene-d8	*99.7*				*82-127*	*%REC*	*1*	*29-Nov-2021 18:09*

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RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P04 Lab ID:HS21111356-02
Collection Date: 13-Nov-2021 09:48 Matrix:Groundwater

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**					Prep:SW3510 / 22-Nov-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	07-Dec-2021 19:36
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	07-Dec-2021 19:36
Acenaphthene	U	H		0.027	0.10	ug/L	1	07-Dec-2021 19:36
Acenaphthylene	U	H		0.015	0.10	ug/L	1	07-Dec-2021 19:36
Anthracene	U	H		0.014	0.10	ug/L	1	07-Dec-2021 19:36
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	07-Dec-2021 19:36
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	07-Dec-2021 19:36
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	07-Dec-2021 19:36
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	07-Dec-2021 19:36
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	07-Dec-2021 19:36
Chrysene	U	H		0.021	0.10	ug/L	1	07-Dec-2021 19:36
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	07-Dec-2021 19:36
Fluoranthene	U	H		0.010	0.10	ug/L	1	07-Dec-2021 19:36
Fluorene	U	H		0.030	0.10	ug/L	1	07-Dec-2021 19:36
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	07-Dec-2021 19:36
Isophorone	U	H		0.025	0.20	ug/L	1	07-Dec-2021 19:36
Naphthalene	U	H		0.020	0.10	ug/L	1	07-Dec-2021 19:36
Phenanthrene	U	H		0.021	0.10	ug/L	1	07-Dec-2021 19:36
Pyrene	U	H		0.019	0.10	ug/L	1	07-Dec-2021 19:36
Surr: 2,4,6-Tribromophenol	*86.1*				*34-129*	*%REC*	*1*	*07-Dec-2021 19:36*
Surr: 2-Fluorobiphenyl	*79.2*				*40-125*	*%REC*	*1*	*07-Dec-2021 19:36*
Surr: 2-Fluorophenol	*81.0*				*20-120*	*%REC*	*1*	*07-Dec-2021 19:36*
Surr: 4-Terphenyl-d14	*97.0*				*40-135*	*%REC*	*1*	*07-Dec-2021 19:36*
Surr: Nitrobenzene-d5	*84.8*				*41-120*	*%REC*	*1*	*07-Dec-2021 19:36*
Surr: Phenol-d6	*71.0*				*20-120*	*%REC*	*1*	*07-Dec-2021 19:36*

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RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P04 Lab ID:HS21111356-02
Collection Date: 13-Nov-2021 09:48 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3510 / 22-Nov-2021		Analyst: JBA
4,4´-DDD	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
4,4´-DDE	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
4,4´-DDT	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
Aldrin	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 02:45
alpha-BHC	**0.0080**	H	**0.0012**	**0.0012**	**ug/L**	1	09-Dec-2021 02:45
alpha-Chlordane	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
beta-BHC	**0.0013**	HP	**0.0012**	**0.0012**	**ug/L**	1	09-Dec-2021 02:45
Chlordane	U	H	0.025	0.025	ug/L	1	09-Dec-2021 02:45
delta-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 02:45
Dieldrin	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
Endosulfan I	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 02:45
Endosulfan II	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
Endosulfan sulfate	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
Endrin	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
Endrin aldehyde	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
Endrin ketone	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
gamma-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 02:45
gamma-Chlordane	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 02:45
Heptachlor	**0.0020**	HP	**0.0012**	**0.0012**	**ug/L**	1	09-Dec-2021 02:45
Heptachlor epoxide	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 02:45
Methoxychlor	U	H	0.012	0.012	ug/L	1	09-Dec-2021 02:45
Toxaphene	U	H	0.025	0.025	ug/L	1	09-Dec-2021 02:45
Surr: Decachlorobiphenyl	*121*			*55-145*	*%REC*	*1*	*09-Dec-2021 02:45*
Surr: Tetrachloro-m-xylene	*113*			*52-142*	*%REC*	*1*	*09-Dec-2021 02:45*
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3510C/3665A / 22-Nov-2021		Analyst: JBA
Aroclor 1016	U		0.0125	0.0125	ug/L	1	23-Nov-2021 19:04
Aroclor 1221	U		0.0125	0.0125	ug/L	1	23-Nov-2021 19:04
Aroclor 1232	U		0.0125	0.0125	ug/L	1	23-Nov-2021 19:04
Aroclor 1242	U		0.0125	0.0125	ug/L	1	23-Nov-2021 19:04
Aroclor 1248	U		0.0125	0.0125	ug/L	1	23-Nov-2021 19:04
Aroclor 1254	U		0.0125	0.0125	ug/L	1	23-Nov-2021 19:04
Aroclor 1260	U		0.0125	0.0125	ug/L	1	23-Nov-2021 19:04
PCBs (Total)	U		0.0125	0.0125	ug/L	1	23-Nov-2021 19:04
Surr: Decachlorobiphenyl	*121*			*54-140*	*%REC*	*1*	*23-Nov-2021 19:04*
Surr: Tetrachloro-m-xylene	*94.0*			*53-137*	*%REC*	*1*	*23-Nov-2021 19:04*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P04 Lab ID:HS21111356-02
Collection Date: 13-Nov-2021 09:48 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
CHLORINATED HERBICIDES BY SW8151A		**Method:SW8151**			Prep:SW8151 / 22-Nov-2021		Analyst: JBA
2,4,5-T	U	H	0.0500	0.200	ug/L	1	01-Dec-2021 22:31
2,4,5-TP (Silvex)	U	H	0.0500	0.200	ug/L	1	01-Dec-2021 22:31
2,4-D	U	H	0.0600	0.200	ug/L	1	01-Dec-2021 22:31
2,4-DB	U	H	0.0800	0.400	ug/L	1	01-Dec-2021 22:31
Dalapon	U	H	0.0700	0.200	ug/L	1	01-Dec-2021 22:31
Dicamba	U	H	0.0500	0.200	ug/L	1	01-Dec-2021 22:31
Dichlorprop	U	H	0.0800	0.400	ug/L	1	01-Dec-2021 22:31
Dinoseb	U	H	0.0500	0.300	ug/L	1	01-Dec-2021 22:31
MCPA	U	H	8.10	30.0	ug/L	1	01-Dec-2021 22:31
MCPP	U	H	8.10	30.0	ug/L	1	01-Dec-2021 22:31
Surr: DCAA	*87.3*			*50-130*	*%REC*	*1*	*01-Dec-2021 22:31*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 06-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	07-Dec-2021 20:35
Arsenic	**0.0254**		**0.000400**	**0.00200**	**mg/L**	1	07-Dec-2021 20:35
Beryllium	**0.0203**		**0.000200**	**0.00200**	**mg/L**	1	07-Dec-2021 20:35
Cadmium	**0.000284**	J	**0.000200**	**0.00200**	**mg/L**	1	07-Dec-2021 20:35
Chromium	**0.0229**		**0.000400**	**0.00400**	**mg/L**	1	07-Dec-2021 20:35
Copper	**0.00160**	J	**0.00100**	**0.00200**	**mg/L**	1	07-Dec-2021 20:35
Iron	**386**		**0.600**	**10.0**	**mg/L**	50	08-Dec-2021 12:08
Lead	**0.0291**		**0.000600**	**0.00200**	**mg/L**	1	07-Dec-2021 20:35
Manganese	**2.85**		**0.0350**	**0.250**	**mg/L**	50	08-Dec-2021 12:08
Nickel	**0.0855**		**0.000600**	**0.00200**	**mg/L**	1	07-Dec-2021 20:35
Potassium	**14.7**		**0.0180**	**0.200**	**mg/L**	1	07-Dec-2021 20:35
Selenium	**0.00479**		**0.00110**	**0.00200**	**mg/L**	1	07-Dec-2021 20:35
Silver	U		0.000200	0.00200	mg/L	1	07-Dec-2021 20:35
Thallium	U		0.000200	0.00200	mg/L	1	07-Dec-2021 20:35
Zinc	**1.52**		**0.00200**	**0.00400**	**mg/L**	1	07-Dec-2021 20:35
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 03-Dec-2021		Analyst: MSC
Mercury	**0.0000670**	J	**0.0000300**	**0.000200**	**mg/L**	1	03-Dec-2021 12:55
SPECIFIC CONDUCTANCE BY E120.1, 1982		**Method:E120.1**					Analyst: MZD
Specific Conductance	**367**		**5.00**	**5.00**	**umhos/cm**	1	07-Dec-2021 12:13
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**3.86**		**0.200**	**0.500**	**mg/L**	1	07-Dec-2021 14:20
PH BY SW9040C		**Method:SW9040C**					Analyst: SH
pH	**4.88**	H	**0.100**	**0.100**	**pH Units**	1	30-Nov-2021 15:00
Temp Deg C @pH	**20.5**	H	**0**	**0**	**DEG C**	1	30-Nov-2021 15:00
ANIONS BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate (As N)	**0.105**	H	**0.0300**	**0.100**	**mg/L**	1	23-Nov-2021 11:52

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P04 Lab ID:HS21111356-02
Collection Date: 13-Nov-2021 09:48 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
NITRATE/NITRITE BY IC BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate-Nitrite	**2.58**	J	**0.600**	**4.00**	**mg/L**	20	08-Dec-2021 11:42
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**					Analyst: JAC
Organic Carbon, Total	**20.8**		**0.500**	**1.00**	**mg/L**	1	08-Dec-2021 14:42

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P03 Lab ID:HS21111356-03
Collection Date: 12-Nov-2021 10:17 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: AKP
1,1,1-Trichloroethane	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
1,1,2,2-Tetrachloroethane	U	H	0.50	1.0	ug/L	1	30-Nov-2021 15:02
1,1,2-Trichlor-1,2,2-trifluoroethane	U	H	0.50	1.0	ug/L	1	30-Nov-2021 15:02
1,1,2-Trichloroethane	U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
1,1-Dichloroethane	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
1,1-Dichloroethene	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
1,2,3-Trichlorobenzene	U	H	0.40	1.0	ug/L	1	30-Nov-2021 15:02
1,2,4-Trichlorobenzene	U	H	0.50	1.0	ug/L	1	30-Nov-2021 15:02
1,2-Dibromo-3-chloropropane	U	H	1.0	1.0	ug/L	1	30-Nov-2021 15:02
1,2-Dibromoethane	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
1,2-Dichlorobenzene	U	H	0.50	1.0	ug/L	1	30-Nov-2021 15:02
1,2-Dichloroethane	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
1,2-Dichloropropane	U	H	0.50	1.0	ug/L	1	30-Nov-2021 15:02
1,3-Dichlorobenzene	U	H	0.40	1.0	ug/L	1	30-Nov-2021 15:02
1,4-Dichlorobenzene	U	H	0.40	1.0	ug/L	1	30-Nov-2021 15:02
2-Butanone	U	H	0.50	2.0	ug/L	1	30-Nov-2021 15:02
2-Hexanone	U	H	1.0	2.0	ug/L	1	30-Nov-2021 15:02
4-Methyl-2-pentanone	U	H	0.70	2.0	ug/L	1	30-Nov-2021 15:02
Acetone	**4.7**	H	**2.0**	**2.0**	**ug/L**	1	30-Nov-2021 15:02
Benzene	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
Bromochloromethane	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
Bromodichloromethane	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
Bromoform	U	H	0.40	1.0	ug/L	1	30-Nov-2021 15:02
Bromomethane	U	H	0.40	1.0	ug/L	1	30-Nov-2021 15:02
Carbon disulfide	**1.2**	JH	**0.60**	**2.0**	**ug/L**	1	30-Nov-2021 15:02
Carbon tetrachloride	U	H	0.50	1.0	ug/L	1	30-Nov-2021 15:02
Chlorobenzene	U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Chloroethane	U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Chloroform	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
Chloromethane	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
cis-1,2-Dichloroethene	U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
cis-1,3-Dichloropropene	U	H	0.10	1.0	ug/L	1	30-Nov-2021 15:02
Cyclohexane	U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Dibromochloromethane	U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Dichlorodifluoromethane	U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Ethylbenzene	U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Isopropylbenzene	U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
m,p-Xylene	U	H	0.50	2.0	ug/L	1	30-Nov-2021 15:02
Methyl acetate	U	H	1.0	1.0	ug/L	1	30-Nov-2021 15:02

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P03 Lab ID:HS21111356-03
Collection Date: 12-Nov-2021 10:17 Matrix:Groundwater

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**						Analyst: AKP
Methyl tert-butyl ether		U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
Methylcyclohexane		U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Methylene chloride		U	H	1.0	2.0	ug/L	1	30-Nov-2021 15:02
o-Xylene		U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Styrene		U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Tetrachloroethene		U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Toluene		U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
trans-1,2-Dichloroethene		U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
trans-1,3-Dichloropropene		U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
Trichloroethene		U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
Trichlorofluoromethane		U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Vinyl chloride		U	H	0.20	1.0	ug/L	1	30-Nov-2021 15:02
Xylenes, Total		U	H	0.30	1.0	ug/L	1	30-Nov-2021 15:02
Surr: 1,2-Dichloroethane-d4	*95.6*				*70-126*	*%REC*	*1*	*30-Nov-2021 15:02*
Surr: 4-Bromofluorobenzene	*91.8*				*81-113*	*%REC*	*1*	*30-Nov-2021 15:02*
Surr: Dibromofluoromethane	*98.1*				*77-123*	*%REC*	*1*	*30-Nov-2021 15:02*
Surr: Toluene-d8	*98.9*				*82-127*	*%REC*	*1*	*30-Nov-2021 15:02*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P03 Lab ID:HS21111356-03
Collection Date: 12-Nov-2021 10:17 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**				Prep:SW3510 / 24-Nov-2021		Analyst: GEY
1-Methylnaphthalene	U	H	0.012	0.12	ug/L	1	07-Dec-2021 19:56
2-Methylnaphthalene	**0.040**	JH	**0.024**	**0.12**	**ug/L**	1	07-Dec-2021 19:56
Acenaphthene	U	H	0.034	0.12	ug/L	1	07-Dec-2021 19:56
Acenaphthylene	U	H	0.019	0.12	ug/L	1	07-Dec-2021 19:56
Anthracene	U	H	0.018	0.12	ug/L	1	07-Dec-2021 19:56
Benz(a)anthracene	U	H	0.062	0.12	ug/L	1	07-Dec-2021 19:56
Benzo(a)pyrene	U	H	0.025	0.12	ug/L	1	07-Dec-2021 19:56
Benzo(b)fluoranthene	U	H	0.029	0.12	ug/L	1	07-Dec-2021 19:56
Benzo(g,h,i)perylene	U	H	0.018	0.12	ug/L	1	07-Dec-2021 19:56
Benzo(k)fluoranthene	U	H	0.024	0.12	ug/L	1	07-Dec-2021 19:56
Chrysene	U	H	0.026	0.12	ug/L	1	07-Dec-2021 19:56
Dibenz(a,h)anthracene	U	H	0.030	0.12	ug/L	1	07-Dec-2021 19:56
Fluoranthene	**0.029**	JH	**0.012**	**0.12**	**ug/L**	1	07-Dec-2021 19:56
Fluorene	U	H	0.038	0.12	ug/L	1	07-Dec-2021 19:56
Indeno(1,2,3-cd)pyrene	U	H	0.028	0.12	ug/L	1	07-Dec-2021 19:56
Isophorone	U	H	0.031	0.25	ug/L	1	07-Dec-2021 19:56
Naphthalene	U	H	0.025	0.12	ug/L	1	07-Dec-2021 19:56
Phenanthrene	**0.056**	JH	**0.026**	**0.12**	**ug/L**	1	07-Dec-2021 19:56
Pyrene	**0.026**	JH	**0.024**	**0.12**	**ug/L**	1	07-Dec-2021 19:56
Surr: 2,4,6-Tribromophenol	*79.1*			*34-129*	*%REC*	*1*	*07-Dec-2021 19:56*
Surr: 2-Fluorobiphenyl	*79.2*			*40-125*	*%REC*	*1*	*07-Dec-2021 19:56*
Surr: 2-Fluorophenol	*81.7*			*20-120*	*%REC*	*1*	*07-Dec-2021 19:56*
Surr: 4-Terphenyl-d14	*102*			*40-135*	*%REC*	*1*	*07-Dec-2021 19:56*
Surr: Nitrobenzene-d5	*91.3*			*41-120*	*%REC*	*1*	*07-Dec-2021 19:56*
Surr: Phenol-d6	*73.4*			*20-120*	*%REC*	*1*	*07-Dec-2021 19:56*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P03 Lab ID:HS21111356-03
Collection Date: 12-Nov-2021 10:17 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3510 / 29-Nov-2021		Analyst: JBA
4,4´-DDD	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
4,4´-DDE	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
4,4´-DDT	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
Aldrin	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 03:08
alpha-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 03:08
alpha-Chlordane	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
beta-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 03:08
Chlordane	U	H	0.025	0.025	ug/L	1	09-Dec-2021 03:08
delta-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 03:08
Dieldrin	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
Endosulfan I	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 03:08
Endosulfan II	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
Endosulfan sulfate	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
Endrin	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
Endrin aldehyde	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
Endrin ketone	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
gamma-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 03:08
gamma-Chlordane	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 03:08
Heptachlor	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 03:08
Heptachlor epoxide	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 03:08
Methoxychlor	U	H	0.012	0.012	ug/L	1	09-Dec-2021 03:08
Toxaphene	U	H	0.025	0.025	ug/L	1	09-Dec-2021 03:08
Surr: Decachlorobiphenyl	*106*			*55-145*	*%REC*	*1*	*09-Dec-2021 03:08*
Surr: Tetrachloro-m-xylene	*86.0*			*52-142*	*%REC*	*1*	*09-Dec-2021 03:08*
PCBS BY SW8082A	**Method:SW8082**				Prep:SW3510C/3665A / 29-Nov-2021		Analyst: JBA
Aroclor 1016	U		0.0125	0.0125	ug/L	1	01-Dec-2021 16:35
Aroclor 1221	U		0.0125	0.0125	ug/L	1	01-Dec-2021 16:35
Aroclor 1232	U		0.0125	0.0125	ug/L	1	01-Dec-2021 16:35
Aroclor 1242	U		0.0125	0.0125	ug/L	1	01-Dec-2021 16:35
Aroclor 1248	U		0.0125	0.0125	ug/L	1	01-Dec-2021 16:35
Aroclor 1254	U		0.0125	0.0125	ug/L	1	01-Dec-2021 16:35
Aroclor 1260	U		0.0125	0.0125	ug/L	1	01-Dec-2021 16:35
PCBs (Total)	U		0.0125	0.0125	ug/L	1	01-Dec-2021 16:35
Surr: Decachlorobiphenyl	*97.2*			*54-140*	*%REC*	*1*	*01-Dec-2021 16:35*
Surr: Tetrachloro-m-xylene	*79.0*			*53-137*	*%REC*	*1*	*01-Dec-2021 16:35*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P03 Lab ID:HS21111356-03
Collection Date: 12-Nov-2021 10:17 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
CHLORINATED HERBICIDES BY SW8151A		**Method:SW8151**			Prep:SW8151 / 29-Nov-2021		Analyst: JBA
2,4,5-T	U	H	0.0500	0.200	ug/L	1	02-Dec-2021 04:23
2,4,5-TP (Silvex)	U	H	0.0500	0.200	ug/L	1	02-Dec-2021 04:23
2,4-D	U	H	0.0600	0.200	ug/L	1	02-Dec-2021 04:23
2,4-DB	U	H	0.0800	0.400	ug/L	1	02-Dec-2021 04:23
Dalapon	U	H	0.0700	0.200	ug/L	1	02-Dec-2021 04:23
Dicamba	U	H	0.0500	0.200	ug/L	1	02-Dec-2021 04:23
Dichlorprop	U	H	0.0800	0.400	ug/L	1	02-Dec-2021 04:23
Dinoseb	U	H	0.0500	0.300	ug/L	1	02-Dec-2021 04:23
MCPA	U	H	8.10	30.0	ug/L	1	02-Dec-2021 04:23
MCPP	U	H	8.10	30.0	ug/L	1	02-Dec-2021 04:23
Surr: DCAA	*113*			*50-130*	*%REC*	*1*	*02-Dec-2021 04:23*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 06-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	07-Dec-2021 20:37
Arsenic	**0.119**		**0.000400**	**0.00200**	**mg/L**	1	07-Dec-2021 20:37
Beryllium	**0.00394**		**0.000200**	**0.00200**	**mg/L**	1	07-Dec-2021 20:37
Cadmium	**0.000550**	J	**0.000200**	**0.00200**	**mg/L**	1	07-Dec-2021 20:37
Chromium	**0.0431**		**0.000400**	**0.00400**	**mg/L**	1	07-Dec-2021 20:37
Copper	U		0.00100	0.00200	mg/L	1	07-Dec-2021 20:37
Iron	**280**		**0.240**	**4.00**	**mg/L**	20	08-Dec-2021 12:10
Lead	**0.104**		**0.000600**	**0.00200**	**mg/L**	1	07-Dec-2021 20:37
Manganese	**0.632**		**0.000700**	**0.00500**	**mg/L**	1	07-Dec-2021 20:37
Nickel	**0.0981**		**0.000600**	**0.00200**	**mg/L**	1	07-Dec-2021 20:37
Potassium	**8.59**		**0.0180**	**0.200**	**mg/L**	1	07-Dec-2021 20:37
Selenium	**0.00347**		**0.00110**	**0.00200**	**mg/L**	1	07-Dec-2021 20:37
Silver	U		0.000200	0.00200	mg/L	1	07-Dec-2021 20:37
Thallium	**0.000223**	J	**0.000200**	**0.00200**	**mg/L**	1	07-Dec-2021 20:37
Zinc	**0.594**		**0.00200**	**0.00400**	**mg/L**	1	07-Dec-2021 20:37
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 03-Dec-2021		Analyst: MSC
Mercury	**0.0000700**	J	**0.0000300**	**0.000200**	**mg/L**	1	03-Dec-2021 12:57
SPECIFIC CONDUCTANCE BY E120.1, 1982		**Method:E120.1**					Analyst: MZD
Specific Conductance	**1,080**		**5.00**	**5.00**	**umhos/cm**	1	07-Dec-2021 12:13
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**0.410**	J	**0.200**	**0.500**	**mg/L**	1	07-Dec-2021 14:20
PH BY SW9040C		**Method:SW9040C**					Analyst: SH
pH	**4.40**	H	**0.100**	**0.100**	**pH Units**	1	30-Nov-2021 15:00
Temp Deg C @pH	**20.8**	H	**0**	**0**	**DEG C**	1	30-Nov-2021 15:00
ANIONS BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate (As N)	**0.0760**	JH	**0.0300**	**0.100**	**mg/L**	1	08-Dec-2021 10:20

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111356
Sample ID: GW-P03 Lab ID:HS21111356-03
Collection Date: 12-Nov-2021 10:17 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
NITRATE/NITRITE BY IC BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate-Nitrite	**2.68**	J	**0.600**	**4.00**	**mg/L**	20	08-Dec-2021 11:50
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**					Analyst: JAC
Organic Carbon, Total	**19.9**		**0.500**	**1.00**	**mg/L**	1	08-Dec-2021 15:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

Batch ID: 172827 **Start Date:** 22 Nov 2021 17:00 **End Date:** 22 Nov 2021 19:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21111356-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 172828 **Start Date:** 22 Nov 2021 15:30 **End Date:** 23 Nov 2021 09:30
Method: HERBICIDE AQ SEP FUN EXTRACT-SW8151 **Prep Code:** 3510_H

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-01	1	1000 (mL)	10 (mL)	0.01	1-liter amber glass, Neat
HS21111356-02	1	1000 (mL)	10 (mL)	0.01	1-liter amber glass, Neat

Batch ID: 172829 **Start Date:** 22 Nov 2021 15:30 **End Date:** 22 Nov 2021 18:30
Method: PEST AQ SEP FUN EXTRACT-SW3510C **Prep Code:** 3510_P_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21111356-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 172830 **Start Date:** 22 Nov 2021 15:30 **End Date:** 22 Nov 2021 19:00
Method: PCBS AQ SEP FUN EXTRACT-SW3510C **Prep Code:** 3510_PCB_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21111356-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 172924 **Start Date:** 24 Nov 2021 15:04 **End Date:** 24 Nov 2021 18:00
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-03	1	800 (mL)	1 (mL)	0.00125	1-liter amber glass, Neat

Batch ID: 172969 **Start Date:** 29 Nov 2021 07:00 **End Date:** 29 Nov 2021 15:00
Method: HERBICIDE AQ SEP FUN EXTRACT-SW8151 **Prep Code:** 3510_H

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-03	1	1000 (mL)	10 (mL)	0.01	1-liter amber glass, Neat

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Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

Batch ID: 172970 **Start Date:** 29 Nov 2021 07:00 **End Date:** 29 Nov 2021 12:30
Method: PEST AQ SEP FUN EXTRACT-SW3510C **Prep Code:** 3510_P_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 172971 **Start Date:** 29 Nov 2021 08:00 **End Date:** 29 Nov 2021 13:00
Method: PCBS AQ SEP FUN EXTRACT-SW3510C **Prep Code:** 3510_PCB_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173148 **Start Date:** 03 Dec 2021 08:03 **End Date:** 03 Dec 2021 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21111356-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21111356-03		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173216 **Start Date:** 06 Dec 2021 12:00 **End Date:** 06 Dec 2021 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21111356-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21111356-03		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173275 **Start Date:** 07 Dec 2021 10:00 **End Date:** 07 Dec 2021 12:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111356-01		5 (mg/L)	50 (mL)	10	500 mL plastic, H2SO4 to pH <2
HS21111356-02		5 (mg/L)	50 (mL)	10	500 mL plastic, H2SO4 to pH <2
HS21111356-03		5 (mg/L)	50 (mL)	10	500 mL plastic, H2SO4 to pH <2

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 172827 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15		22 Nov 2021 18:28	07 Dec 2021 19:17	1
HS21111356-02	GW-P04	13 Nov 2021 09:48		22 Nov 2021 18:28	07 Dec 2021 19:36	1
Batch ID: 172828 (0)	**Test Name :** CHLORINATED HERBICIDES BY SW8151A				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15		22 Nov 2021 18:33	01 Dec 2021 22:13	1
HS21111356-02	GW-P04	13 Nov 2021 09:48		22 Nov 2021 18:33	01 Dec 2021 22:31	1
Batch ID: 172829 (0)	**Test Name :** ORGANOCHLORINE PESTICIDES BY SW8081B				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15		22 Nov 2021 18:35	09 Dec 2021 02:23	1
HS21111356-02	GW-P04	13 Nov 2021 09:48		22 Nov 2021 18:35	09 Dec 2021 02:45	1
Batch ID: 172830 (0)	**Test Name :** PCBS BY SW8082A				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15		22 Nov 2021 18:36	23 Nov 2021 18:47	1
HS21111356-02	GW-P04	13 Nov 2021 09:48		22 Nov 2021 18:36	23 Nov 2021 19:04	1
Batch ID: 172924 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Groundwater	
HS21111356-03	GW-P03	12 Nov 2021 10:17		24 Nov 2021 15:04	07 Dec 2021 19:56	1
Batch ID: 172969 (0)	**Test Name :** CHLORINATED HERBICIDES BY SW8151A				**Matrix:** Groundwater	
HS21111356-03	GW-P03	12 Nov 2021 10:17		29 Nov 2021 13:41	02 Dec 2021 04:23	1
Batch ID: 172970 (0)	**Test Name :** ORGANOCHLORINE PESTICIDES BY SW8081B				**Matrix:** Groundwater	
HS21111356-03	GW-P03	12 Nov 2021 10:17		29 Nov 2021 13:42	09 Dec 2021 03:08	1
Batch ID: 172971 (0)	**Test Name :** PCBS BY SW8082A				**Matrix:** Groundwater	
HS21111356-03	GW-P03	12 Nov 2021 10:17		29 Nov 2021 13:42	01 Dec 2021 16:35	1
Batch ID: 173148 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15		03 Dec 2021 08:03	03 Dec 2021 12:54	1
HS21111356-02	GW-P04	13 Nov 2021 09:48		03 Dec 2021 08:03	03 Dec 2021 12:55	1
HS21111356-03	GW-P03	12 Nov 2021 10:17		03 Dec 2021 08:03	03 Dec 2021 12:57	1
Batch ID: 173216 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15		06 Dec 2021 16:00	08 Dec 2021 12:06	50
HS21111356-01	GW-P05	15 Nov 2021 07:15		06 Dec 2021 16:00	07 Dec 2021 17:50	1
HS21111356-02	GW-P04	13 Nov 2021 09:48		06 Dec 2021 16:00	08 Dec 2021 12:08	50
HS21111356-02	GW-P04	13 Nov 2021 09:48		06 Dec 2021 16:00	07 Dec 2021 20:35	1
HS21111356-03	GW-P03	12 Nov 2021 10:17		06 Dec 2021 16:00	08 Dec 2021 12:10	20
HS21111356-03	GW-P03	12 Nov 2021 10:17		06 Dec 2021 16:00	07 Dec 2021 20:37	1
Batch ID: 173275 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15		07 Dec 2021 10:00	07 Dec 2021 14:20	1
HS21111356-02	GW-P04	13 Nov 2021 09:48		07 Dec 2021 10:00	07 Dec 2021 14:20	1
HS21111356-03	GW-P03	12 Nov 2021 10:17		07 Dec 2021 10:00	07 Dec 2021 14:20	1

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R396401 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15			23 Nov 2021 11:30	5
HS21111356-02	GW-P04	13 Nov 2021 09:48			23 Nov 2021 11:52	1
Batch ID: R396583 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15			29 Nov 2021 17:47	1
HS21111356-02	GW-P04	13 Nov 2021 09:48			29 Nov 2021 18:09	1
Batch ID: R396651 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15			30 Nov 2021 15:00	1
HS21111356-02	GW-P04	13 Nov 2021 09:48			30 Nov 2021 15:00	1
HS21111356-03	GW-P03	12 Nov 2021 10:17			30 Nov 2021 15:00	1
Batch ID: R396668 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Groundwater	
HS21111356-03	GW-P03	12 Nov 2021 10:17			30 Nov 2021 15:02	1
Batch ID: R397104 (0)	**Test Name :** SPECIFIC CONDUCTANCE BY E120.1, 1982				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15			07 Dec 2021 12:13	10
HS21111356-02	GW-P04	13 Nov 2021 09:48			07 Dec 2021 12:13	1
HS21111356-03	GW-P03	12 Nov 2021 10:17			07 Dec 2021 12:13	1
Batch ID: R397214 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Groundwater	
HS21111356-03	GW-P03	12 Nov 2021 10:17			08 Dec 2021 10:20	1
Batch ID: R397215 (0)	**Test Name :** NITRATE/NITRITE BY IC BY SW9056A				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15			08 Dec 2021 11:20	20
HS21111356-02	GW-P04	13 Nov 2021 09:48			08 Dec 2021 11:42	20
HS21111356-03	GW-P03	12 Nov 2021 10:17			08 Dec 2021 11:50	20
Batch ID: R397217 (0)	**Test Name :** TOTAL ORGANIC CARBON BY SW9060A				**Matrix:** Groundwater	
HS21111356-01	GW-P05	15 Nov 2021 07:15			08 Dec 2021 14:07	1
HS21111356-02	GW-P04	13 Nov 2021 09:48			08 Dec 2021 14:42	1
HS21111356-03	GW-P03	12 Nov 2021 10:17			08 Dec 2021 15:00	1

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172828 (0) **Instrument: ECD_13** **Method: CHLORINATED HERBICIDES BY SW8151A**

MBLK Sample ID: **MBLK-172828** Units: **ug/L** Analysis Date: **01-Dec-2021 21:20**
Client ID: Run ID: **ECD_13_396860** SeqNo: **6403325** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	U	0.200								
2,4,5-TP (Silvex)	U	0.200								
2,4-D	U	0.200								
2,4-DB	U	0.400								
Dalapon	U	0.200								
Dicamba	U	0.200								
Dichlorprop	U	0.400								
Dinoseb	U	0.300								
MCPA	U	30.0								
MCPP	U	30.0								
Surr: DCAA	*4.386*	*0*	*5*	*0*	*87.7*	*50 - 130*				

LCS Sample ID: **LCS-172828** Units: **ug/L** Analysis Date: **01-Dec-2021 21:02**
Client ID: Run ID: **ECD_13_396860** SeqNo: **6403324** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	2.381	0.200	2.5	0	95.2	44 - 122				
2,4,5-TP (Silvex)	2.483	0.200	2.5	0	99.3	49 - 126				
2,4-D	2.103	0.200	2.5	0	84.1	39 - 120				
2,4-DB	2.529	0.400	2.5	0	101	44 - 120				
Dalapon	2.395	0.200	2.5	0	95.8	40 - 120				
Dicamba	2.386	0.200	2.5	0	95.4	60 - 120				
Dichlorprop	2.371	0.400	2.5	0	94.8	68 - 122				
Dinoseb	2.214	0.300	2.5	0	88.5	28 - 115				
MCPA	244.9	30.0	250	0	98.0	62 - 144				
MCPP	320.7	30.0	250	0	128	60 - 133				
Surr: DCAA	*4.128*	*0*	*5*	*0*	*82.6*	*50 - 130*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172828 (0) **Instrument: ECD_13** **Method: CHLORINATED HERBICIDES BY SW8151A**

LCSD Sample ID: **LCSD-172828** Units: **ug/L** Analysis Date: **01-Dec-2021 21:38**
Client ID: Run ID: **ECD_13_396860** SeqNo: **6403326** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	5.134	0.200	5	0	103	44 - 122	2.381	73.3	30	R
2,4,5-TP (Silvex)	3.833	0.200	5	0	76.7	49 - 126	2.483	42.7	30	R
2,4-D	5.067	0.200	5	0	101	39 - 120	2.103	82.7	30	R
2,4-DB	4.298	0.400	5	0	86.0	44 - 120	2.529	51.8	30	R
Dalapon	3.863	0.200	5	0	77.3	40 - 120	2.395	46.9	30	R
Dicamba	3.949	0.200	5	0	79.0	60 - 120	2.386	49.3	30	R
Dichlorprop	4.194	0.400	5	0	83.9	68 - 122	2.371	55.5	30	R
Dinoseb	4.436	0.300	5	0	88.7	28 - 115	2.214	66.8	30	R
MCPA	461.6	30.0	500	0	92.3	62 - 144	244.9	61.3	30	R
MCPP	472.2	30.0	500	0	94.4	60 - 133	320.7	38.2	30	R
Surr: DCAA	*7.408*	*0*	*10*	*0*	*74.1*	*50 - 130*	*4.128*	*56.9*	*30*	R

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172829 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MBLK Sample ID: **MBLK-172829** Units: **ug/L** Analysis Date: **08-Dec-2021 20:48**
Client ID: Run ID: **ECD_11_397313** SeqNo: **6413868** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	U	0.0025								
4,4´-DDE	U	0.0025								
4,4´-DDT	U	0.0025								
Aldrin	U	0.0012								
alpha-BHC	U	0.0012								
alpha-Chlordane	U	0.0025								
beta-BHC	U	0.0012								
Chlordane	U	0.025								
delta-BHC	U	0.0012								
Dieldrin	U	0.0025								
Endosulfan I	U	0.0012								
Endosulfan II	U	0.0025								
Endosulfan sulfate	U	0.0025								
Endrin	U	0.0025								
Endrin aldehyde	U	0.0025								
Endrin ketone	U	0.0025								
gamma-BHC	U	0.0012								
gamma-Chlordane	U	0.0025								
Heptachlor	U	0.0012								
Heptachlor epoxide	U	0.0012								
Methoxychlor	U	0.012								
Toxaphene	U	0.025								
Surr: Decachlorobiphenyl	*0.0225*	*0*	*0.02*	*0*	*112*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.02272*	*0*	*0.02*	*0*	*114*	*52 - 142*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172829 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS-172829** Units: **ug/L** Analysis Date: **08-Dec-2021 21:11**
Client ID: Run ID: **ECD_11_397313** SeqNo: **6413869** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	0.05279	0.0025	0.05	0	106	53 - 144				
4,4´-DDE	0.04802	0.0025	0.05	0	96.0	55 - 144				
4,4´-DDT	0.05668	0.0025	0.05	0	113	53 - 149				
Aldrin	0.02663	0.0012	0.025	0	107	47 - 141				
alpha-BHC	0.02674	0.0012	0.025	0	107	51 - 141				
alpha-Chlordane	0.0268	0.0025	0.025	0	107	55 - 141				
beta-BHC	0.02582	0.0012	0.025	0	103	58 - 144				
delta-BHC	0.02598	0.0012	0.025	0	104	48 - 146				
Dieldrin	0.05266	0.0025	0.05	0	105	56 - 144				
Endosulfan I	0.02223	0.0012	0.025	0	88.9	55 - 141				
Endosulfan II	0.04249	0.0025	0.05	0	85.0	57 - 144				
Endosulfan sulfate	0.0521	0.0025	0.05	0	104	58 - 145				
Endrin	0.05809	0.0025	0.05	0	116	60 - 163				
Endrin aldehyde	0.04829	0.0025	0.05	0	96.6	59 - 158				
Endrin ketone	0.05098	0.0025	0.05	0	102	59 - 154				
gamma-BHC	0.02688	0.0012	0.025	0	108	53 - 142				
gamma-Chlordane	0.02673	0.0025	0.025	0	107	55 - 137				
Heptachlor	0.02852	0.0012	0.025	0	114	51 - 144				
Heptachlor epoxide	0.02704	0.0012	0.025	0	108	55 - 142				
Methoxychlor	0.266	0.012	0.25	0	106	50 - 150				
Surr: Decachlorobiphenyl	*0.02307*	*0*	*0.02*	*0*	*115*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.02238*	*0*	*0.02*	*0*	*112*	*52 - 142*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172829 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCSD Sample ID: **LCSD-172829** Units: **ug/L** Analysis Date: **08-Dec-2021 21:33**
Client ID: Run ID: **ECD_11_397313** SeqNo: **6413870** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
4,4´-DDD	0.05124	0.0025	0.05	0	102	53 - 144	0.05279	2.97	30	
4,4´-DDE	0.04661	0.0025	0.05	0	93.2	55 - 144	0.04802	2.98	30	
4,4´-DDT	0.05551	0.0025	0.05	0	111	53 - 149	0.05668	2.09	30	
Aldrin	0.02629	0.0012	0.025	0	105	47 - 141	0.02663	1.29	30	
alpha-BHC	0.02635	0.0012	0.025	0	105	51 - 141	0.02674	1.48	30	
alpha-Chlordane	0.02625	0.0025	0.025	0	105	55 - 141	0.0268	2.06	30	
beta-BHC	0.02523	0.0012	0.025	0	101	58 - 144	0.02582	2.3	30	
delta-BHC	0.02523	0.0012	0.025	0	101	48 - 146	0.02598	2.91	30	
Dieldrin	0.05093	0.0025	0.05	0	102	56 - 144	0.05266	3.35	30	
Endosulfan I	0.02159	0.0012	0.025	0	86.4	55 - 141	0.02223	2.93	30	
Endosulfan II	0.041	0.0025	0.05	0	82.0	57 - 144	0.04249	3.57	30	
Endosulfan sulfate	0.05103	0.0025	0.05	0	102	58 - 145	0.0521	2.07	30	
Endrin	0.05786	0.0025	0.05	0	116	60 - 163	0.05809	0.395	30	
Endrin aldehyde	0.04691	0.0025	0.05	0	93.8	59 - 158	0.04829	2.9	30	
Endrin ketone	0.04985	0.0025	0.05	0	99.7	59 - 154	0.05098	2.25	30	
gamma-BHC	0.02628	0.0012	0.025	0	105	53 - 142	0.02688	2.27	30	
gamma-Chlordane	0.02621	0.0025	0.025	0	105	55 - 137	0.02673	1.95	30	
Heptachlor	0.02822	0.0012	0.025	0	113	51 - 144	0.02852	1.07	30	
Heptachlor epoxide	0.02651	0.0012	0.025	0	106	55 - 142	0.02704	1.98	30	
Methoxychlor	0.2624	0.012	0.25	0	105	50 - 150	0.266	1.35	30	
Surr: Decachlorobiphenyl	*0.02217*	*0*	*0.02*	*0*	*111*	*55 - 145*	*0.02307*	*3.97*	*30*	
Surr: Tetrachloro-m-xylene	*0.02236*	*0*	*0.02*	*0*	*112*	*52 - 142*	*0.02238*	*0.121*	*30*	

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172830 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MBLK Sample ID: **MBLK-172830** Units: **ug/L** Analysis Date: **23-Nov-2021 19:21**
Client ID: Run ID: **ECD_7_396359** SeqNo: **6390955** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	U	0.0125								
Aroclor 1221	U	0.0125								
Aroclor 1232	U	0.0125								
Aroclor 1242	U	0.0125								
Aroclor 1248	U	0.0125								
Aroclor 1254	U	0.0125								
Aroclor 1260	U	0.0125								
PCBs (Total)	U	0.0125								
Surr: Decachlorobiphenyl	*0.01969*	*0.00125*	*0.02*	*0*	*98.4*	*54 - 140*				
Surr: Tetrachloro-m-xylene	*0.016*	*0.00125*	*0.02*	*0*	*80.0*	*53 - 137*				

LCS Sample ID: **LCS-172830** Units: **ug/L** Analysis Date: **23-Nov-2021 19:39**
Client ID: Run ID: **ECD_7_396359** SeqNo: **6390956** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	0.4151	0.0125	0.5	0	83.0	54 - 138				
Aroclor 1260	0.464	0.0125	0.5	0	92.8	57 - 136				
Surr: Decachlorobiphenyl	*0.0195*	*0.00125*	*0.02*	*0*	*97.5*	*54 - 140*				
Surr: Tetrachloro-m-xylene	*0.01808*	*0.00125*	*0.02*	*0*	*90.4*	*53 - 137*				

LCSD Sample ID: **LCSD-172830** Units: **ug/L** Analysis Date: **23-Nov-2021 19:56**
Client ID: Run ID: **ECD_7_396359** SeqNo: **6390957** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	0.429	0.0125	0.5	0	85.8	54 - 138	0.4151	3.3	30	
Aroclor 1260	0.4751	0.0125	0.5	0	95.0	57 - 136	0.464	2.37	30	
Surr: Decachlorobiphenyl	*0.0216*	*0.00125*	*0.02*	*0*	*108*	*54 - 140*	*0.0195*	*10.2*	*30*	
Surr: Tetrachloro-m-xylene	*0.01948*	*0.00125*	*0.02*	*0*	*97.4*	*53 - 137*	*0.01808*	*7.44*	*30*	

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172969 (0) **Instrument: ECD_13** **Method: CHLORINATED HERBICIDES BY SW8151A**

MBLK Sample ID: **MBLK-172969** Units: **ug/L** Analysis Date: **02-Dec-2021 04:58**
Client ID: Run ID: **ECD_13_397321** SeqNo: **6413998** PrepDate: **29-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	U	0.200								
2,4,5-TP (Silvex)	U	0.200								
2,4-D	U	0.200								
2,4-DB	U	0.400								
Dalapon	U	0.200								
Dicamba	U	0.200								
Dichlorprop	U	0.400								
Dinoseb	U	0.300								
MCPA	U	30.0								
MCPP	U	30.0								
Surr: DCAA	*4.16*	*0*	*5*	*0*	*83.2*	*50 - 130*				

LCS Sample ID: **LCS-172969** Units: **ug/L** Analysis Date: **02-Dec-2021 04:41**
Client ID: Run ID: **ECD_13_397321** SeqNo: **6413997** PrepDate: **29-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	5.13	0.200	5	0	103	44 - 122				
2,4,5-TP (Silvex)	3.863	0.200	5	0	77.3	49 - 126				
2,4-D	5.064	0.200	5	0	101	39 - 120				
2,4-DB	4.47	0.400	5	0	89.4	44 - 120				
Dalapon	3.249	0.200	5	0	65.0	40 - 120				
Dicamba	4.169	0.200	5	0	83.4	60 - 120				
Dichlorprop	4.255	0.400	5	0	85.1	68 - 122				
Dinoseb	4.609	0.300	5	0	92.2	28 - 115				
MCPA	506.1	30.0	500	0	101	62 - 144				
MCPP	503.7	30.0	500	0	101	60 - 133				
Surr: DCAA	*8.126*	*0*	*10*	*0*	*81.3*	*50 - 130*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172969 (0) **Instrument: ECD_13** **Method: CHLORINATED HERBICIDES BY SW8151A**

LCSD Sample ID: **LCSD-172969** Units: **ug/L** Analysis Date: **02-Dec-2021 05:16**
Client ID: Run ID: **ECD_13_397321** SeqNo: **6413999** PrepDate: **29-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	4.453	0.200	5	0	89.1	44 - 122	5.13	14.1	30	
2,4,5-TP (Silvex)	3.315	0.200	5	0	66.3	49 - 126	3.863	15.3	30	
2,4-D	4.36	0.200	5	0	87.2	39 - 120	5.064	14.9	30	
2,4-DB	3.847	0.400	5	0	76.9	44 - 120	4.47	15	30	
Dalapon	2.81	0.200	5	0	56.2	40 - 120	3.249	14.5	30	
Dicamba	3.517	0.200	5	0	70.3	60 - 120	4.169	17	30	
Dichlorprop	3.643	0.400	5	0	72.9	68 - 122	4.255	15.5	30	
Dinoseb	3.969	0.300	5	0	79.4	28 - 115	4.609	14.9	30	
MCPA	424.4	30.0	500	0	84.9	62 - 144	506.1	17.6	30	
MCPP	425.3	30.0	500	0	85.1	60 - 133	503.7	16.9	30	
Surr: DCAA	*6.729*	*0*	*10*	*0*	*67.3*	*50 - 130*	*8.126*	*18.8*	*30*	

The following samples were analyzed in this batch: HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172970 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MBLK Sample ID: **MBLK-172970** Units: **ug/L** Analysis Date: **08-Dec-2021 21:55**
Client ID: Run ID: **ECD_11_397314** SeqNo: **6413873** PrepDate: **29-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	U	0.0025								
4,4´-DDE	U	0.0025								
4,4´-DDT	U	0.0025								
Aldrin	U	0.0012								
alpha-BHC	U	0.0012								
alpha-Chlordane	U	0.0025								
beta-BHC	U	0.0012								
Chlordane	U	0.025								
delta-BHC	U	0.0012								
Dieldrin	U	0.0025								
Endosulfan I	U	0.0012								
Endosulfan II	U	0.0025								
Endosulfan sulfate	U	0.0025								
Endrin	U	0.0025								
Endrin aldehyde	U	0.0025								
Endrin ketone	U	0.0025								
gamma-BHC	U	0.0012								
gamma-Chlordane	U	0.0025								
Heptachlor	U	0.0012								
Heptachlor epoxide	U	0.0012								
Methoxychlor	U	0.012								
Toxaphene	U	0.025								
Surr: Decachlorobiphenyl	*0.02402*	*0*	*0.02*	*0*	*120*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.0239*	*0*	*0.02*	*0*	*120*	*52 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172970 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS-172970** Units: **ug/L** Analysis Date: **08-Dec-2021 22:18**
Client ID: Run ID: **ECD_11_397314** SeqNo: **6413874** PrepDate: **29-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	0.05312	0.0025	0.05	0	106	53 - 144				
4,4´-DDE	0.04894	0.0025	0.05	0	97.9	55 - 144				
4,4´-DDT	0.05824	0.0025	0.05	0	116	53 - 149				
Aldrin	0.02708	0.0012	0.025	0	108	47 - 141				
alpha-BHC	0.02725	0.0012	0.025	0	109	51 - 141				
alpha-Chlordane	0.02726	0.0025	0.025	0	109	55 - 141				
beta-BHC	0.02638	0.0012	0.025	0	106	58 - 144				
delta-BHC	0.02694	0.0012	0.025	0	108	48 - 146				
Dieldrin	0.05336	0.0025	0.05	0	107	56 - 144				
Endosulfan I	0.02318	0.0012	0.025	0	92.7	55 - 141				
Endosulfan II	0.04483	0.0025	0.05	0	89.7	57 - 144				
Endosulfan sulfate	0.05322	0.0025	0.05	0	106	58 - 145				
Endrin	0.05972	0.0025	0.05	0	119	60 - 163				
Endrin aldehyde	0.04905	0.0025	0.05	0	98.1	59 - 158				
Endrin ketone	0.05128	0.0025	0.05	0	103	59 - 154				
gamma-BHC	0.0276	0.0012	0.025	0	110	53 - 142				
gamma-Chlordane	0.02719	0.0025	0.025	0	109	55 - 137				
Heptachlor	0.02942	0.0012	0.025	0	118	51 - 144				
Heptachlor epoxide	0.02748	0.0012	0.025	0	110	55 - 142				
Methoxychlor	0.2776	0.012	0.25	0	111	50 - 150				
Surr: Decachlorobiphenyl	*0.0233*	*0*	*0.02*	*0*	*117*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.02323*	*0*	*0.02*	*0*	*116*	*52 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172970 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCSD Sample ID: **LCSD-172970** Units: **ug/L** Analysis Date: **08-Dec-2021 22:40**
Client ID: Run ID: **ECD_11_397314** SeqNo: **6413875** PrepDate: **29-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
4,4´-DDD	0.05146	0.0025	0.05	0	103	53 - 144	0.05312	3.16	30	
4,4´-DDE	0.04768	0.0025	0.05	0	95.4	55 - 144	0.04894	2.61	30	
4,4´-DDT	0.05655	0.0025	0.05	0	113	53 - 149	0.05824	2.94	30	
Aldrin	0.02629	0.0012	0.025	0	105	47 - 141	0.02708	2.97	30	
alpha-BHC	0.02616	0.0012	0.025	0	105	51 - 141	0.02725	4.08	30	
alpha-Chlordane	0.0263	0.0025	0.025	0	105	55 - 141	0.02726	3.58	30	
beta-BHC	0.02533	0.0012	0.025	0	101	58 - 144	0.02638	4.08	30	
delta-BHC	0.02537	0.0012	0.025	0	101	48 - 146	0.02694	6	30	
Dieldrin	0.05157	0.0025	0.05	0	103	56 - 144	0.05336	3.41	30	
Endosulfan I	0.02203	0.0012	0.025	0	88.1	55 - 141	0.02318	5.08	30	
Endosulfan II	0.04245	0.0025	0.05	0	84.9	57 - 144	0.04483	5.45	30	
Endosulfan sulfate	0.05122	0.0025	0.05	0	102	58 - 145	0.05322	3.82	30	
Endrin	0.05819	0.0025	0.05	0	116	60 - 163	0.05972	2.59	30	
Endrin aldehyde	0.04708	0.0025	0.05	0	94.2	59 - 158	0.04905	4.11	30	
Endrin ketone	0.04964	0.0025	0.05	0	99.3	59 - 154	0.05128	3.27	30	
gamma-BHC	0.02639	0.0012	0.025	0	106	53 - 142	0.0276	4.49	30	
gamma-Chlordane	0.02631	0.0025	0.025	0	105	55 - 137	0.02719	3.29	30	
Heptachlor	0.02829	0.0012	0.025	0	113	51 - 144	0.02942	3.93	30	
Heptachlor epoxide	0.02652	0.0012	0.025	0	106	55 - 142	0.02748	3.57	30	
Methoxychlor	0.2692	0.012	0.25	0	108	50 - 150	0.2776	3.07	30	
Surr: Decachlorobiphenyl	*0.02272*	*0*	*0.02*	*0*	*114*	*55 - 145*	*0.0233*	*2.56*	*30*	
Surr: Tetrachloro-m-xylene	*0.02227*	*0*	*0.02*	*0*	*111*	*52 - 142*	*0.02323*	*4.24*	*30*	

The following samples were analyzed in this batch: HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172971 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MBLK Sample ID: **MBLK-172971** Units: **ug/L** Analysis Date: **01-Dec-2021 16:52**
Client ID: Run ID: **ECD_7_396780** SeqNo: **6401583** PrepDate: **29-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	U	0.0125								
Aroclor 1221	U	0.0125								
Aroclor 1232	U	0.0125								
Aroclor 1242	U	0.0125								
Aroclor 1248	U	0.0125								
Aroclor 1254	U	0.0125								
Aroclor 1260	U	0.0125								
PCBs (Total)	U	0.0125								
Surr: Decachlorobiphenyl	*0.02333*	*0.00125*	*0.02*	*0*	*117*	*54 - 140*				
Surr: Tetrachloro-m-xylene	*0.01773*	*0.00125*	*0.02*	*0*	*88.6*	*53 - 137*				

LCS Sample ID: **LCS-172971** Units: **ug/L** Analysis Date: **01-Dec-2021 17:09**
Client ID: Run ID: **ECD_7_396780** SeqNo: **6401584** PrepDate: **29-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	0.4813	0.0125	0.5	0	96.3	54 - 138				
Aroclor 1260	0.463	0.0125	0.5	0	92.6	57 - 136				
Surr: Decachlorobiphenyl	*0.02246*	*0.00125*	*0.02*	*0*	*112*	*54 - 140*				
Surr: Tetrachloro-m-xylene	*0.02066*	*0.00125*	*0.02*	*0*	*103*	*53 - 137*				

LCSD Sample ID: **LCSD-172971** Units: **ug/L** Analysis Date: **01-Dec-2021 17:27**
Client ID: Run ID: **ECD_7_396780** SeqNo: **6401585** PrepDate: **29-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	0.5455	0.0125	0.5	0	109	54 - 138	0.4813	12.5	30	
Aroclor 1260	0.5633	0.0125	0.5	0	113	57 - 136	0.463	19.5	30	
Surr: Decachlorobiphenyl	*0.02356*	*0.00125*	*0.02*	*0*	*118*	*54 - 140*	*0.02246*	*4.78*	*30*	
Surr: Tetrachloro-m-xylene	*0.02345*	*0.00125*	*0.02*	*0*	*117*	*53 - 137*	*0.02066*	*12.7*	*30*	

The following samples were analyzed in this batch: HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 173148 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-173148** Units: **mg/L** Analysis Date: **03-Dec-2021 12:33**
Client ID: Run ID: **HG03_396903** SeqNo: **6404370** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-173148** Units: **mg/L** Analysis Date: **03-Dec-2021 12:36**
Client ID: Run ID: **HG03_396903** SeqNo: **6404371** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00445	0.000200	0.005	0	89.0	80 - 120				

MS Sample ID: **HS21111529-01MS** Units: **mg/L** Analysis Date: **03-Dec-2021 12:47**
Client ID: Run ID: **HG03_396903** SeqNo: **6404376** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00472	0.000200	0.005	0.000026	93.9	75 - 125				

MSD Sample ID: **HS21111529-01MSD** Units: **mg/L** Analysis Date: **03-Dec-2021 12:42**
Client ID: Run ID: **HG03_396903** SeqNo: **6404373** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00508	0.000200	0.005	0.000026	101	75 - 125	0.00472	7.35	20	

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02 HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 173216 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-173216** Units: **mg/L** Analysis Date: **07-Dec-2021 14:57**
Client ID: Run ID: **ICPMS06_397091** SeqNo: **6409684** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Copper	U	0.00200								
Iron	U	0.200								
Lead	U	0.00200								
Manganese	U	0.00500								
Nickel	U	0.00200								
Potassium	0.02151	0.200								J
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 173216 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-173216** Units: **mg/L** Analysis Date: **07-Dec-2021 16:10**
Client ID: Run ID: **ICPMS06_397091** SeqNo: **6409757** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05505	0.00200	0.05	0	110	80 - 120				
Arsenic	0.053	0.00200	0.05	0	106	80 - 120				
Beryllium	0.05244	0.00200	0.05	0	105	80 - 120				
Cadmium	0.05388	0.00200	0.05	0	108	80 - 120				
Chromium	0.05179	0.00400	0.05	0	104	80 - 120				
Copper	0.05491	0.00200	0.05	0	110	80 - 120				
Iron	5.211	0.200	5	0	104	80 - 120				
Lead	0.05072	0.00200	0.05	0	101	80 - 120				
Manganese	0.05219	0.00500	0.05	0	104	80 - 120				
Nickel	0.0537	0.00200	0.05	0	107	80 - 120				
Potassium	5.222	0.200	5	0	104	80 - 120				
Selenium	0.05486	0.00200	0.05	0	110	80 - 120				
Silver	0.05019	0.00200	0.05	0	100	80 - 120				
Thallium	0.05252	0.00200	0.05	0	105	80 - 120				
Zinc	0.05725	0.00400	0.05	0	114	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 173216 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21111627-06MS** Units: **mg/L** Analysis Date: **07-Dec-2021 16:49**
Client ID: Run ID: **ICPMS06_397091** SeqNo: **6409825** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0553	0.00200	0.05	0	111	80 - 120				
Arsenic	0.06001	0.00200	0.05	0.00066	119	80 - 120				
Beryllium	0.05577	0.00200	0.05	0	112	80 - 120				
Cadmium	0.05345	0.00200	0.05	0	107	80 - 120				
Chromium	0.05434	0.00400	0.05	0.00095	107	80 - 120				
Copper	0.05318	0.00200	0.05	0	106	80 - 120				
Iron	5.402	0.200	5	0.3699	101	80 - 120				
Lead	0.05209	0.00200	0.05	0	104	80 - 120				
Manganese	0.3212	0.00500	0.05	0.2792	83.9	80 - 120				O
Nickel	0.05424	0.00200	0.05	0.001781	105	80 - 120				
Potassium	8.188	0.200	5	2.993	104	80 - 120				
Selenium	0.0651	0.00200	0.05	0	130	80 - 120				S
Silver	0.04612	0.00200	0.05	0	92.2	80 - 120				
Thallium	0.0558	0.00200	0.05	0	112	80 - 120				
Zinc	0.05563	0.00400	0.05	0.002807	106	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 173216 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21111627-06MSD** Units: **mg/L** Analysis Date: **07-Dec-2021 16:56**
Client ID: Run ID: **ICPMS06_397091** SeqNo: **6409834** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Antimony	0.05476	0.00200	0.05	0	110	80 - 120	0.0553	0.983	20	
Arsenic	0.059	0.00200	0.05	0.00066	117	80 - 120	0.06001	1.69	20	
Beryllium	0.05539	0.00200	0.05	0	111	80 - 120	0.05577	0.687	20	
Cadmium	0.05164	0.00200	0.05	0	103	80 - 120	0.05345	3.45	20	
Chromium	0.05303	0.00400	0.05	0.00095	104	80 - 120	0.05434	2.44	20	
Copper	0.0516	0.00200	0.05	0	103	80 - 120	0.05318	3.01	20	
Iron	5.329	0.200	5	0.3699	99.2	80 - 120	5.402	1.37	20	
Lead	0.04952	0.00200	0.05	0	99.0	80 - 120	0.05209	5.05	20	
Manganese	0.3205	0.00500	0.05	0.2792	82.5	80 - 120	0.3212	0.224	20	O
Nickel	0.05296	0.00200	0.05	0.001781	102	80 - 120	0.05424	2.38	20	
Potassium	8.098	0.200	5	2.993	102	80 - 120	8.188	1.11	20	
Selenium	0.06525	0.00200	0.05	0	130	80 - 120	0.0651	0.227	20	S
Silver	0.04554	0.00200	0.05	0	91.1	80 - 120	0.04612	1.27	20	
Thallium	0.05284	0.00200	0.05	0	106	80 - 120	0.0558	5.46	20	
Zinc	0.05518	0.00400	0.05	0.002807	105	80 - 120	0.05563	0.816	20	

PDS Sample ID: **HS21111627-06PDS** Units: **mg/L** Analysis Date: **07-Dec-2021 16:45**
Client ID: Run ID: **ICPMS06_397091** SeqNo: **6409824** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Antimony	0.1009	0.00200	0.1	0	101	75 - 125				
Arsenic	0.1052	0.00200	0.1	0.00066	104	75 - 125				
Beryllium	0.09684	0.00200	0.1	0	96.8	75 - 125				
Cadmium	0.09556	0.00200	0.1	0	95.6	75 - 125				
Chromium	0.09504	0.00400	0.1	0.00095	94.1	75 - 125				
Copper	0.09405	0.00200	0.1	0	94.1	75 - 125				
Iron	9.406	0.200	10	0.3699	90.4	75 - 125				
Lead	0.09668	0.00200	0.1	0	96.7	75 - 125				
Nickel	0.09447	0.00200	0.1	0.001781	92.7	75 - 125				
Potassium	12.11	0.200	10	2.993	91.1	75 - 125				
Selenium	0.115	0.00200	0.1	0	115	75 - 125				
Silver	0.08321	0.00200	0.1	0	83.2	75 - 125				
Thallium	0.09928	0.00200	0.1	0	99.3	75 - 125				
Zinc	0.09822	0.00400	0.1	0.002807	95.4	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 173216 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21111627-06SD** Units: **mg/L** Analysis Date: **07-Dec-2021 15:32**
Client ID: Run ID: **ICPMS06_397091** SeqNo: **6409689** PrepDate: **06-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000034	0	10	
Arsenic	U	0.0100					0.00066	0	10	
Beryllium	U	0.0100					0.000036	0	10	
Cadmium	U	0.0100					0.000008	0	10	
Chromium	U	0.0200					0.00095	0	10	
Copper	U	0.0100					0.000457	0	10	
Iron	0.3236	1.00					0.3699	0	10	J
Lead	U	0.0100					0.000335	0	10	
Manganese	0.2726	0.0250					0.2792	2.39	10	
Nickel	U	0.0100					0.001781	0	10	
Potassium	3.019	1.00					2.993	0.863	10	
Selenium	U	0.0100					0.000175	0	10	
Silver	U	0.0100					0.000012	0	10	
Thallium	U	0.0100					0.000013	0	10	
Zinc	U	0.0200					0.002807	0	10	

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02 HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172827 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-172827** Units: **ug/L** Analysis Date: **08-Dec-2021 14:18**
Client ID: Run ID: **SV-7_397225** SeqNo: **6411979** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.10								
2-Methylnaphthalene	U	0.10								
Acenaphthene	U	0.10								
Acenaphthylene	U	0.10								
Anthracene	U	0.10								
Benz(a)anthracene	U	0.10								
Benzo(a)pyrene	U	0.10								
Benzo(b)fluoranthene	U	0.10								
Benzo(g,h,i)perylene	U	0.10								
Benzo(k)fluoranthene	U	0.10								
Chrysene	U	0.10								
Dibenz(a,h)anthracene	U	0.10								
Fluoranthene	U	0.10								
Fluorene	U	0.10								
Indeno(1,2,3-cd)pyrene	U	0.10								
Isophorone	U	0.20								
Naphthalene	U	0.10								
Phenanthrene	U	0.10								
Pyrene	U	0.10								
Surr: 2,4,6-Tribromophenol	*4.269*	*0.20*	*5*	*0*	*85.4*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.104*	*0.20*	*5*	*0*	*82.1*	*40 - 125*				
Surr: 2-Fluorophenol	*4.61*	*0.20*	*5*	*0*	*92.2*	*20 - 120*				
Surr: 4-Terphenyl-d14	*5.062*	*0.20*	*5*	*0*	*101*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.249*	*0.20*	*5*	*0*	*85.0*	*41 - 120*				
Surr: Phenol-d6	*3.729*	*0.20*	*5*	*0*	*74.6*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172827 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCS Sample ID: **LCS-172827** Units: **ug/L** Analysis Date: **08-Dec-2021 14:38**
Client ID: Run ID: **SV-7_397225** SeqNo: **6411980** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	4.102	0.10	5	0	82.0	45 - 120				
2-Methylnaphthalene	4.138	0.10	5	0	82.8	50 - 120				
Acenaphthene	3.72	0.10	5	0	74.4	45 - 120				
Acenaphthylene	3.914	0.10	5	0	78.3	47 - 120				
Anthracene	4.211	0.10	5	0	84.2	45 - 120				
Benz(a)anthracene	4.583	0.10	5	0	91.7	40 - 120				
Benzo(a)pyrene	4.8	0.10	5	0	96.0	45 - 120				
Benzo(b)fluoranthene	5.366	0.10	5	0	107	50 - 120				
Benzo(g,h,i)perylene	4.728	0.10	5	0	94.6	42 - 127				
Benzo(k)fluoranthene	3.877	0.10	5	0	77.5	45 - 127				
Chrysene	4.105	0.10	5	0	82.1	43 - 120				
Dibenz(a,h)anthracene	4.671	0.10	5	0	93.4	45 - 125				
Fluoranthene	4.422	0.10	5	0	88.4	45 - 125				
Fluorene	4.376	0.10	5	0	87.5	49 - 120				
Indeno(1,2,3-cd)pyrene	5.951	0.10	5	0	119	41 - 128				
Isophorone	3.848	0.20	5	0	77.0	40 - 121				
Naphthalene	3.935	0.10	5	0	78.7	45 - 120				
Phenanthrene	4.109	0.10	5	0	82.2	45 - 121				
Pyrene	4.31	0.10	5	0	86.2	40 - 130				
Surr: 2,4,6-Tribromophenol	*4.366*	*0.20*	*5*	*0*	*87.3*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.154*	*0.20*	*5*	*0*	*83.1*	*40 - 125*				
Surr: 2-Fluorophenol	*4.492*	*0.20*	*5*	*0*	*89.8*	*20 - 120*				
Surr: 4-Terphenyl-d14	*4.53*	*0.20*	*5*	*0*	*90.6*	*40 - 135*				
Surr: Nitrobenzene-d5	*3.918*	*0.20*	*5*	*0*	*78.4*	*41 - 120*				
Surr: Phenol-d6	*4.104*	*0.20*	*5*	*0*	*82.1*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172827 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCSD Sample ID: **LCSD-172827** Units: **ug/L** Analysis Date: **08-Dec-2021 14:57**
Client ID: Run ID: **SV-7_397225** SeqNo: **6411981** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	3.904	0.10	5	0	78.1	45 - 120	4.102	4.95	20	
2-Methylnaphthalene	3.937	0.10	5	0	78.7	50 - 120	4.138	4.97	20	
Acenaphthene	3.638	0.10	5	0	72.8	45 - 120	3.72	2.24	20	
Acenaphthylene	3.888	0.10	5	0	77.8	47 - 120	3.914	0.667	20	
Anthracene	4.204	0.10	5	0	84.1	45 - 120	4.211	0.162	20	
Benz(a)anthracene	4.749	0.10	5	0	95.0	40 - 120	4.583	3.57	20	
Benzo(a)pyrene	4.892	0.10	5	0	97.8	45 - 120	4.8	1.88	20	
Benzo(b)fluoranthene	5.077	0.10	5	0	102	50 - 120	5.366	5.54	20	
Benzo(g,h,i)perylene	4.739	0.10	5	0	94.8	42 - 127	4.728	0.239	20	
Benzo(k)fluoranthene	4.206	0.10	5	0	84.1	45 - 127	3.877	8.15	20	
Chrysene	4.361	0.10	5	0	87.2	43 - 120	4.105	6.06	20	
Dibenz(a,h)anthracene	4.689	0.10	5	0	93.8	45 - 125	4.671	0.384	20	
Fluoranthene	4.088	0.10	5	0	81.8	45 - 125	4.422	7.86	20	
Fluorene	4.092	0.10	5	0	81.8	49 - 120	4.376	6.72	20	
Indeno(1,2,3-cd)pyrene	5.952	0.10	5	0	119	41 - 128	5.951	0	20	
Isophorone	3.744	0.20	5	0	74.9	40 - 121	3.848	2.73	20	
Naphthalene	3.912	0.10	5	0	78.2	45 - 120	3.935	0.583	20	
Phenanthrene	4.169	0.10	5	0	83.4	45 - 121	4.109	1.47	20	
Pyrene	4.377	0.10	5	0	87.5	40 - 130	4.31	1.54	20	
Surr: 2,4,6-Tribromophenol	*4.123*	*0.20*	*5*	*0*	*82.5*	*34 - 129*	*4.366*	*5.74*	*20*	
Surr: 2-Fluorobiphenyl	*4.121*	*0.20*	*5*	*0*	*82.4*	*40 - 125*	*4.154*	*0.809*	*20*	
Surr: 2-Fluorophenol	*4.304*	*0.20*	*5*	*0*	*86.1*	*20 - 120*	*4.492*	*4.27*	*20*	
Surr: 4-Terphenyl-d14	*4.501*	*0.20*	*5*	*0*	*90.0*	*40 - 135*	*4.53*	*0.641*	*20*	
Surr: Nitrobenzene-d5	*3.895*	*0.20*	*5*	*0*	*77.9*	*41 - 120*	*3.918*	*0.602*	*20*	
Surr: Phenol-d6	*4.126*	*0.20*	*5*	*0*	*82.5*	*20 - 120*	*4.104*	*0.528*	*20*	

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172924 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-172924** Units: **ug/L** Analysis Date: **02-Dec-2021 14:52**
Client ID: Run ID: **SV-7_396841** SeqNo: **6404992** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.10								
2-Methylnaphthalene	U	0.10								
Acenaphthene	U	0.10								
Acenaphthylene	U	0.10								
Anthracene	U	0.10								
Benz(a)anthracene	U	0.10								
Benzo(a)pyrene	U	0.10								
Benzo(b)fluoranthene	U	0.10								
Benzo(g,h,i)perylene	U	0.10								
Benzo(k)fluoranthene	U	0.10								
Chrysene	U	0.10								
Dibenz(a,h)anthracene	U	0.10								
Fluoranthene	U	0.10								
Fluorene	U	0.10								
Indeno(1,2,3-cd)pyrene	U	0.10								
Isophorone	U	0.20								
Naphthalene	U	0.10								
Phenanthrene	U	0.10								
Pyrene	U	0.10								
Surr: 2,4,6-Tribromophenol	*2.436*	*0.20*	*5*	*0*	*48.7*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.777*	*0.20*	*5*	*0*	*95.5*	*40 - 125*				
Surr: 2-Fluorophenol	*4.694*	*0.20*	*5*	*0*	*93.9*	*20 - 120*				
Surr: 4-Terphenyl-d14	*6.359*	*0.20*	*5*	*0*	*127*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.383*	*0.20*	*5*	*0*	*87.7*	*41 - 120*				
Surr: Phenol-d6	*4.617*	*0.20*	*5*	*0*	*92.3*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172924 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCS Sample ID: **LCS-172924** Units: **ug/L** Analysis Date: **02-Dec-2021 15:11**
Client ID: Run ID: **SV-7_396841** SeqNo: **6404993** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	4.699	0.10	5	0	94.0	45 - 120				
2-Methylnaphthalene	4.515	0.10	5	0	90.3	50 - 120				
Acenaphthene	4.188	0.10	5	0	83.8	45 - 120				
Acenaphthylene	4.815	0.10	5	0	96.3	47 - 120				
Anthracene	4.806	0.10	5	0	96.1	45 - 120				
Benz(a)anthracene	5.298	0.10	5	0	106	40 - 120				
Benzo(a)pyrene	5.894	0.10	5	0	118	45 - 120				
Benzo(b)fluoranthene	5.039	0.10	5	0	101	50 - 120				
Benzo(g,h,i)perylene	5.293	0.10	5	0	106	42 - 127				
Benzo(k)fluoranthene	6.026	0.10	5	0	121	45 - 127				
Chrysene	5.369	0.10	5	0	107	43 - 120				
Dibenz(a,h)anthracene	5.682	0.10	5	0	114	45 - 125				
Fluoranthene	5.227	0.10	5	0	105	45 - 125				
Fluorene	4.666	0.10	5	0	93.3	49 - 120				
Indeno(1,2,3-cd)pyrene	5.68	0.10	5	0	114	41 - 128				
Isophorone	4.12	0.20	5	0	82.4	40 - 121				
Naphthalene	4.512	0.10	5	0	90.2	45 - 120				
Phenanthrene	4.933	0.10	5	0	98.7	45 - 121				
Pyrene	5.131	0.10	5	0	103	40 - 130				
Surr: 2,4,6-Tribromophenol	*2.134*	*0.20*	*5*	*0*	*42.7*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.542*	*0.20*	*5*	*0*	*90.8*	*40 - 125*				
Surr: 2-Fluorophenol	*4.34*	*0.20*	*5*	*0*	*86.8*	*20 - 120*				
Surr: 4-Terphenyl-d14	*5.279*	*0.20*	*5*	*0*	*106*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.008*	*0.20*	*5*	*0*	*80.2*	*41 - 120*				
Surr: Phenol-d6	*4.309*	*0.20*	*5*	*0*	*86.2*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 172924 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCSD Sample ID: **LCSD-172924** Units: **ug/L** Analysis Date: **02-Dec-2021 15:30**
Client ID: Run ID: **SV-7_396841** SeqNo: **6404994** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	4.631	0.10	5	0	92.6	45 - 120	4.699	1.44	20	
2-Methylnaphthalene	4.332	0.10	5	0	86.6	50 - 120	4.515	4.13	20	
Acenaphthene	4.24	0.10	5	0	84.8	45 - 120	4.188	1.24	20	
Acenaphthylene	4.69	0.10	5	0	93.8	47 - 120	4.815	2.63	20	
Anthracene	5.139	0.10	5	0	103	45 - 120	4.806	6.7	20	
Benz(a)anthracene	5.345	0.10	5	0	107	40 - 120	5.298	0.876	20	
Benzo(a)pyrene	5.939	0.10	5	0	119	45 - 120	5.894	0.75	20	
Benzo(b)fluoranthene	5.715	0.10	5	0	114	50 - 120	5.039	12.6	20	
Benzo(g,h,i)perylene	5.232	0.10	5	0	105	42 - 127	5.293	1.15	20	
Benzo(k)fluoranthene	5.981	0.10	5	0	120	45 - 127	6.026	0.75	20	
Chrysene	5.023	0.10	5	0	100	43 - 120	5.369	6.66	20	
Dibenz(a,h)anthracene	5.174	0.10	5	0	103	45 - 125	5.682	9.36	20	
Fluoranthene	5.746	0.10	5	0	115	45 - 125	5.227	9.46	20	
Fluorene	4.665	0.10	5	0	93.3	49 - 120	4.666	0.0155	20	
Indeno(1,2,3-cd)pyrene	5.535	0.10	5	0	111	41 - 128	5.68	2.59	20	
Isophorone	4.304	0.20	5	0	86.1	40 - 121	4.12	4.36	20	
Naphthalene	4.297	0.10	5	0	85.9	45 - 120	4.512	4.88	20	
Phenanthrene	5.17	0.10	5	0	103	45 - 121	4.933	4.68	20	
Pyrene	4.874	0.10	5	0	97.5	40 - 130	5.131	5.14	20	
Surr: 2,4,6-Tribromophenol	*3.594*	*0.20*	*5*	*0*	*71.9*	*34 - 129*	*2.134*	*51*	*20*	R
Surr: 2-Fluorobiphenyl	*5.18*	*0.20*	*5*	*0*	*104*	*40 - 125*	*4.542*	*13.1*	*20*	
Surr: 2-Fluorophenol	*5.09*	*0.20*	*5*	*0*	*102*	*20 - 120*	*4.34*	*15.9*	*20*	
Surr: 4-Terphenyl-d14	*6.017*	*0.20*	*5*	*0*	*120*	*40 - 135*	*5.279*	*13.1*	*20*	
Surr: Nitrobenzene-d5	*4.408*	*0.20*	*5*	*0*	*88.2*	*41 - 120*	*4.008*	*9.49*	*20*	
Surr: Phenol-d6	*4.802*	*0.20*	*5*	*0*	*96.0*	*20 - 120*	*4.309*	*10.8*	*20*	

The following samples were analyzed in this batch: HS21111356-03

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396583 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-211129** Units: **ug/L** Analysis Date: **29-Nov-2021 10:16**
Client ID: Run ID: **VOA4_396583** SeqNo: **6396924** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	1.0								
1,1,2,2-Tetrachloroethane	U	1.0								
1,1,2-Trichlor-1,2,2-trifluoroethane	U	1.0								
1,1,2-Trichloroethane	U	1.0								
1,1-Dichloroethane	U	1.0								
1,1-Dichloroethene	U	1.0								
1,2,3-Trichlorobenzene	U	1.0								
1,2,4-Trichlorobenzene	U	1.0								
1,2-Dibromo-3-chloropropane	U	1.0								
1,2-Dibromoethane	U	1.0								
1,2-Dichlorobenzene	U	1.0								
1,2-Dichloroethane	U	1.0								
1,2-Dichloropropane	U	1.0								
1,3-Dichlorobenzene	U	1.0								
1,4-Dichlorobenzene	U	1.0								
2-Butanone	U	2.0								
2-Hexanone	U	2.0								
4-Methyl-2-pentanone	U	2.0								
Acetone	U	2.0								
Benzene	U	1.0								
Bromochloromethane	U	1.0								
Bromodichloromethane	U	1.0								
Bromoform	U	1.0								
Bromomethane	U	1.0								
Carbon disulfide	U	2.0								
Carbon tetrachloride	U	1.0								
Chlorobenzene	U	1.0								
Chloroethane	U	1.0								
Chloroform	U	1.0								
Chloromethane	U	1.0								
cis-1,2-Dichloroethene	U	1.0								
cis-1,3-Dichloropropene	U	1.0								
Cyclohexane	U	1.0								
Dibromochloromethane	U	1.0								

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396583 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-211129** Units: **ug/L** Analysis Date: **29-Nov-2021 10:16**
Client ID: Run ID: **VOA4_396583** SeqNo: **6396924** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	U	1.0								
Ethylbenzene	U	1.0								
Isopropylbenzene	U	1.0								
m,p-Xylene	U	2.0								
Methyl acetate	U	1.0								
Methyl tert-butyl ether	U	1.0								
Methylcyclohexane	U	1.0								
Methylene chloride	U	2.0								
o-Xylene	U	1.0								
Styrene	U	1.0								
Tetrachloroethene	U	1.0								
Toluene	U	1.0								
trans-1,2-Dichloroethene	U	1.0								
trans-1,3-Dichloropropene	U	1.0								
Trichloroethene	U	1.0								
Trichlorofluoromethane	U	1.0								
Vinyl chloride	U	1.0								
Xylenes, Total	U	1.0								
Surr: 1,2-Dichloroethane-d4	*48.89*	*1.0*	*50*	*0*	*97.8*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*46.9*	*1.0*	*50*	*0*	*93.8*	*82 - 115*				
Surr: Dibromofluoromethane	*49.92*	*1.0*	*50*	*0*	*99.8*	*73 - 126*				
Surr: Toluene-d8	*49.79*	*1.0*	*50*	*0*	*99.6*	*81 - 120*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396583 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-211129** Units: **ug/L** Analysis Date: **29-Nov-2021 09:32**
Client ID: Run ID: **VOA4_396583** SeqNo: **6396923** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	20.42	1.0	20	0	102	70 - 130				
1,1,2,2-Tetrachloroethane	22.03	1.0	20	0	110	70 - 120				
1,1,2-Trichlor-1,2,2-trifluoroethane	21.66	1.0	20	0	108	70 - 130				
1,1,2-Trichloroethane	19.39	1.0	20	0	97.0	77 - 113				
1,1-Dichloroethane	19.75	1.0	20	0	98.8	71 - 122				
1,1-Dichloroethene	19.52	1.0	20	0	97.6	70 - 130				
1,2,3-Trichlorobenzene	19.78	1.0	20	0	98.9	70 - 130				
1,2,4-Trichlorobenzene	18.89	1.0	20	0	94.5	77 - 126				
1,2-Dibromo-3-chloropropane	17.62	1.0	20	0	88.1	70 - 130				
1,2-Dibromoethane	19.4	1.0	20	0	97.0	76 - 123				
1,2-Dichlorobenzene	21.33	1.0	20	0	107	77 - 113				
1,2-Dichloroethane	20.01	1.0	20	0	100	70 - 124				
1,2-Dichloropropane	20.51	1.0	20	0	103	72 - 119				
1,3-Dichlorobenzene	21.07	1.0	20	0	105	78 - 118				
1,4-Dichlorobenzene	21.39	1.0	20	0	107	79 - 113				
2-Butanone	44.6	2.0	40	0	111	70 - 130				
2-Hexanone	40.67	2.0	40	0	102	70 - 130				
4-Methyl-2-pentanone	44.21	2.0	40	0	111	70 - 130				
Acetone	41.79	2.0	40	0	104	70 - 130				
Benzene	19.85	1.0	20	0	99.3	74 - 120				
Bromochloromethane	19.5	1.0	20	0	97.5	76 - 124				
Bromodichloromethane	19.84	1.0	20	0	99.2	74 - 122				
Bromoform	19.93	1.0	20	0	99.6	73 - 128				
Bromomethane	22.13	1.0	20	0	111	70 - 130				
Carbon disulfide	40.76	2.0	40	0	102	70 - 130				
Carbon tetrachloride	19.08	1.0	20	0	95.4	71 - 125				
Chlorobenzene	20.85	1.0	20	0	104	76 - 113				
Chloroethane	19.6	1.0	20	0	98.0	70 - 130				
Chloroform	19.23	1.0	20	0	96.1	71 - 121				
Chloromethane	19.55	1.0	20	0	97.8	70 - 129				
cis-1,2-Dichloroethene	19.08	1.0	20	0	95.4	75 - 122				
cis-1,3-Dichloropropene	21.37	1.0	20	0	107	73 - 127				
Cyclohexane	20.54	1.0	20	0	103	70 - 130				
Dibromochloromethane	19.66	1.0	20	0	98.3	77 - 122				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396583 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-211129** Units: **ug/L** Analysis Date: **29-Nov-2021 09:32**
Client ID: Run ID: **VOA4_396583** SeqNo: **6396923** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	22.9	1.0	20	0	114	70 - 130				
Ethylbenzene	20.49	1.0	20	0	102	77 - 117				
Isopropylbenzene	19.83	1.0	20	0	99.1	73 - 127				
m,p-Xylene	39.06	2.0	40	0	97.7	77 - 122				
Methyl acetate	21	1.0	20	0	105	76 - 122				
Methyl tert-butyl ether	16.04	1.0	20	0	80.2	70 - 130				
Methylcyclohexane	21.29	1.0	20	0	106	61 - 157				
Methylene chloride	22.51	2.0	20	0	113	70 - 127				
o-Xylene	19.16	1.0	20	0	95.8	75 - 119				
Styrene	20.08	1.0	20	0	100	72 - 126				
Tetrachloroethene	20.15	1.0	20	0	101	76 - 119				
Toluene	19.61	1.0	20	0	98.0	77 - 118				
trans-1,2-Dichloroethene	19.97	1.0	20	0	99.9	72 - 127				
trans-1,3-Dichloropropene	18.45	1.0	20	0	92.2	77 - 119				
Trichloroethene	20.03	1.0	20	0	100	77 - 121				
Trichlorofluoromethane	21.05	1.0	20	0	105	70 - 130				
Vinyl chloride	20.71	1.0	20	0	104	70 - 130				
Xylenes, Total	58.23	1.0	60	0	97.0	75 - 122				
Surr: 1,2-Dichloroethane-d4	*48.9*	*1.0*	*50*	*0*	*97.8*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*48.61*	*1.0*	*50*	*0*	*97.2*	*82 - 115*				
Surr: Dibromofluoromethane	*49.24*	*1.0*	*50*	*0*	*98.5*	*73 - 126*				
Surr: Toluene-d8	*50.06*	*1.0*	*50*	*0*	*100*	*81 - 120*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396583 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21111000-22MS** Units: **ug/L** Analysis Date: **29-Nov-2021 18:31**
Client ID: Run ID: **VOA4_396583** SeqNo: **6396946** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	18.61	1.0	20	0	93.1	70 - 130				
1,1,2,2-Tetrachloroethane	19.53	1.0	20	0	97.7	70 - 123				
1,1,2-Trichlor-1,2,2-trifluoroethane	21.13	1.0	20	0	106	70 - 130				
1,1,2-Trichloroethane	17.34	1.0	20	0	86.7	70 - 117				
1,1-Dichloroethane	17.74	1.0	20	0	88.7	70 - 127				
1,1-Dichloroethene	17.93	1.0	20	0	89.6	70 - 130				
1,2,3-Trichlorobenzene	14.98	1.0	20	0	74.9	70 - 130				
1,2,4-Trichlorobenzene	15.03	1.0	20	0	75.2	70 - 125				
1,2-Dibromo-3-chloropropane	14.02	1.0	20	0	70.1	70 - 130				
1,2-Dibromoethane	18.21	1.0	20	0	91.0	70 - 124				
1,2-Dichlorobenzene	19.68	1.0	20	0	98.4	70 - 115				
1,2-Dichloroethane	17.51	1.0	20	0	87.6	70 - 127				
1,2-Dichloropropane	18.92	1.0	20	0	94.6	70 - 122				
1,3-Dichlorobenzene	19.05	1.0	20	0	95.3	70 - 119				
1,4-Dichlorobenzene	18.36	1.0	20	0	91.8	70 - 114				
2-Butanone	36.46	2.0	40	0	91.2	70 - 130				
2-Hexanone	32.14	2.0	40	0	80.3	70 - 130				
4-Methyl-2-pentanone	35.38	2.0	40	0	88.5	70 - 130				
Acetone	35.62	2.0	40	0	89.1	70 - 130				
Benzene	18.07	1.0	20	0	90.4	70 - 127				
Bromochloromethane	17.97	1.0	20	0	89.9	70 - 127				
Bromodichloromethane	17.59	1.0	20	0	88.0	70 - 124				
Bromoform	17.66	1.0	20	0	88.3	70 - 129				
Bromomethane	17.07	1.0	20	0	85.3	70 - 130				
Carbon disulfide	37.97	2.0	40	0	94.9	70 - 130				
Carbon tetrachloride	17.6	1.0	20	0	88.0	70 - 130				
Chlorobenzene	18.55	1.0	20	0	92.7	70 - 114				
Chloroethane	20.29	1.0	20	0	101	70 - 130				
Chloroform	17.18	1.0	20	0	85.9	70 - 125				
Chloromethane	17.41	1.0	20	0	87.1	70 - 130				
cis-1,2-Dichloroethene	17.41	1.0	20	0	87.0	70 - 128				
cis-1,3-Dichloropropene	17.76	1.0	20	0	88.8	70 - 125				
Cyclohexane	19.72	1.0	20	0	98.6	70 - 130				
Dibromochloromethane	17.51	1.0	20	0	87.6	70 - 124				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396583 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21111000-22MS** Units: **ug/L** Analysis Date: **29-Nov-2021 18:31**
Client ID: Run ID: **VOA4_396583** SeqNo: **6396946** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	16.38	1.0	20	0	81.9	70 - 130				
Ethylbenzene	18.66	1.0	20	0	93.3	70 - 124				
Isopropylbenzene	18.52	1.0	20	0	92.6	70 - 130				
m,p-Xylene	35.66	2.0	40	0	89.2	70 - 130				
Methyl acetate	18.73	1.0	20	0	93.7	76 - 122				
Methyl tert-butyl ether	10.64	1.0	20	0	53.2	70 - 130				S
Methylcyclohexane	18.91	1.0	20	0	94.6	61 - 158				
Methylene chloride	19.48	2.0	20	0	97.4	70 - 128				
o-Xylene	17.36	1.0	20	0	86.8	70 - 124				
Styrene	18.13	1.0	20	0	90.7	70 - 130				
Tetrachloroethene	19.65	1.0	20	0	98.2	70 - 130				
Toluene	17.91	1.0	20	0	89.6	70 - 123				
trans-1,2-Dichloroethene	19.32	1.0	20	0	96.6	70 - 130				
trans-1,3-Dichloropropene	16.5	1.0	20	0	82.5	70 - 121				
Trichloroethene	17.39	1.0	20	0	86.9	70 - 129				
Trichlorofluoromethane	18.89	1.0	20	0	94.4	70 - 130				
Vinyl chloride	19.16	1.0	20	0	95.8	70 - 130				
Xylenes, Total	53.03	1.0	60	0	88.4	70 - 130				
Surr: 1,2-Dichloroethane-d4	*49.06*	*1.0*	*50*	*0*	*98.1*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*49.04*	*1.0*	*50*	*0*	*98.1*	*81 - 113*				
Surr: Dibromofluoromethane	*49.83*	*1.0*	*50*	*0*	*99.7*	*77 - 123*				
Surr: Toluene-d8	*49.68*	*1.0*	*50*	*0*	*99.4*	*82 - 127*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396583 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21111000-22MSD** Units: **ug/L** Analysis Date: **29-Nov-2021 18:53**
Client ID: Run ID: **VOA4_396583** SeqNo: **6396947** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	18.3	1.0	20	0	91.5	70 - 130	18.61	1.67	20	
1,1,2,2-Tetrachloroethane	17.43	1.0	20	0	87.2	70 - 123	19.53	11.4	20	
1,1,2-Trichlor-1,2,2-trifluoroethane	19.26	1.0	20	0	96.3	70 - 130	21.13	9.25	20	
1,1,2-Trichloroethane	16.2	1.0	20	0	81.0	70 - 117	17.34	6.77	20	
1,1-Dichloroethane	17.41	1.0	20	0	87.0	70 - 127	17.74	1.91	20	
1,1-Dichloroethene	17.62	1.0	20	0	88.1	70 - 130	17.93	1.76	20	
1,2,3-Trichlorobenzene	15.71	1.0	20	0	78.5	70 - 130	14.98	4.76	20	
1,2,4-Trichlorobenzene	15.59	1.0	20	0	77.9	70 - 125	15.03	3.65	20	
1,2-Dibromo-3-chloropropane	13.39	1.0	20	0	66.9	70 - 130	14.02	4.62	20	S
1,2-Dibromoethane	16.76	1.0	20	0	83.8	70 - 124	18.21	8.31	20	
1,2-Dichlorobenzene	17.97	1.0	20	0	89.9	70 - 115	19.68	9.05	20	
1,2-Dichloroethane	17.03	1.0	20	0	85.1	70 - 127	17.51	2.81	20	
1,2-Dichloropropane	18.19	1.0	20	0	90.9	70 - 122	18.92	3.94	20	
1,3-Dichlorobenzene	18.34	1.0	20	0	91.7	70 - 119	19.05	3.79	20	
1,4-Dichlorobenzene	17.95	1.0	20	0	89.8	70 - 114	18.36	2.27	20	
2-Butanone	34.42	2.0	40	0	86.0	70 - 130	36.46	5.77	20	
2-Hexanone	32.79	2.0	40	0	82.0	70 - 130	32.14	2	20	
4-Methyl-2-pentanone	34.63	2.0	40	0	86.6	70 - 130	35.38	2.16	20	
Acetone	34.41	2.0	40	0	86.0	70 - 130	35.62	3.47	20	
Benzene	17.65	1.0	20	0	88.2	70 - 127	18.07	2.4	20	
Bromochloromethane	17	1.0	20	0	85.0	70 - 127	17.97	5.56	20	
Bromodichloromethane	17.62	1.0	20	0	88.1	70 - 124	17.59	0.182	20	
Bromoform	17.31	1.0	20	0	86.6	70 - 129	17.66	2	20	
Bromomethane	16.54	1.0	20	0	82.7	70 - 130	17.07	3.15	20	
Carbon disulfide	35.58	2.0	40	0	88.9	70 - 130	37.97	6.5	20	
Carbon tetrachloride	17.58	1.0	20	0	87.9	70 - 130	17.6	0.115	20	
Chlorobenzene	18.29	1.0	20	0	91.4	70 - 114	18.55	1.4	20	
Chloroethane	22.13	1.0	20	0	111	70 - 130	20.29	8.67	20	
Chloroform	16.6	1.0	20	0	83.0	70 - 125	17.18	3.4	20	
Chloromethane	16.33	1.0	20	0	81.7	70 - 130	17.41	6.39	20	
cis-1,2-Dichloroethene	16.71	1.0	20	0	83.5	70 - 128	17.41	4.1	20	
cis-1,3-Dichloropropene	17.85	1.0	20	0	89.3	70 - 125	17.76	0.536	20	
Cyclohexane	18.77	1.0	20	0	93.9	70 - 130	19.72	4.93	20	
Dibromochloromethane	16.99	1.0	20	0	85.0	70 - 124	17.51	2.99	20	

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396583 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21111000-22MSD** Units: **ug/L** Analysis Date: **29-Nov-2021 18:53**
Client ID: Run ID: **VOA4_396583** SeqNo: **6396947** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	15.14	1.0	20	0	75.7	70 - 130	16.38	7.83	20	
Ethylbenzene	18.46	1.0	20	0	92.3	70 - 124	18.66	1.1	20	
Isopropylbenzene	17.89	1.0	20	0	89.4	70 - 130	18.52	3.49	20	
m,p-Xylene	34.65	2.0	40	0	86.6	70 - 130	35.66	2.88	20	
Methyl acetate	16.77	1.0	20	0	83.8	76 - 122	18.73	11.1	20	
Methyl tert-butyl ether	10.65	1.0	20	0	53.3	70 - 130	10.64	0.1	20	S
Methylcyclohexane	18.62	1.0	20	0	93.1	61 - 158	18.91	1.54	20	
Methylene chloride	18.63	2.0	20	0	93.1	70 - 128	19.48	4.48	20	
o-Xylene	16.84	1.0	20	0	84.2	70 - 124	17.36	3.08	20	
Styrene	17.93	1.0	20	0	89.6	70 - 130	18.13	1.15	20	
Tetrachloroethene	18.03	1.0	20	0	90.1	70 - 130	19.65	8.59	20	
Toluene	16.95	1.0	20	0	84.7	70 - 123	17.91	5.55	20	
trans-1,2-Dichloroethene	18.34	1.0	20	0	91.7	70 - 130	19.32	5.19	20	
trans-1,3-Dichloropropene	15.77	1.0	20	0	78.9	70 - 121	16.5	4.53	20	
Trichloroethene	17.78	1.0	20	0	88.9	70 - 129	17.39	2.24	20	
Trichlorofluoromethane	17.76	1.0	20	0	88.8	70 - 130	18.89	6.15	20	
Vinyl chloride	18.14	1.0	20	0	90.7	70 - 130	19.16	5.48	20	
Xylenes, Total	51.49	1.0	60	0	85.8	70 - 130	53.03	2.95	20	
Surr: 1,2-Dichloroethane-d4	*46.59*	*1.0*	*50*	*0*	*93.2*	*70 - 126*	*49.06*	*5.16*	*20*	
Surr: 4-Bromofluorobenzene	*48.27*	*1.0*	*50*	*0*	*96.5*	*81 - 113*	*49.04*	*1.57*	*20*	
Surr: Dibromofluoromethane	*48.42*	*1.0*	*50*	*0*	*96.8*	*77 - 123*	*49.83*	*2.87*	*20*	
Surr: Toluene-d8	*49.51*	*1.0*	*50*	*0*	*99.0*	*82 - 127*	*49.68*	*0.354*	*20*	

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396668 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-211130** Units: **ug/L** Analysis Date: **30-Nov-2021 10:13**
Client ID: Run ID: **VOA4_396668** SeqNo: **6398880** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	1.0								
1,1,2,2-Tetrachloroethane	U	1.0								
1,1,2-Trichlor-1,2,2-trifluoroethane	U	1.0								
1,1,2-Trichloroethane	U	1.0								
1,1-Dichloroethane	U	1.0								
1,1-Dichloroethene	U	1.0								
1,2,3-Trichlorobenzene	U	1.0								
1,2,4-Trichlorobenzene	U	1.0								
1,2-Dibromo-3-chloropropane	U	1.0								
1,2-Dibromoethane	U	1.0								
1,2-Dichlorobenzene	U	1.0								
1,2-Dichloroethane	U	1.0								
1,2-Dichloropropane	U	1.0								
1,3-Dichlorobenzene	U	1.0								
1,4-Dichlorobenzene	U	1.0								
2-Butanone	U	2.0								
2-Hexanone	U	2.0								
4-Methyl-2-pentanone	U	2.0								
Acetone	U	2.0								
Benzene	U	1.0								
Bromochloromethane	U	1.0								
Bromodichloromethane	U	1.0								
Bromoform	U	1.0								
Bromomethane	U	1.0								
Carbon disulfide	U	2.0								
Carbon tetrachloride	U	1.0								
Chlorobenzene	U	1.0								
Chloroethane	U	1.0								
Chloroform	U	1.0								
Chloromethane	U	1.0								
cis-1,2-Dichloroethene	U	1.0								
cis-1,3-Dichloropropene	U	1.0								
Cyclohexane	U	1.0								
Dibromochloromethane	U	1.0								

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396668 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-211130** Units: **ug/L** Analysis Date: **30-Nov-2021 10:13**
Client ID: Run ID: **VOA4_396668** SeqNo: **6398880** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	U	1.0								
Ethylbenzene	U	1.0								
Isopropylbenzene	U	1.0								
m,p-Xylene	U	2.0								
Methyl acetate	U	1.0								
Methyl tert-butyl ether	U	1.0								
Methylcyclohexane	U	1.0								
Methylene chloride	U	2.0								
o-Xylene	U	1.0								
Styrene	U	1.0								
Tetrachloroethene	U	1.0								
Toluene	U	1.0								
trans-1,2-Dichloroethene	U	1.0								
trans-1,3-Dichloropropene	U	1.0								
Trichloroethene	U	1.0								
Trichlorofluoromethane	U	1.0								
Vinyl chloride	U	1.0								
Xylenes, Total	U	1.0								
Surr: 1,2-Dichloroethane-d4	*48.75*	*1.0*	*50*	*0*	*97.5*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*47.04*	*1.0*	*50*	*0*	*94.1*	*82 - 115*				
Surr: Dibromofluoromethane	*47.51*	*1.0*	*50*	*0*	*95.0*	*73 - 126*				
Surr: Toluene-d8	*49.83*	*1.0*	*50*	*0*	*99.7*	*81 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396668 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-211130** Units: **ug/L** Analysis Date: **30-Nov-2021 09:29**
Client ID: Run ID: **VOA4_396668** SeqNo: **6398879** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	18.23	1.0	20	0	91.1	70 - 130				
1,1,2,2-Tetrachloroethane	19.79	1.0	20	0	99.0	70 - 120				
1,1,2-Trichlor-1,2,2-trifluoroethane	18.74	1.0	20	0	93.7	70 - 130				
1,1,2-Trichloroethane	18.09	1.0	20	0	90.5	77 - 113				
1,1-Dichloroethane	18.63	1.0	20	0	93.2	71 - 122				
1,1-Dichloroethene	18.82	1.0	20	0	94.1	70 - 130				
1,2,3-Trichlorobenzene	18.49	1.0	20	0	92.4	70 - 130				
1,2,4-Trichlorobenzene	17.98	1.0	20	0	89.9	77 - 126				
1,2-Dibromo-3-chloropropane	15.05	1.0	20	0	75.3	70 - 130				
1,2-Dibromoethane	19.18	1.0	20	0	95.9	76 - 123				
1,2-Dichlorobenzene	20.14	1.0	20	0	101	77 - 113				
1,2-Dichloroethane	18.17	1.0	20	0	90.8	70 - 124				
1,2-Dichloropropane	19.84	1.0	20	0	99.2	72 - 119				
1,3-Dichlorobenzene	19.97	1.0	20	0	99.9	78 - 118				
1,4-Dichlorobenzene	20.23	1.0	20	0	101	79 - 113				
2-Butanone	36.8	2.0	40	0	92.0	70 - 130				
2-Hexanone	35.82	2.0	40	0	89.6	70 - 130				
4-Methyl-2-pentanone	39.51	2.0	40	0	98.8	70 - 130				
Acetone	35.81	2.0	40	0	89.5	70 - 130				
Benzene	18.74	1.0	20	0	93.7	74 - 120				
Bromochloromethane	18.09	1.0	20	0	90.4	76 - 124				
Bromodichloromethane	19.21	1.0	20	0	96.1	74 - 122				
Bromoform	18.66	1.0	20	0	93.3	73 - 128				
Bromomethane	21.08	1.0	20	0	105	70 - 130				
Carbon disulfide	37.2	2.0	40	0	93.0	70 - 130				
Carbon tetrachloride	17.43	1.0	20	0	87.1	71 - 125				
Chlorobenzene	19.43	1.0	20	0	97.1	76 - 113				
Chloroethane	20.5	1.0	20	0	102	70 - 130				
Chloroform	18.25	1.0	20	0	91.3	71 - 121				
Chloromethane	18.14	1.0	20	0	90.7	70 - 129				
cis-1,2-Dichloroethene	17.59	1.0	20	0	87.9	75 - 122				
cis-1,3-Dichloropropene	20.89	1.0	20	0	104	73 - 127				
Cyclohexane	18.65	1.0	20	0	93.3	70 - 130				
Dibromochloromethane	18.51	1.0	20	0	92.5	77 - 122				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396668 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-211130** Units: **ug/L** Analysis Date: **30-Nov-2021 09:29**
Client ID: Run ID: **VOA4_396668** SeqNo: **6398879** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	19.82	1.0	20	0	99.1	70 - 130				
Ethylbenzene	18.62	1.0	20	0	93.1	77 - 117				
Isopropylbenzene	18.78	1.0	20	0	93.9	73 - 127				
m,p-Xylene	36.89	2.0	40	0	92.2	77 - 122				
Methyl acetate	19	1.0	20	0	95.0	76 - 122				
Methyl tert-butyl ether	22.35	1.0	20	0	112	70 - 130				
Methylcyclohexane	18.97	1.0	20	0	94.9	61 - 157				
Methylene chloride	20.18	2.0	20	0	101	70 - 127				
o-Xylene	18.62	1.0	20	0	93.1	75 - 119				
Styrene	19.46	1.0	20	0	97.3	72 - 126				
Tetrachloroethene	21.27	1.0	20	0	106	76 - 119				
Toluene	18.09	1.0	20	0	90.5	77 - 118				
trans-1,2-Dichloroethene	19.4	1.0	20	0	97.0	72 - 127				
trans-1,3-Dichloropropene	18.24	1.0	20	0	91.2	77 - 119				
Trichloroethene	19.51	1.0	20	0	97.6	77 - 121				
Trichlorofluoromethane	18.65	1.0	20	0	93.3	70 - 130				
Vinyl chloride	18.86	1.0	20	0	94.3	70 - 130				
Xylenes, Total	55.51	1.0	60	0	92.5	75 - 122				
Surr: 1,2-Dichloroethane-d4	*46.18*	*1.0*	*50*	*0*	*92.4*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*48.29*	*1.0*	*50*	*0*	*96.6*	*82 - 115*				
Surr: Dibromofluoromethane	*47.22*	*1.0*	*50*	*0*	*94.4*	*73 - 126*				
Surr: Toluene-d8	*48.26*	*1.0*	*50*	*0*	*96.5*	*81 - 120*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396668 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21111059-13MS** Units: **ug/L** Analysis Date: **30-Nov-2021 17:13**
Client ID: Run ID: **VOA4_396668** SeqNo: **6398895** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	18.4	1.0	20	0	92.0	70 - 130				
1,1,2,2-Tetrachloroethane	19.24	1.0	20	0	96.2	70 - 123				
1,1,2-Trichlor-1,2,2-trifluoroethane	19.87	1.0	20	0	99.3	70 - 130				
1,1,2-Trichloroethane	16.54	1.0	20	0	82.7	70 - 117				
1,1-Dichloroethane	17.51	1.0	20	0	87.6	70 - 127				
1,1-Dichloroethene	17.97	1.0	20	0	89.9	70 - 130				
1,2,3-Trichlorobenzene	16.58	1.0	20	0	82.9	70 - 130				
1,2,4-Trichlorobenzene	16.56	1.0	20	0	82.8	70 - 125				
1,2-Dibromo-3-chloropropane	13.03	1.0	20	0	65.1	70 - 130				S
1,2-Dibromoethane	17.48	1.0	20	0	87.4	70 - 124				
1,2-Dichlorobenzene	19.4	1.0	20	0	97.0	70 - 115				
1,2-Dichloroethane	17.67	1.0	20	0	88.4	70 - 127				
1,2-Dichloropropane	18.96	1.0	20	0	94.8	70 - 122				
1,3-Dichlorobenzene	19.77	1.0	20	0	98.9	70 - 119				
1,4-Dichlorobenzene	19.1	1.0	20	0	95.5	70 - 114				
2-Butanone	33.07	2.0	40	0	82.7	70 - 130				
2-Hexanone	29.13	2.0	40	0	72.8	70 - 130				
4-Methyl-2-pentanone	33.77	2.0	40	0	84.4	70 - 130				
Acetone	33.05	2.0	40	0	82.6	70 - 130				
Benzene	17.68	1.0	20	0	88.4	70 - 127				
Bromochloromethane	17.27	1.0	20	0	86.4	70 - 127				
Bromodichloromethane	17.81	1.0	20	0	89.1	70 - 124				
Bromoform	17.72	1.0	20	0	88.6	70 - 129				
Bromomethane	8.407	1.0	20	0	42.0	70 - 130				S
Carbon disulfide	38.74	2.0	40	0	96.8	70 - 130				
Carbon tetrachloride	17.81	1.0	20	0	89.0	70 - 130				
Chlorobenzene	18.52	1.0	20	0	92.6	70 - 114				
Chloroethane	18.68	1.0	20	0	93.4	70 - 130				
Chloroform	17	1.0	20	0	85.0	70 - 125				
Chloromethane	12.69	1.0	20	0	63.5	70 - 130				S
cis-1,2-Dichloroethene	18.11	1.0	20	0	90.5	70 - 128				
cis-1,3-Dichloropropene	17.46	1.0	20	0	87.3	70 - 125				
Cyclohexane	20.27	1.0	20	0	101	70 - 130				
Dibromochloromethane	17.73	1.0	20	0	88.7	70 - 124				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396668 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21111059-13MS** Units: **ug/L** Analysis Date: **30-Nov-2021 17:13**
Client ID: Run ID: **VOA4_396668** SeqNo: **6398895** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	14.97	1.0	20	0	74.9	70 - 130				
Ethylbenzene	20.13	1.0	20	0	101	70 - 124				
Isopropylbenzene	19.31	1.0	20	0	96.5	70 - 130				
m,p-Xylene	37.02	2.0	40	0	92.5	70 - 130				
Methyl acetate	16.54	1.0	20	0	82.7	76 - 122				
Methyl tert-butyl ether	9.663	1.0	20	0	48.3	70 - 130				S
Methylcyclohexane	20.28	1.0	20	0	101	61 - 158				
Methylene chloride	19.36	2.0	20	0	96.8	70 - 128				
o-Xylene	17.67	1.0	20	0	88.4	70 - 124				
Styrene	17.76	1.0	20	0	88.8	70 - 130				
Tetrachloroethene	20.63	1.0	20	0	103	70 - 130				
Toluene	17.86	1.0	20	0	89.3	70 - 123				
trans-1,2-Dichloroethene	18.63	1.0	20	0	93.1	70 - 130				
trans-1,3-Dichloropropene	16.22	1.0	20	0	81.1	70 - 121				
Trichloroethene	18.56	1.0	20	0	92.8	70 - 129				
Trichlorofluoromethane	19.45	1.0	20	0	97.3	70 - 130				
Vinyl chloride	16.73	1.0	20	0	83.7	70 - 130				
Xylenes, Total	54.69	1.0	60	0	91.1	70 - 130				
Surr: 1,2-Dichloroethane-d4	*47.47*	*1.0*	*50*	*0*	*94.9*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*50.25*	*1.0*	*50*	*0*	*101*	*81 - 113*				
Surr: Dibromofluoromethane	*48.39*	*1.0*	*50*	*0*	*96.8*	*77 - 123*				
Surr: Toluene-d8	*50.87*	*1.0*	*50*	*0*	*102*	*82 - 127*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396668 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21111059-13MSD** Units: **ug/L** Analysis Date: **30-Nov-2021 17:35**
Client ID: Run ID: **VOA4_396668** SeqNo: **6398896** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	19.08	1.0	20	0	95.4	70 - 130	18.4	3.61	20	
1,1,2,2-Tetrachloroethane	18.01	1.0	20	0	90.0	70 - 123	19.24	6.65	20	
1,1,2-Trichlor-1,2,2-trifluoroethane	19.09	1.0	20	0	95.5	70 - 130	19.87	3.98	20	
1,1,2-Trichloroethane	17.3	1.0	20	0	86.5	70 - 117	16.54	4.5	20	
1,1-Dichloroethane	18.14	1.0	20	0	90.7	70 - 127	17.51	3.52	20	
1,1-Dichloroethene	18.83	1.0	20	0	94.1	70 - 130	17.97	4.66	20	
1,2,3-Trichlorobenzene	16.89	1.0	20	0	84.5	70 - 130	16.58	1.9	20	
1,2,4-Trichlorobenzene	16.89	1.0	20	0	84.5	70 - 125	16.56	1.97	20	
1,2-Dibromo-3-chloropropane	13.84	1.0	20	0	69.2	70 - 130	13.03	6.08	20	S
1,2-Dibromoethane	18.09	1.0	20	0	90.4	70 - 124	17.48	3.41	20	
1,2-Dichlorobenzene	18.82	1.0	20	0	94.1	70 - 115	19.4	3.05	20	
1,2-Dichloroethane	17.57	1.0	20	0	87.9	70 - 127	17.67	0.563	20	
1,2-Dichloropropane	19.59	1.0	20	0	97.9	70 - 122	18.96	3.26	20	
1,3-Dichlorobenzene	19.05	1.0	20	0	95.3	70 - 119	19.77	3.72	20	
1,4-Dichlorobenzene	18.79	1.0	20	0	93.9	70 - 114	19.1	1.64	20	
2-Butanone	32.72	2.0	40	0	81.8	70 - 130	33.07	1.09	20	
2-Hexanone	31.78	2.0	40	0	79.5	70 - 130	29.13	8.71	20	
4-Methyl-2-pentanone	36.23	2.0	40	0	90.6	70 - 130	33.77	7.03	20	
Acetone	34.77	2.0	40	0	86.9	70 - 130	33.05	5.07	20	
Benzene	17.53	1.0	20	0	87.6	70 - 127	17.68	0.882	20	
Bromochloromethane	17.01	1.0	20	0	85.1	70 - 127	17.27	1.5	20	
Bromodichloromethane	18.2	1.0	20	0	91.0	70 - 124	17.81	2.17	20	
Bromoform	16.76	1.0	20	0	83.8	70 - 129	17.72	5.58	20	
Bromomethane	11.08	1.0	20	0	55.4	70 - 130	8.407	27.4	20	SR
Carbon disulfide	38.49	2.0	40	0	96.2	70 - 130	38.74	0.646	20	
Carbon tetrachloride	17.8	1.0	20	0	89.0	70 - 130	17.81	0.0369	20	
Chlorobenzene	18.63	1.0	20	0	93.2	70 - 114	18.52	0.594	20	
Chloroethane	19.66	1.0	20	0	98.3	70 - 130	18.68	5.1	20	
Chloroform	17.11	1.0	20	0	85.5	70 - 125	17	0.636	20	
Chloromethane	11.68	1.0	20	0	58.4	70 - 130	12.69	8.3	20	S
cis-1,2-Dichloroethene	17.25	1.0	20	0	86.3	70 - 128	18.11	4.85	20	
cis-1,3-Dichloropropene	18.76	1.0	20	0	93.8	70 - 125	17.46	7.18	20	
Cyclohexane	19.83	1.0	20	0	99.1	70 - 130	20.27	2.23	20	
Dibromochloromethane	18	1.0	20	0	90.0	70 - 124	17.73	1.49	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396668 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21111059-13MSD** Units: **ug/L** Analysis Date: **30-Nov-2021 17:35**
Client ID: Run ID: **VOA4_396668** SeqNo: **6398896** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Dichlorodifluoromethane	13.32	1.0	20	0	66.6	70 - 130	14.97	11.7	20	S
Ethylbenzene	18.71	1.0	20	0	93.6	70 - 124	20.13	7.3	20	
Isopropylbenzene	18.74	1.0	20	0	93.7	70 - 130	19.31	3	20	
m,p-Xylene	36.55	2.0	40	0	91.4	70 - 130	37.02	1.28	20	
Methyl acetate	18.14	1.0	20	0	90.7	76 - 122	16.54	9.24	20	
Methyl tert-butyl ether	9.731	1.0	20	0	48.7	70 - 130	9.663	0.699	20	S
Methylcyclohexane	20	1.0	20	0	100.0	61 - 158	20.28	1.38	20	
Methylene chloride	18.8	2.0	20	0	94.0	70 - 128	19.36	2.96	20	
o-Xylene	17.76	1.0	20	0	88.8	70 - 124	17.67	0.532	20	
Styrene	17.51	1.0	20	0	87.5	70 - 130	17.76	1.46	20	
Tetrachloroethene	19.61	1.0	20	0	98.1	70 - 130	20.63	5.05	20	
Toluene	17.81	1.0	20	0	89.1	70 - 123	17.86	0.3	20	
trans-1,2-Dichloroethene	19.27	1.0	20	0	96.3	70 - 130	18.63	3.38	20	
trans-1,3-Dichloropropene	15.78	1.0	20	0	78.9	70 - 121	16.22	2.72	20	
Trichloroethene	17.09	1.0	20	0	85.5	70 - 129	18.56	8.25	20	
Trichlorofluoromethane	17.95	1.0	20	0	89.7	70 - 130	19.45	8.06	20	
Vinyl chloride	16.58	1.0	20	0	82.9	70 - 130	16.73	0.909	20	
Xylenes, Total	54.31	1.0	60	0	90.5	70 - 130	54.69	0.694	20	
Surr: 1,2-Dichloroethane-d4	*46.81*	*1.0*	*50*	*0*	*93.6*	*70 - 126*	*47.47*	*1.4*	*20*	
Surr: 4-Bromofluorobenzene	*48.99*	*1.0*	*50*	*0*	*98.0*	*81 - 113*	*50.25*	*2.55*	*20*	
Surr: Dibromofluoromethane	*49.12*	*1.0*	*50*	*0*	*98.2*	*77 - 123*	*48.39*	*1.49*	*20*	
Surr: Toluene-d8	*48.63*	*1.0*	*50*	*0*	*97.3*	*82 - 127*	*50.87*	*4.5*	*20*	

The following samples were analyzed in this batch: HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: 173275 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173275** Units: **mg/L** Analysis Date: **07-Dec-2021 14:20**
Client ID: Run ID: **UV-2450_397130** SeqNo: **6409468** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-173275** Units: **mg/L** Analysis Date: **07-Dec-2021 14:20**
Client ID: Run ID: **UV-2450_397130** SeqNo: **6409467** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.238	0.0500	0.25	0	95.2	80 - 120				

MS Sample ID: **HS21111248-01MS** Units: **mg/L** Analysis Date: **07-Dec-2021 14:20**
Client ID: Run ID: **UV-2450_397130** SeqNo: **6409465** PrepDate: **07-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	4.58	0.250	1.25	2.675	152	80 - 120				S

MSD Sample ID: **HS21111248-01MSD** Units: **mg/L** Analysis Date: **07-Dec-2021 14:20**
Client ID: Run ID: **UV-2450_397130** SeqNo: **6409466** PrepDate: **07-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	4.615	0.250	1.25	2.675	155	80 - 120	4.58	0.761	20	S

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02 HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396401 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **23-Nov-2021 09:18**
Client ID: Run ID: **ICS-Integrion_396401** SeqNo: **6391903** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	U	0.100								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **23-Nov-2021 09:25**
Client ID: Run ID: **ICS-Integrion_396401** SeqNo: **6391904** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	4.161	0.100	4	0	104	80 - 120				

MS Sample ID: **HS21111412-01MS** Units: **mg/L** Analysis Date: **23-Nov-2021 16:48**
Client ID: Run ID: **ICS-Integrion_396401** SeqNo: **6391916** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	2.12	0.100	2	0	106	80 - 120				

MS Sample ID: **HS21111356-01MS** Units: **mg/L** Analysis Date: **23-Nov-2021 11:37**
Client ID: **GW-P05** Run ID: **ICS-Integrion_396401** SeqNo: **6391908** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	10.68	0.500	10	0.908	97.7	80 - 120				

MSD Sample ID: **HS21111412-01MSD** Units: **mg/L** Analysis Date: **23-Nov-2021 16:56**
Client ID: Run ID: **ICS-Integrion_396401** SeqNo: **6391917** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	2.124	0.100	2	0	106	80 - 120	2.12	0.212	20	

MSD Sample ID: **HS21111356-01MSD** Units: **mg/L** Analysis Date: **23-Nov-2021 11:44**
Client ID: **GW-P05** Run ID: **ICS-Integrion_396401** SeqNo: **6391909** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	10.71	0.500	10	0.908	98.0	80 - 120	10.68	0.29	20	

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R396651 (0) **Instrument: WetChem_HS** **Method: PH BY SM4500H+ B-2011**

DUP Sample ID: **HS21111510-01DUP** Units: **pH Units** Analysis Date: **30-Nov-2021 15:00**
Client ID: Run ID: **WetChem_HS_396651** SeqNo: **6398281** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	8.49	0.100					8.47	0.236	10	
Temp Deg C @pH	20.6	0					20.8	0.966	10	

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02 HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R397104 (0) **Instrument: WetChem_HS** **Method: SPECIFIC CONDUCTANCE BY E120.1, 1982**

MBLK Sample ID: **MBLK-R397104** Units: **umhos/cm** Analysis Date: **07-Dec-2021 12:13**
Client ID: Run ID: **WetChem_HS_397104** SeqNo: **6408962** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	U	5.00								

LCS Sample ID: **LCS-R397104** Units: **umhos/cm** Analysis Date: **07-Dec-2021 12:13**
Client ID: Run ID: **WetChem_HS_397104** SeqNo: **6408961** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	1458	5.00	1413	0	103	80 - 120				

DUP Sample ID: **HS21120083-01DUP** Units: **umhos/cm** Analysis Date: **07-Dec-2021 12:13**
Client ID: Run ID: **WetChem_HS_397104** SeqNo: **6408963** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	1669	5.00					1678	0.538	20	

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02 HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R397214 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **08-Dec-2021 09:44**
Client ID: Run ID: **ICS-Integrion_397214** SeqNo: **6411629** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	U	0.100								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **08-Dec-2021 09:51**
Client ID: Run ID: **ICS-Integrion_397214** SeqNo: **6411630** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	4.121	0.100	4	0	103	80 - 120				

MS Sample ID: **HS21120072-01MS** Units: **mg/L** Analysis Date: **08-Dec-2021 10:35**
Client ID: Run ID: **ICS-Integrion_397214** SeqNo: **6411633** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	1.953	0.100	2	0	97.6	80 - 120				

MSD Sample ID: **HS21120072-01MSD** Units: **mg/L** Analysis Date: **08-Dec-2021 10:42**
Client ID: Run ID: **ICS-Integrion_397214** SeqNo: **6411634** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	1.897	0.100	2	0	94.8	80 - 120	1.953	2.9	20	

The following samples were analyzed in this batch: HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R397215 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY IC BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **08-Dec-2021 09:59**
Client ID: Run ID: **ICS-Integrion_397215** SeqNo: **6411641** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **08-Dec-2021 10:06**
Client ID: Run ID: **ICS-Integrion_397215** SeqNo: **6411642** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	8.021	0.200	8	0	100	90 - 110				

MS Sample ID: **HS21111356-01MS** Units: **mg/L** Analysis Date: **08-Dec-2021 11:27**
Client ID: **GW-P05** Run ID: **ICS-Integrion_397215** SeqNo: **6411646** PrepDate: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	80.47	4.00	80	1.758	98.4	80 - 120				

MSD Sample ID: **HS21111356-01MSD** Units: **mg/L** Analysis Date: **08-Dec-2021 11:35**
Client ID: **GW-P05** Run ID: **ICS-Integrion_397215** SeqNo: **6411647** PrepDate: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	75.7	4.00	80	1.758	92.4	80 - 120	80.47	6.1	20	

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02 HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111356

QC BATCH REPORT

Batch ID: R397217 (0) **Instrument: TOC_04** **Method: TOTAL ORGANIC CARBON BY SW9060A**

MBLK Sample ID: **MBLK-12072021** Units: **mg/L** Analysis Date: **08-Dec-2021 11:30**
Client ID: Run ID: **TOC_04_397217** SeqNo: **6411688** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	U	1.00								

LCS Sample ID: **LCS-12072021** Units: **mg/L** Analysis Date: **08-Dec-2021 11:46**
Client ID: Run ID: **TOC_04_397217** SeqNo: **6411689** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.69	1.00	10	0	107	85 - 115				

LCSD Sample ID: **LCSD-12072021** Units: **mg/L** Analysis Date: **08-Dec-2021 12:02**
Client ID: Run ID: **TOC_04_397217** SeqNo: **6411690** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.86	1.00	10	0	109	85 - 115	10.69	1.58	20	

MS Sample ID: **HS21111356-01MS** Units: **mg/L** Analysis Date: **08-Dec-2021 14:25**
Client ID: **GW-P05** Run ID: **TOC_04_397217** SeqNo: **6411692** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	45.14	1.00	10	33.8	113	80 - 120				

The following samples were analyzed in this batch: HS21111356-01 HS21111356-02 HS21111356-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: **HS21111356**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
Date	
mg/L	Milligrams per Liter

RIGHT SOLUTIONS | RIGHT PARTNER

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Dept of Defense	PJLA L20-507-R2	22-Dec-2021
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS21111356 **Date/Time Received:** 22-Nov-2021 15:55

Client Name: ERM Annapolis **Received by:** Paresh M. Giga

Completed By: /S/ Paresh M. Giga (eSignature) 22-Nov-2021 18:08 (Date/Time) **Reviewed by:** /S/ Corey Grandits (eSignature)

Matrices: **GW** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s):	17.8C; 18.8C U/C	IR31
Cooler(s)/Kit(s):	47600/47821	
Date/Time sample(s) sent to storage:	11/22/2021 18:20	

Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☑	N/A ☐
pH adjusted?	Yes ☑	No ☐	N/A ☐
pH adjusted by:	Si Ma		

Login Notes: All sampling times vary. logged in per chain.
GW-P05 Metals pH >2 (5) Pres'd with 0.5ml HNO3 (Lot 316135911)
11/22/2021 @ 16:45. Final pH (1)

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS21111356 **Date/Time Received:** 22-Nov-2021 15:55

Client Name: ERM Annapolis **Received by:** Paresh M. Giga

Completed By: /S/ Paresh M. Giga (eSignature) 23-Nov-2021 19:13 (Date/Time) **Reviewed by:** /S/ Corey Grandits (eSignature)

Matrices: **GW** Carrier name: **FedEx International Priority**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	13.6C U/C	IR31	
Cooler(s)/Kit(s):	47997		
Date/Time sample(s) sent to storage:	11/23/2021 19:30		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: SRC for samples received 11/23/2021.
Received out of hold & Temp.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

HS21111356

ERM

Gas to Energy Environmental Impact Assessment S

Customer Information		Project Information		ALS Project Manager:	
Purchase Order		Project Name	Gas to Energy Environmental Impact Assesment Study	A	8081_Water_Low (8081 Pesticides)
Work Order		Project Number	0590231	B	8151_Water (8151 Herbicides)
Company Name	ERM	Bill To Company	ERM	C	8260_LL_Water (8260 TCL VOCs)
Send Report To	Herbert Pirela	Invoice Attn.	AP	D	8270_LOW_Water (8270 PAHs)
Address	190 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr	E	9056_Water-NO2-NO3 Combined & NO3 *NEAT*
				F	COND_Water (Conductivity) & pH
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401	G	ICP_TWater (6020/7470 Metals 16)
Phone	(410) 972-4124	Phone	(410) 972-4124	H	P_TWater (Phosphorous)
Fax		Fax		I	PCB_Water_Low (8082 PCBs)
e-Mail Address	herbet.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	J	TOC_Water 9060 (Total Organic Carbon)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	GW-P05	15/11/2021	7:15 AM	GW	1,2,3,8	14	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
2	GW-P04	13/11/2021	9:48 AM	GW	1,2,3,8	14	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
3	GW-P03	12/11/2021	10:17 AM	GW	1,2,3,8	14	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Delshah Hamid Delshah Hamid
Lalita Gopaul Lgopaul

Shipment Method:

Required Turnaround Time: ☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other

Results Due Date:

Relinquished by:	Date:	Time:	Received by:	Notes:
Lalita Gopaul Lgopaul	16/11/2021	10:08		
Relinquished by: DHL (GLS)	Date:	Time:	Received by (Laboratory): 11/22/2021 15:55	Cooler Temp.
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory): 47860 47821	17.8° 18.8°

QC Package: (Check Box Below)

x	Level II: Standard QC	TRRP-Checklist
	Level III: Std QC + Raw Data	TRRP Level IV
	Level IV: SW846 CLP-Like	
	Other:	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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Houston, Texas 77099
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Chain of Custody Form

Page 1 of 1

HS21111356

ERM

Gas to Energy Environmental Impact Assessment S

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	Gas to Energy Environmental Impact Assesment Study
Work Order		Project Number	0590231
Company Name	ERM	Bill To Company	ERM
Send Report To	Herbert Pirela	Invoice Attn.	AP
Address	190 Admiral Cochrance Dr Suite 400 MD 21401	Address	180 Admiral Cochrance Dr
City/State/Zip		City/State/Zip	Suite 400 MD 21401
Phone	(410) 972-4124	Phone	(410) 972-4124
Fax		Fax	
e-Mail Address	herbet.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

A	8081_Water_Low (8081 Pesticides)
B	8151_Water (8151 Herbicides)
C	8260_LL_Water (8260 TCL VOCs)
D	8270_LOW_Water (8270 PAHs)
E	9056_Water-NO2-NO3 Combined & NO3 *NEAT*
F	COND_Water (Conductivity) & pH
G	ICP_TWater (6020/7470 Metals 16)
H	P_TWater (Phosphorous)
I	PCB_Water_Low (8082 PCBs)
J	TOC_Water 9060 (Total Organic Carbon)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	GW-P05	15/11/2021	7:15 AM	GW	1,2,3,8	14	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
2	GW-P04	13/11/2021	9:48 AM	GW	1,2,3,8	14	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
3	GW-P03	12/11/2021	10:17 AM	GW	1,2,3,8	14	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Delshah Hamid
Lalita Gopaul

Shipment Method:

Required Turnaround Time: ☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other

Results Due Date:

Relinquished by: Lalita Gopaul	Date: 16/11/2021	Time:	Received by:	Notes:
Relinquished by: DHL (GLAS)	Date: 16/	Time:	Received by (Laboratory): 11/23/2021 16:35	Cooler Temp.
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

QC Package: (Check Box Below)

x	Level II: Standard QC	TRRP-Checklist
	Level III: Std QC + Raw Data	TRRP Level IV
	Level IV: SW846 CLP-Like	
	Other:	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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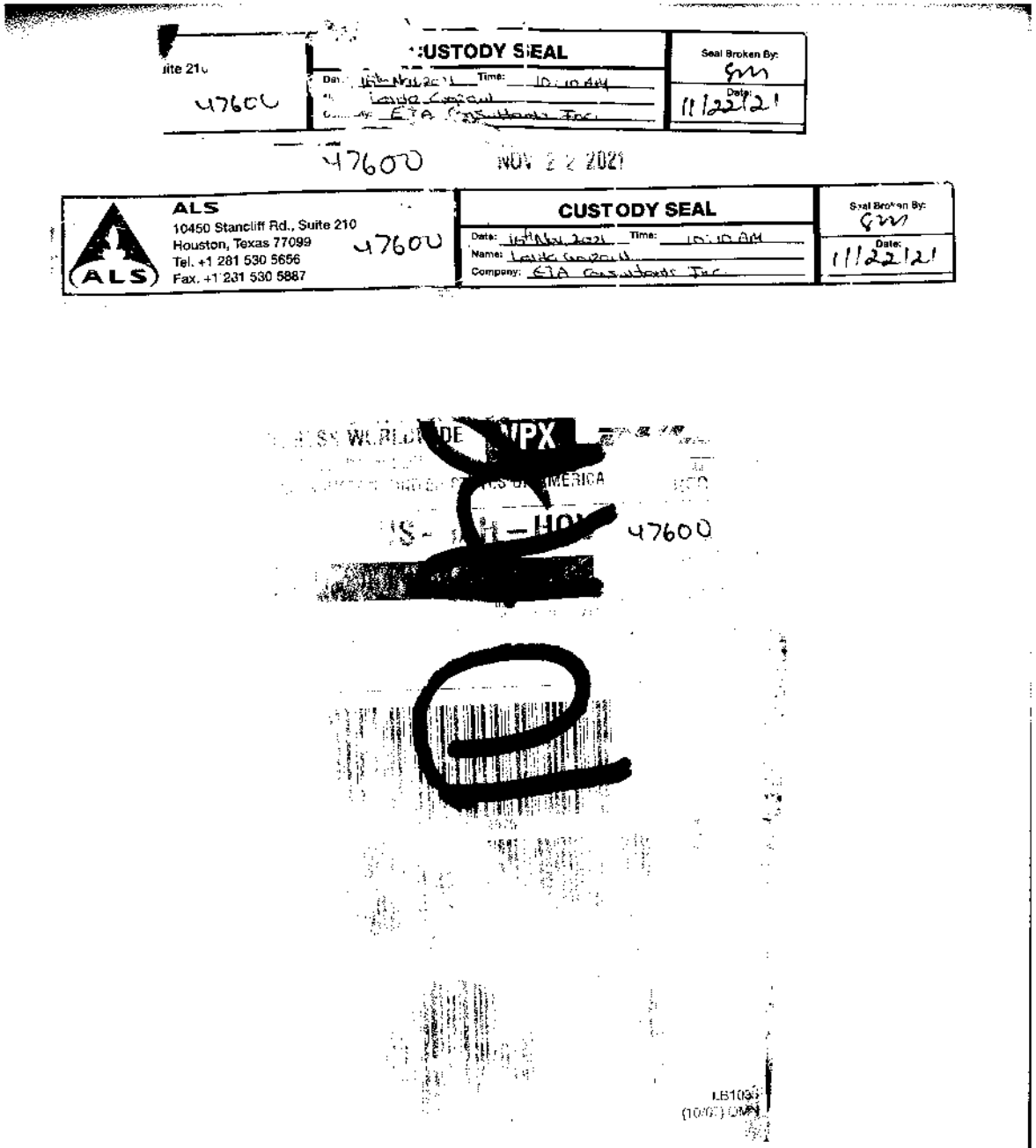

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ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

CUSTODY SEAL

Seal Broken By:

Date: 11/23/21

47821

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

47821

CUSTODY SEAL

Seal Broken By:

Date: 11/23/21

NWO (11/9) 926187

EXPRESS WORLDWIDE WPX DHL

NOV 2 2 2021

47821

To: ALS ABORATORY
CORE: GRANDITS (PROJECT MANAGE
10450 S ANCLIFF ROAD
SUITE
77099 HOUSTON Texa
United Stat of America

US HO

C

Ref: 954631200

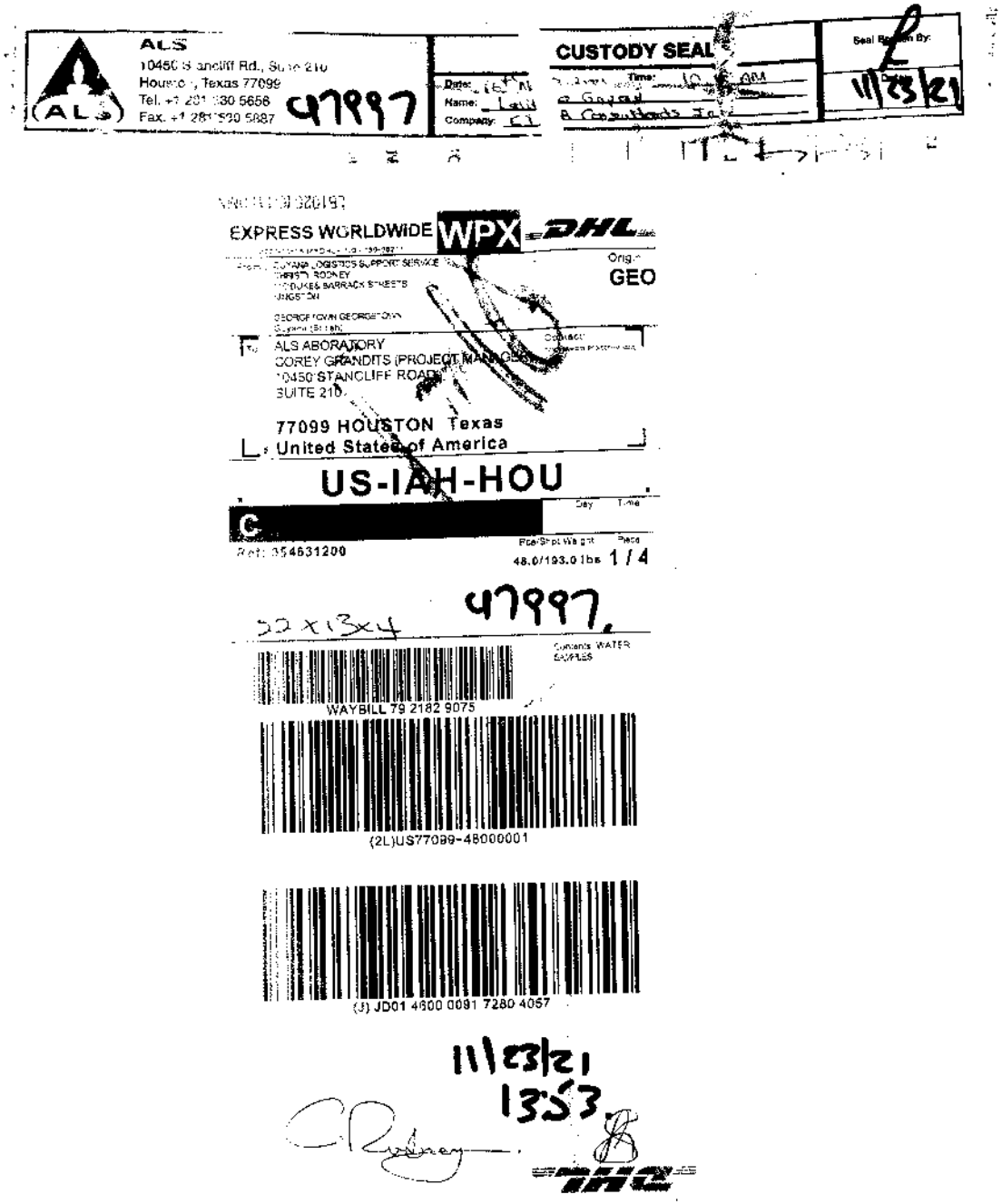
4 / 4

Contents WATER SAMPLES

WAYBILL 79 2182 9075

(2L)US77098+48000001

(J) JD01 460C 0091 728D 4060



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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

December 20, 2021

Herbert Pirela
ERM
180 Admiral Cochrance Dr
Suite 400
Annapolis, MD 21401

Work Order: **HS21120072**

Laboratory Results for: **Gas to Energy Environmental Impact Assessment Study**

Dear Herbert Pirela,

ALS Environmental received 2 sample(s) on Dec 01, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: DAYNA.FISHER
Corey Grandits
Project Manager

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21120072

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21120072-01	G-P04	Groundwater		23-Nov-2021 11:22	01-Dec-2021 17:15	☐
HS21120072-02	G-P05	Groundwater		23-Nov-2021 13:44	01-Dec-2021 17:15	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21120072

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

ECD Organics by Method SW8082

Batch ID: 173177

Sample ID: MBLK-173177

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

ECD Organics by Method SW8081

Batch ID: 173176

Sample ID: G-P04 (HS21120072-01)

• Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: G-P05 (HS21120072-02)

• Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: LCS-173176

• The multi-response compounds toxaphene and chlordane were not included in the spiking solution for the LCS.

Sample ID: MBLK-173176

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

ECD Organics by Method SW8151

Batch ID: 173175

Sample ID: G-P04 (HS21120072-01)

• Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: G-P05 (HS21120072-02)

• Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: MBLK-173175

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

GCMS Semivolatiles by Method SW8270

Batch ID: 173242

Sample ID: G-P04 (HS21120072-01)

• Sample extracted or prepared outside of hold time.

Sample ID: G-P05 (HS21120072-02)

• Sample extracted or prepared outside of hold time.

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Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21120072

GCMS Volatiles by Method SW8260

Batch ID: R397189

Sample ID: HS21120222-04MS

- MS and MSD are for an unrelated sample

Metals by Method SW6020A

Batch ID: 173450

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 173251

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9056

Batch ID: R397215

Sample ID: G-P04 (HS21120072-01)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Sample ID: G-P05 (HS21120072-02)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Batch ID: R397214

Sample ID: G-P04 (HS21120072-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: G-P05 (HS21120072-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method SW9060

Batch ID: R397633

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E120.1

Batch ID: R397104

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R396853

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21120072

WetChemistry by Method E365.3

Batch ID: 173609

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P04 Lab ID:HS21120072-01
Collection Date: 23-Nov-2021 11:22 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: PC
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
1,1,2,2-Tetrachloroethane	U		0.50	1.0	ug/L	1	06-Dec-2021 21:03
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.50	1.0	ug/L	1	06-Dec-2021 21:03
1,1,2-Trichloroethane	U		0.30	1.0	ug/L	1	06-Dec-2021 21:03
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
1,2,3-Trichlorobenzene	U		0.40	1.0	ug/L	1	06-Dec-2021 21:03
1,2,4-Trichlorobenzene	U		0.50	1.0	ug/L	1	06-Dec-2021 21:03
1,2-Dibromo-3-chloropropane	U		1.0	1.0	ug/L	1	06-Dec-2021 21:03
1,2-Dibromoethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
1,2-Dichlorobenzene	U		0.50	1.0	ug/L	1	06-Dec-2021 21:03
1,2-Dichloroethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
1,2-Dichloropropane	U		0.50	1.0	ug/L	1	06-Dec-2021 21:03
1,3-Dichlorobenzene	U		0.40	1.0	ug/L	1	06-Dec-2021 21:03
1,4-Dichlorobenzene	U		0.40	1.0	ug/L	1	06-Dec-2021 21:03
2-Butanone	U		0.50	2.0	ug/L	1	06-Dec-2021 21:03
2-Hexanone	U		1.0	2.0	ug/L	1	06-Dec-2021 21:03
4-Methyl-2-pentanone	U		0.70	2.0	ug/L	1	06-Dec-2021 21:03
Acetone	**6.1**		**2.0**	**2.0**	**ug/L**	1	06-Dec-2021 21:03
Benzene	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
Bromochloromethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
Bromodichloromethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
Bromoform	U		0.40	1.0	ug/L	1	06-Dec-2021 21:03
Bromomethane	U		0.40	1.0	ug/L	1	06-Dec-2021 21:03
Carbon disulfide	U		0.60	2.0	ug/L	1	06-Dec-2021 21:03
Carbon tetrachloride	U		0.50	1.0	ug/L	1	06-Dec-2021 21:03
Chlorobenzene	U		0.30	1.0	ug/L	1	06-Dec-2021 21:03
Chloroethane	U		0.30	1.0	ug/L	1	06-Dec-2021 21:03
Chloroform	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
Chloromethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
cis-1,2-Dichloroethene	U		0.20	1.0	ug/L	1	06-Dec-2021 21:03
cis-1,3-Dichloropropene	U		0.10	1.0	ug/L	1	06-Dec-2021 21:03
Cyclohexane	U		0.30	1.0	ug/L	1	06-Dec-2021 21:03
Dibromochloromethane	U		0.30	1.0	ug/L	1	06-Dec-2021 21:03
Dichlorodifluoromethane	U		0.30	1.0	ug/L	1	06-Dec-2021 21:03
Ethylbenzene	U		0.30	1.0	ug/L	1	06-Dec-2021 21:03
Isopropylbenzene	U		0.30	1.0	ug/L	1	06-Dec-2021 21:03
m,p-Xylene	U		0.50	2.0	ug/L	1	06-Dec-2021 21:03
Methyl acetate	U		1.0	1.0	ug/L	1	06-Dec-2021 21:03

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P04 Lab ID:HS21120072-01
Collection Date: 23-Nov-2021 11:22 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: PC
Methyl tert-butyl ether		U	0.20	1.0	ug/L	1	06-Dec-2021 21:03
Methylcyclohexane		U	0.30	1.0	ug/L	1	06-Dec-2021 21:03
Methylene chloride		U	1.0	2.0	ug/L	1	06-Dec-2021 21:03
o-Xylene		U	0.30	1.0	ug/L	1	06-Dec-2021 21:03
Styrene		U	0.30	1.0	ug/L	1	06-Dec-2021 21:03
Tetrachloroethene		U	0.30	1.0	ug/L	1	06-Dec-2021 21:03
Toluene		U	0.20	1.0	ug/L	1	06-Dec-2021 21:03
trans-1,2-Dichloroethene		U	0.20	1.0	ug/L	1	06-Dec-2021 21:03
trans-1,3-Dichloropropene		U	0.20	1.0	ug/L	1	06-Dec-2021 21:03
Trichloroethene		U	0.20	1.0	ug/L	1	06-Dec-2021 21:03
Trichlorofluoromethane		U	0.30	1.0	ug/L	1	06-Dec-2021 21:03
Vinyl chloride		U	0.20	1.0	ug/L	1	06-Dec-2021 21:03
Xylenes, Total		U	0.30	1.0	ug/L	1	06-Dec-2021 21:03
Surr: 1,2-Dichloroethane-d4	*93.0*			*70-126*	*%REC*	*1*	*06-Dec-2021 21:03*
Surr: 4-Bromofluorobenzene	*85.8*			*81-113*	*%REC*	*1*	*06-Dec-2021 21:03*
Surr: Dibromofluoromethane	*95.1*			*77-123*	*%REC*	*1*	*06-Dec-2021 21:03*
Surr: Toluene-d8	*103*			*82-127*	*%REC*	*1*	*06-Dec-2021 21:03*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P04 Lab ID:HS21120072-01
Collection Date: 23-Nov-2021 11:22 Matrix:Groundwater

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**					Prep:SW3510 / 07-Dec-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	09-Dec-2021 15:25
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 15:25
Acenaphthene	U	H		0.027	0.10	ug/L	1	09-Dec-2021 15:25
Acenaphthylene	U	H		0.015	0.10	ug/L	1	09-Dec-2021 15:25
Anthracene	U	H		0.014	0.10	ug/L	1	09-Dec-2021 15:25
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	09-Dec-2021 15:25
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	09-Dec-2021 15:25
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	09-Dec-2021 15:25
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	09-Dec-2021 15:25
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 15:25
Chrysene	U	H		0.021	0.10	ug/L	1	09-Dec-2021 15:25
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	09-Dec-2021 15:25
Fluoranthene	U	H		0.010	0.10	ug/L	1	09-Dec-2021 15:25
Fluorene	U	H		0.030	0.10	ug/L	1	09-Dec-2021 15:25
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	09-Dec-2021 15:25
Isophorone	U	H		0.025	0.20	ug/L	1	09-Dec-2021 15:25
Naphthalene	U	H		0.020	0.10	ug/L	1	09-Dec-2021 15:25
Phenanthrene	U	H		0.021	0.10	ug/L	1	09-Dec-2021 15:25
Pyrene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 15:25
Surr: 2,4,6-Tribromophenol	*70.5*				*34-129*	*%REC*	*1*	*09-Dec-2021 15:25*
Surr: 2-Fluorobiphenyl	*67.8*				*40-125*	*%REC*	*1*	*09-Dec-2021 15:25*
Surr: 2-Fluorophenol	*69.3*				*20-120*	*%REC*	*1*	*09-Dec-2021 15:25*
Surr: 4-Terphenyl-d14	*88.0*				*40-135*	*%REC*	*1*	*09-Dec-2021 15:25*
Surr: Nitrobenzene-d5	*66.5*				*41-120*	*%REC*	*1*	*09-Dec-2021 15:25*
Surr: Phenol-d6	*70.6*				*20-120*	*%REC*	*1*	*09-Dec-2021 15:25*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P04 Lab ID:HS21120072-01
Collection Date: 23-Nov-2021 11:22 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3510 / 03-Dec-2021		Analyst: JBA
4,4´-DDD	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:28
4,4´-DDE	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:28
4,4´-DDT	**0.0070**	HP	**0.0025**	**0.0025**	**ug/L**	1	09-Dec-2021 06:28
Aldrin	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:28
alpha-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:28
alpha-Chlordane	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:28
beta-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:28
Chlordane	U	H	0.025	0.025	ug/L	1	09-Dec-2021 06:28
delta-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:28
Dieldrin	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:28
Endosulfan I	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:28
Endosulfan II	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:28
Endosulfan sulfate	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:28
Endrin	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:28
Endrin aldehyde	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:28
Endrin ketone	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:28
gamma-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:28
gamma-Chlordane	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:28
Heptachlor	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:28
Heptachlor epoxide	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:28
Methoxychlor	U	H	0.012	0.012	ug/L	1	09-Dec-2021 06:28
Toxaphene	U	H	0.025	0.025	ug/L	1	09-Dec-2021 06:28
Surr: Decachlorobiphenyl	*119*			*55-145*	*%REC*	*1*	*09-Dec-2021 06:28*
Surr: Tetrachloro-m-xylene	*113*			*52-142*	*%REC*	*1*	*09-Dec-2021 06:28*
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3510C/3665A / 03-Dec-2021		Analyst: JBA
Aroclor 1016	U		0.0125	0.0125	ug/L	1	06-Dec-2021 08:34
Aroclor 1221	U		0.0125	0.0125	ug/L	1	06-Dec-2021 08:34
Aroclor 1232	U		0.0125	0.0125	ug/L	1	06-Dec-2021 08:34
Aroclor 1242	U		0.0125	0.0125	ug/L	1	06-Dec-2021 08:34
Aroclor 1248	U		0.0125	0.0125	ug/L	1	06-Dec-2021 08:34
Aroclor 1254	U		0.0125	0.0125	ug/L	1	06-Dec-2021 08:34
Aroclor 1260	U		0.0125	0.0125	ug/L	1	06-Dec-2021 08:34
PCBs (Total)	U		0.0125	0.0125	ug/L	1	06-Dec-2021 08:34
Surr: Decachlorobiphenyl	*80.3*			*54-140*	*%REC*	*1*	*06-Dec-2021 08:34*
Surr: Tetrachloro-m-xylene	*79.5*			*53-137*	*%REC*	*1*	*06-Dec-2021 08:34*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Sample ID: G-P04
Collection Date: 23-Nov-2021 11:22

ANALYTICAL REPORT
WorkOrder:HS21120072
Lab ID:HS21120072-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
CHLORINATED HERBICIDES BY SW8151A		**Method:SW8151**			Prep:SW8151 / 03-Dec-2021		Analyst: JBA
2,4,5-T	U	H	0.0500	0.200	ug/L	1	10-Dec-2021 10:50
2,4,5-TP (Silvex)	U	H	0.0500	0.200	ug/L	1	10-Dec-2021 10:50
2,4-D	U	H	0.0600	0.200	ug/L	1	10-Dec-2021 10:50
2,4-DB	U	H	0.0800	0.400	ug/L	1	10-Dec-2021 10:50
Dalapon	U	H	0.0700	0.200	ug/L	1	10-Dec-2021 10:50
Dicamba	U	H	0.0500	0.200	ug/L	1	10-Dec-2021 10:50
Dichlorprop	U	H	0.0800	0.400	ug/L	1	10-Dec-2021 10:50
Dinoseb	U	H	0.0500	0.300	ug/L	1	10-Dec-2021 10:50
MCPA	U	H	8.10	30.0	ug/L	1	10-Dec-2021 10:50
MCPP	U	H	8.10	30.0	ug/L	1	10-Dec-2021 10:50
Surr: DCAA	*113*			*50-130*	*%REC*	*1*	*10-Dec-2021 10:50*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 13-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	14-Dec-2021 12:41
Arsenic	**0.0553**		**0.000400**	**0.00200**	**mg/L**	1	14-Dec-2021 12:41
Beryllium	**0.0140**		**0.000200**	**0.00200**	**mg/L**	1	14-Dec-2021 12:41
Cadmium	**0.000625**	J	**0.000200**	**0.00200**	**mg/L**	1	14-Dec-2021 12:41
Chromium	**0.0690**		**0.000400**	**0.00400**	**mg/L**	1	14-Dec-2021 12:41
Copper	**0.0485**		**0.00100**	**0.00200**	**mg/L**	1	14-Dec-2021 12:41
Iron	**379**		**0.0600**	**1.00**	**mg/L**	5	13-Dec-2021 20:59
Lead	**0.178**		**0.000600**	**0.00200**	**mg/L**	1	14-Dec-2021 12:41
Manganese	**16.6**		**0.0700**	**0.500**	**mg/L**	100	14-Dec-2021 12:43
Nickel	**0.208**		**0.000600**	**0.00200**	**mg/L**	1	14-Dec-2021 12:41
Potassium	**9.74**		**0.0180**	**0.200**	**mg/L**	1	14-Dec-2021 12:41
Selenium	**0.00763**		**0.00110**	**0.00200**	**mg/L**	1	14-Dec-2021 12:41
Silver	U		0.000200	0.00200	mg/L	1	14-Dec-2021 12:41
Thallium	U		0.000200	0.00200	mg/L	1	14-Dec-2021 12:41
Zinc	**1.18**		**0.00200**	**0.00400**	**mg/L**	1	14-Dec-2021 12:41
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 07-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	07-Dec-2021 13:50
SPECIFIC CONDUCTANCE BY E120.1, 1982		**Method:E120.1**					Analyst: MZD
Specific Conductance	**1,220**		**5.00**	**5.00**	**umhos/cm**	1	07-Dec-2021 12:13
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 15-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	15-Dec-2021 13:45
PH BY SW9040C		**Method:SW9040C**					Analyst: SH
pH	**6.41**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 19:10
Temp Deg C @pH	**22.2**	H	**0**	**0**	**DEG C**	1	02-Dec-2021 19:10
ANIONS BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate (As N)	U	H	0.0300	0.100	mg/L	1	08-Dec-2021 10:27

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P04 Lab ID:HS21120072-01
Collection Date: 23-Nov-2021 11:22 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
NITRATE/NITRITE BY IC BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate-Nitrite	**2.76**	J	**0.600**	**4.00**	**mg/L**	20	08-Dec-2021 11:57
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**					Analyst: JAC
Organic Carbon, Total	**20.0**		**0.500**	**1.00**	**mg/L**	1	15-Dec-2021 02:03

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P05 Lab ID:HS21120072-02
Collection Date: 23-Nov-2021 13:44 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: PC
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
1,1,2,2-Tetrachloroethane	U		0.50	1.0	ug/L	1	06-Dec-2021 21:24
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.50	1.0	ug/L	1	06-Dec-2021 21:24
1,1,2-Trichloroethane	U		0.30	1.0	ug/L	1	06-Dec-2021 21:24
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
1,2,3-Trichlorobenzene	U		0.40	1.0	ug/L	1	06-Dec-2021 21:24
1,2,4-Trichlorobenzene	U		0.50	1.0	ug/L	1	06-Dec-2021 21:24
1,2-Dibromo-3-chloropropane	U		1.0	1.0	ug/L	1	06-Dec-2021 21:24
1,2-Dibromoethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
1,2-Dichlorobenzene	U		0.50	1.0	ug/L	1	06-Dec-2021 21:24
1,2-Dichloroethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
1,2-Dichloropropane	U		0.50	1.0	ug/L	1	06-Dec-2021 21:24
1,3-Dichlorobenzene	U		0.40	1.0	ug/L	1	06-Dec-2021 21:24
1,4-Dichlorobenzene	U		0.40	1.0	ug/L	1	06-Dec-2021 21:24
2-Butanone	U		0.50	2.0	ug/L	1	06-Dec-2021 21:24
2-Hexanone	U		1.0	2.0	ug/L	1	06-Dec-2021 21:24
4-Methyl-2-pentanone	U		0.70	2.0	ug/L	1	06-Dec-2021 21:24
Acetone	**4.4**		**2.0**	**2.0**	**ug/L**	1	06-Dec-2021 21:24
Benzene	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
Bromochloromethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
Bromodichloromethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
Bromoform	U		0.40	1.0	ug/L	1	06-Dec-2021 21:24
Bromomethane	U		0.40	1.0	ug/L	1	06-Dec-2021 21:24
Carbon disulfide	U		0.60	2.0	ug/L	1	06-Dec-2021 21:24
Carbon tetrachloride	U		0.50	1.0	ug/L	1	06-Dec-2021 21:24
Chlorobenzene	U		0.30	1.0	ug/L	1	06-Dec-2021 21:24
Chloroethane	U		0.30	1.0	ug/L	1	06-Dec-2021 21:24
Chloroform	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
Chloromethane	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
cis-1,2-Dichloroethene	U		0.20	1.0	ug/L	1	06-Dec-2021 21:24
cis-1,3-Dichloropropene	U		0.10	1.0	ug/L	1	06-Dec-2021 21:24
Cyclohexane	U		0.30	1.0	ug/L	1	06-Dec-2021 21:24
Dibromochloromethane	U		0.30	1.0	ug/L	1	06-Dec-2021 21:24
Dichlorodifluoromethane	U		0.30	1.0	ug/L	1	06-Dec-2021 21:24
Ethylbenzene	U		0.30	1.0	ug/L	1	06-Dec-2021 21:24
Isopropylbenzene	U		0.30	1.0	ug/L	1	06-Dec-2021 21:24
m,p-Xylene	U		0.50	2.0	ug/L	1	06-Dec-2021 21:24
Methyl acetate	U		1.0	1.0	ug/L	1	06-Dec-2021 21:24

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P05 Lab ID:HS21120072-02
Collection Date: 23-Nov-2021 13:44 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: PC
Methyl tert-butyl ether		U	0.20	1.0	ug/L	1	06-Dec-2021 21:24
Methylcyclohexane		U	0.30	1.0	ug/L	1	06-Dec-2021 21:24
Methylene chloride		U	1.0	2.0	ug/L	1	06-Dec-2021 21:24
o-Xylene		U	0.30	1.0	ug/L	1	06-Dec-2021 21:24
Styrene		U	0.30	1.0	ug/L	1	06-Dec-2021 21:24
Tetrachloroethene		U	0.30	1.0	ug/L	1	06-Dec-2021 21:24
Toluene		U	0.20	1.0	ug/L	1	06-Dec-2021 21:24
trans-1,2-Dichloroethene		U	0.20	1.0	ug/L	1	06-Dec-2021 21:24
trans-1,3-Dichloropropene		U	0.20	1.0	ug/L	1	06-Dec-2021 21:24
Trichloroethene		U	0.20	1.0	ug/L	1	06-Dec-2021 21:24
Trichlorofluoromethane		U	0.30	1.0	ug/L	1	06-Dec-2021 21:24
Vinyl chloride		U	0.20	1.0	ug/L	1	06-Dec-2021 21:24
Xylenes, Total		U	0.30	1.0	ug/L	1	06-Dec-2021 21:24
Surr: 1,2-Dichloroethane-d4	*90.2*			*70-126*	*%REC*	*1*	*06-Dec-2021 21:24*
Surr: 4-Bromofluorobenzene	*90.5*			*81-113*	*%REC*	*1*	*06-Dec-2021 21:24*
Surr: Dibromofluoromethane	*91.3*			*77-123*	*%REC*	*1*	*06-Dec-2021 21:24*
Surr: Toluene-d8	*103*			*82-127*	*%REC*	*1*	*06-Dec-2021 21:24*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P05 Lab ID:HS21120072-02
Collection Date: 23-Nov-2021 13:44 Matrix:Groundwater

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**					Prep:SW3510 / 07-Dec-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	09-Dec-2021 15:45
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 15:45
Acenaphthene	U	H		0.027	0.10	ug/L	1	09-Dec-2021 15:45
Acenaphthylene	U	H		0.015	0.10	ug/L	1	09-Dec-2021 15:45
Anthracene	U	H		0.014	0.10	ug/L	1	09-Dec-2021 15:45
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	09-Dec-2021 15:45
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	09-Dec-2021 15:45
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	09-Dec-2021 15:45
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	09-Dec-2021 15:45
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 15:45
Chrysene	U	H		0.021	0.10	ug/L	1	09-Dec-2021 15:45
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	09-Dec-2021 15:45
Fluoranthene	U	H		0.010	0.10	ug/L	1	09-Dec-2021 15:45
Fluorene	U	H		0.030	0.10	ug/L	1	09-Dec-2021 15:45
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	09-Dec-2021 15:45
Isophorone	U	H		0.025	0.20	ug/L	1	09-Dec-2021 15:45
Naphthalene	U	H		0.020	0.10	ug/L	1	09-Dec-2021 15:45
Phenanthrene	U	H		0.021	0.10	ug/L	1	09-Dec-2021 15:45
Pyrene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 15:45
Surr: 2,4,6-Tribromophenol	*72.8*				*34-129*	*%REC*	*1*	*09-Dec-2021 15:45*
Surr: 2-Fluorobiphenyl	*71.2*				*40-125*	*%REC*	*1*	*09-Dec-2021 15:45*
Surr: 2-Fluorophenol	*71.7*				*20-120*	*%REC*	*1*	*09-Dec-2021 15:45*
Surr: 4-Terphenyl-d14	*93.5*				*40-135*	*%REC*	*1*	*09-Dec-2021 15:45*
Surr: Nitrobenzene-d5	*70.4*				*41-120*	*%REC*	*1*	*09-Dec-2021 15:45*
Surr: Phenol-d6	*68.4*				*20-120*	*%REC*	*1*	*09-Dec-2021 15:45*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P05 Lab ID:HS21120072-02
Collection Date: 23-Nov-2021 13:44 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3510 / 03-Dec-2021		Analyst: JBA
4,4´-DDD	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
4,4´-DDE	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
4,4´-DDT	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
Aldrin	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:51
alpha-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:51
alpha-Chlordane	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
beta-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:51
Chlordane	U	H	0.025	0.025	ug/L	1	09-Dec-2021 06:51
delta-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:51
Dieldrin	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
Endosulfan I	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:51
Endosulfan II	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
Endosulfan sulfate	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
Endrin	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
Endrin aldehyde	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
Endrin ketone	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
gamma-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:51
gamma-Chlordane	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 06:51
Heptachlor	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:51
Heptachlor epoxide	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 06:51
Methoxychlor	U	H	0.012	0.012	ug/L	1	09-Dec-2021 06:51
Toxaphene	U	H	0.025	0.025	ug/L	1	09-Dec-2021 06:51
Surr: Decachlorobiphenyl	*128*			*55-145*	*%REC*	*1*	*09-Dec-2021 06:51*
Surr: Tetrachloro-m-xylene	*115*			*52-142*	*%REC*	*1*	*09-Dec-2021 06:51*
PCBS BY SW8082A	**Method:SW8082**				Prep:SW3510C/3665A / 03-Dec-2021		Analyst: JBA
Aroclor 1016	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:18
Aroclor 1221	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:18
Aroclor 1232	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:18
Aroclor 1242	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:18
Aroclor 1248	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:18
Aroclor 1254	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:18
Aroclor 1260	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:18
PCBs (Total)	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:18
Surr: Decachlorobiphenyl	*104*			*54-140*	*%REC*	*1*	*06-Dec-2021 10:18*
Surr: Tetrachloro-m-xylene	*99.7*			*53-137*	*%REC*	*1*	*06-Dec-2021 10:18*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P05 Lab ID:HS21120072-02
Collection Date: 23-Nov-2021 13:44 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
CHLORINATED HERBICIDES BY SW8151A		**Method:SW8151**			Prep:SW8151 / 03-Dec-2021		Analyst: JBA
2,4,5-T	U	H	0.0500	0.200	ug/L	1	10-Dec-2021 11:08
2,4,5-TP (Silvex)	U	H	0.0500	0.200	ug/L	1	10-Dec-2021 11:08
2,4-D	U	H	0.0600	0.200	ug/L	1	10-Dec-2021 11:08
2,4-DB	U	H	0.0800	0.400	ug/L	1	10-Dec-2021 11:08
Dalapon	U	H	0.0700	0.200	ug/L	1	10-Dec-2021 11:08
Dicamba	U	H	0.0500	0.200	ug/L	1	10-Dec-2021 11:08
Dichlorprop	U	H	0.0800	0.400	ug/L	1	10-Dec-2021 11:08
Dinoseb	U	H	0.0500	0.300	ug/L	1	10-Dec-2021 11:08
MCPA	U	H	8.10	30.0	ug/L	1	10-Dec-2021 11:08
MCPP	U	H	8.10	30.0	ug/L	1	10-Dec-2021 11:08
Surr: DCAA	*106*			*50-130*	*%REC*	*1*	*10-Dec-2021 11:08*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 13-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	14-Dec-2021 12:45
Arsenic	**0.0186**		**0.000400**	**0.00200**	**mg/L**	1	14-Dec-2021 12:45
Beryllium	**0.00694**		**0.000200**	**0.00200**	**mg/L**	1	14-Dec-2021 12:45
Cadmium	**0.000297**	J	**0.000200**	**0.00200**	**mg/L**	1	14-Dec-2021 12:45
Chromium	**0.0248**		**0.000400**	**0.00400**	**mg/L**	1	14-Dec-2021 12:45
Copper	**0.0409**		**0.00100**	**0.00200**	**mg/L**	1	14-Dec-2021 12:45
Iron	**125**		**0.0600**	**1.00**	**mg/L**	5	13-Dec-2021 21:01
Lead	**0.0942**		**0.000600**	**0.00200**	**mg/L**	1	14-Dec-2021 12:45
Manganese	**11.5**		**0.0700**	**0.500**	**mg/L**	100	14-Dec-2021 12:47
Nickel	**0.117**		**0.000600**	**0.00200**	**mg/L**	1	14-Dec-2021 12:45
Potassium	**5.25**		**0.0180**	**0.200**	**mg/L**	1	14-Dec-2021 12:45
Selenium	**0.00352**		**0.00110**	**0.00200**	**mg/L**	1	14-Dec-2021 12:45
Silver	U		0.000200	0.00200	mg/L	1	14-Dec-2021 12:45
Thallium	U		0.000200	0.00200	mg/L	1	14-Dec-2021 12:45
Zinc	**0.492**		**0.00200**	**0.00400**	**mg/L**	1	14-Dec-2021 12:45
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 07-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	07-Dec-2021 13:52
SPECIFIC CONDUCTANCE BY E120.1, 1982		**Method:E120.1**					Analyst: MZD
Specific Conductance	**1,790**		**5.00**	**5.00**	**umhos/cm**	1	07-Dec-2021 12:13
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 15-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	15-Dec-2021 13:45
PH BY SW9040C		**Method:SW9040C**					Analyst: SH
pH	**6.10**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 19:10
Temp Deg C @pH	**22.4**	H	**0**	**0**	**DEG C**	1	02-Dec-2021 19:10
ANIONS BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate (As N)	**0.0923**	JH	**0.0300**	**0.100**	**mg/L**	1	08-Dec-2021 10:50

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120072
Sample ID: G-P05 Lab ID:HS21120072-02
Collection Date: 23-Nov-2021 13:44 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
NITRATE/NITRITE BY IC BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate-Nitrite	**2.72**	J	**0.600**	**4.00**	**mg/L**	20	08-Dec-2021 12:05
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**					Analyst: JAC
Organic Carbon, Total	**9.08**		**0.500**	**1.00**	**mg/L**	1	15-Dec-2021 02:19

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

Batch ID: 173175 **Start Date:** 03 Dec 2021 07:00 **End Date:** 03 Dec 2021 15:30
Method: HERBICIDE AQ SEP FUN EXTRACT-SW8151 **Prep Code:** 3510_H

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120072-01	1	1000 (mL)	10 (mL)	0.01	1-liter amber glass, Neat
HS21120072-02	1	1000 (mL)	10 (mL)	0.01	1-liter amber glass, Neat

Batch ID: 173176 **Start Date:** 03 Dec 2021 08:00 **End Date:** 03 Dec 2021 14:00
Method: PEST AQ SEP FUN EXTRACT-SW3510C **Prep Code:** 3510_P_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120072-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120072-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173177 **Start Date:** 03 Dec 2021 08:00 **End Date:** 03 Dec 2021 14:00
Method: PCBS AQ SEP FUN EXTRACT-SW3510C **Prep Code:** 3510_PCB_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120072-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120072-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173242 **Start Date:** 07 Dec 2021 07:00 **End Date:** 07 Dec 2021 12:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120072-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120072-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173251 **Start Date:** 07 Dec 2021 08:00 **End Date:** 07 Dec 2021 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120072-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120072-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173450 **Start Date:** 13 Dec 2021 08:30 **End Date:** 13 Dec 2021 12:30
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120072-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120072-02		10 (mL)	10 (mL)	1	120 plastic HNO3

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Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

Batch ID: 173609 **Start Date:** 15 Dec 2021 10:30 **End Date:** 15 Dec 2021 12:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120072-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120072-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173175 (0)	**Test Name :** CHLORINATED HERBICIDES BY SW8151A				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22		03 Dec 2021 12:58	10 Dec 2021 10:50	1
HS21120072-02	G-P05	23 Nov 2021 13:44		03 Dec 2021 12:58	10 Dec 2021 11:08	1
Batch ID: 173176 (0)	**Test Name :** ORGANOCHLORINE PESTICIDES BY SW8081B				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22		03 Dec 2021 12:58	09 Dec 2021 06:28	1
HS21120072-02	G-P05	23 Nov 2021 13:44		03 Dec 2021 12:58	09 Dec 2021 06:51	1
Batch ID: 173177 (0)	**Test Name :** PCBS BY SW8082A				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22		03 Dec 2021 12:58	06 Dec 2021 08:34	1
HS21120072-02	G-P05	23 Nov 2021 13:44		03 Dec 2021 12:58	06 Dec 2021 10:18	1
Batch ID: 173242 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22		07 Dec 2021 09:02	09 Dec 2021 15:25	1
HS21120072-02	G-P05	23 Nov 2021 13:44		07 Dec 2021 09:02	09 Dec 2021 15:45	1
Batch ID: 173251 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22		07 Dec 2021 08:00	07 Dec 2021 13:50	1
HS21120072-02	G-P05	23 Nov 2021 13:44		07 Dec 2021 08:00	07 Dec 2021 13:52	1
Batch ID: 173450 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22		13 Dec 2021 12:30	14 Dec 2021 12:43	100
HS21120072-01	G-P04	23 Nov 2021 11:22		13 Dec 2021 12:30	14 Dec 2021 12:41	1
HS21120072-01	G-P04	23 Nov 2021 11:22		13 Dec 2021 12:30	13 Dec 2021 20:59	5
HS21120072-02	G-P05	23 Nov 2021 13:44		13 Dec 2021 12:30	14 Dec 2021 12:47	100
HS21120072-02	G-P05	23 Nov 2021 13:44		13 Dec 2021 12:30	14 Dec 2021 12:45	1
HS21120072-02	G-P05	23 Nov 2021 13:44		13 Dec 2021 12:30	13 Dec 2021 21:01	5
Batch ID: 173609 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22		15 Dec 2021 10:30	15 Dec 2021 13:45	1
HS21120072-02	G-P05	23 Nov 2021 13:44		15 Dec 2021 10:30	15 Dec 2021 13:45	1
Batch ID: R396853 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22			02 Dec 2021 19:10	1
HS21120072-02	G-P05	23 Nov 2021 13:44			02 Dec 2021 19:10	1
Batch ID: R397104 (0)	**Test Name :** SPECIFIC CONDUCTANCE BY E120.1, 1982				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22			07 Dec 2021 12:13	1
HS21120072-02	G-P05	23 Nov 2021 13:44			07 Dec 2021 12:13	1
Batch ID: R397189 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22			06 Dec 2021 21:03	1
HS21120072-02	G-P05	23 Nov 2021 13:44			06 Dec 2021 21:24	1
Batch ID: R397214 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22			08 Dec 2021 10:27	1
HS21120072-02	G-P05	23 Nov 2021 13:44			08 Dec 2021 10:50	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R397215 (0)	**Test Name :** NITRATE/NITRITE BY IC BY SW9056A				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22			08 Dec 2021 11:57	20
HS21120072-02	G-P05	23 Nov 2021 13:44			08 Dec 2021 12:05	20
Batch ID: R397633 (0)	**Test Name :** TOTAL ORGANIC CARBON BY SW9060A				**Matrix:** Groundwater	
HS21120072-01	G-P04	23 Nov 2021 11:22			15 Dec 2021 02:03	1
HS21120072-02	G-P05	23 Nov 2021 13:44			15 Dec 2021 02:19	1

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173175 (0) **Instrument: ECD_13** **Method: CHLORINATED HERBICIDES BY SW8151A**

MBLK Sample ID: **MBLK-173175** Units: **ug/L** Analysis Date: **10-Dec-2021 10:15**
Client ID: Run ID: **ECD_13_397500** SeqNo: **6418519** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	U	0.200								
2,4,5-TP (Silvex)	U	0.200								
2,4-D	U	0.200								
2,4-DB	U	0.400								
Dalapon	U	0.200								
Dicamba	U	0.200								
Dichlorprop	U	0.400								
Dinoseb	U	0.300								
MCPA	U	30.0								
MCPP	U	30.0								
Surr: DCAA	*4.43*	*0*	*5*	*0*	*88.6*	*50 - 130*				

LCS Sample ID: **LCS-173175** Units: **ug/L** Analysis Date: **10-Dec-2021 09:57**
Client ID: Run ID: **ECD_13_397500** SeqNo: **6418518** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	2.549	0.200	2.5	0	102	44 - 122				
2,4,5-TP (Silvex)	2.522	0.200	2.5	0	101	49 - 126				
2,4-D	2.333	0.200	2.5	0	93.3	39 - 120				
2,4-DB	2.553	0.400	2.5	0	102	44 - 120				
Dalapon	2.514	0.200	2.5	0	101	40 - 120				
Dicamba	2.451	0.200	2.5	0	98.0	60 - 120				
Dichlorprop	2.422	0.400	2.5	0	96.9	68 - 122				
Dinoseb	1.877	0.300	2.5	0	75.1	28 - 115				
MCPA	265.4	30.0	250	0	106	62 - 144				
MCPP	315.4	30.0	250	0	126	60 - 133				
Surr: DCAA	*4.136*	*0*	*5*	*0*	*82.7*	*50 - 130*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173175 (0) **Instrument: ECD_13** **Method: CHLORINATED HERBICIDES BY SW8151A**

LCSD Sample ID: **LCSD-173175** Units: **ug/L** Analysis Date: **10-Dec-2021 10:32**
Client ID: Run ID: **ECD_13_397500** SeqNo: **6418520** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	2.995	0.200	2.5	0	120	44 - 122	2.549	16.1	30	
2,4,5-TP (Silvex)	2.989	0.200	2.5	0	120	49 - 126	2.522	16.9	30	
2,4-D	2.9	0.200	2.5	0	116	39 - 120	2.333	21.7	30	
2,4-DB	2.812	0.400	2.5	0	112	44 - 120	2.553	9.62	30	
Dalapon	2.643	0.200	2.5	0	106	40 - 120	2.514	4.98	30	
Dicamba	2.756	0.200	2.5	0	110	60 - 120	2.451	11.7	30	
Dichlorprop	2.844	0.400	2.5	0	114	68 - 122	2.422	16	30	
Dinoseb	2.438	0.300	2.5	0	97.5	28 - 115	1.877	26	30	
MCPA	324.2	30.0	250	0	130	62 - 144	265.4	20	30	
MCPP	314.6	30.0	250	0	126	60 - 133	315.4	0.247	30	
Surr: DCAA	*5.099*	*0*	*5*	*0*	*102*	*50 - 130*	*4.136*	*20.9*	*30*	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173176 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MBLK Sample ID: **MBLK-173176** Units: **ug/L** Analysis Date: **09-Dec-2021 00:09**
Client ID: Run ID: **ECD_11_397354** SeqNo: **6414904** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	U	0.0025								
4,4´-DDE	U	0.0025								
4,4´-DDT	U	0.0025								
Aldrin	U	0.0012								
alpha-BHC	U	0.0012								
alpha-Chlordane	U	0.0025								
beta-BHC	U	0.0012								
Chlordane	U	0.025								
delta-BHC	U	0.0012								
Dieldrin	U	0.0025								
Endosulfan I	U	0.0012								
Endosulfan II	U	0.0025								
Endosulfan sulfate	U	0.0025								
Endrin	U	0.0025								
Endrin aldehyde	U	0.0025								
Endrin ketone	U	0.0025								
gamma-BHC	U	0.0012								
gamma-Chlordane	U	0.0025								
Heptachlor	U	0.0012								
Heptachlor epoxide	U	0.0012								
Methoxychlor	U	0.012								
Toxaphene	U	0.025								
Surr: Decachlorobiphenyl	*0.02183*	*0*	*0.02*	*0*	*109*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.02187*	*0*	*0.02*	*0*	*109*	*52 - 142*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173176 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS-173176** Units: **ug/L** Analysis Date: **09-Dec-2021 01:38**
Client ID: Run ID: **ECD_11_397354** SeqNo: **6414905** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	0.05224	0.0025	0.05	0	104	53 - 144				
4,4´-DDE	0.04857	0.0025	0.05	0	97.1	55 - 144				
4,4´-DDT	0.05836	0.0025	0.05	0	117	53 - 149				
Aldrin	0.02691	0.0012	0.025	0	108	47 - 141				
alpha-BHC	0.02726	0.0012	0.025	0	109	51 - 141				
alpha-Chlordane	0.02683	0.0025	0.025	0	107	55 - 141				
beta-BHC	0.0259	0.0012	0.025	0	104	58 - 144				
delta-BHC	0.02667	0.0012	0.025	0	107	48 - 146				
Dieldrin	0.05216	0.0025	0.05	0	104	56 - 144				
Endosulfan I	0.02363	0.0012	0.025	0	94.5	55 - 141				
Endosulfan II	0.04746	0.0025	0.05	0	94.9	57 - 144				
Endosulfan sulfate	0.05238	0.0025	0.05	0	105	58 - 145				
Endrin	0.05988	0.0025	0.05	0	120	60 - 163				
Endrin aldehyde	0.04774	0.0025	0.05	0	95.5	59 - 158				
Endrin ketone	0.05087	0.0025	0.05	0	102	59 - 154				
gamma-BHC	0.02728	0.0012	0.025	0	109	53 - 142				
gamma-Chlordane	0.02672	0.0025	0.025	0	107	55 - 137				
Heptachlor	0.02938	0.0012	0.025	0	118	51 - 144				
Heptachlor epoxide	0.02712	0.0012	0.025	0	108	55 - 142				
Methoxychlor	0.2777	0.012	0.25	0	111	50 - 150				
Surr: Decachlorobiphenyl	*0.02248*	*0*	*0.02*	*0*	*112*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.02267*	*0*	*0.02*	*0*	*113*	*52 - 142*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173176 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCSD Sample ID: **LCSD-173176** Units: **ug/L** Analysis Date: **09-Dec-2021 02:01**
Client ID: Run ID: **ECD_11_397354** SeqNo: **6414906** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	0.05269	0.0025	0.05	0	105	53 - 144	0.05224	0.858	30	
4,4´-DDE	0.0488	0.0025	0.05	0	97.6	55 - 144	0.04857	0.474	30	
4,4´-DDT	0.05782	0.0025	0.05	0	116	53 - 149	0.05836	0.93	30	
Aldrin	0.02698	0.0012	0.025	0	108	47 - 141	0.02691	0.26	30	
alpha-BHC	0.02712	0.0012	0.025	0	108	51 - 141	0.02726	0.511	30	
alpha-Chlordane	0.02714	0.0025	0.025	0	109	55 - 141	0.02683	1.15	30	
beta-BHC	0.02627	0.0012	0.025	0	105	58 - 144	0.0259	1.45	30	
delta-BHC	0.02708	0.0012	0.025	0	108	48 - 146	0.02667	1.51	30	
Dieldrin	0.05241	0.0025	0.05	0	105	56 - 144	0.05216	0.474	30	
Endosulfan I	0.02388	0.0012	0.025	0	95.5	55 - 141	0.02363	1.04	30	
Endosulfan II	0.04776	0.0025	0.05	0	95.5	57 - 144	0.04746	0.622	30	
Endosulfan sulfate	0.05228	0.0025	0.05	0	105	58 - 145	0.05238	0.191	30	
Endrin	0.05988	0.0025	0.05	0	120	60 - 163	0.05988	0.00668	30	
Endrin aldehyde	0.04839	0.0025	0.05	0	96.8	59 - 158	0.04774	1.35	30	
Endrin ketone	0.05025	0.0025	0.05	0	100	59 - 154	0.05087	1.22	30	
gamma-BHC	0.0276	0.0012	0.025	0	110	53 - 142	0.02728	1.14	30	
gamma-Chlordane	0.02704	0.0025	0.025	0	108	55 - 137	0.02672	1.19	30	
Heptachlor	0.02942	0.0012	0.025	0	118	51 - 144	0.02938	0.143	30	
Heptachlor epoxide	0.02749	0.0012	0.025	0	110	55 - 142	0.02712	1.35	30	
Methoxychlor	0.2734	0.012	0.25	0	109	50 - 150	0.2777	1.57	30	
Surr: Decachlorobiphenyl	*0.02281*	*0*	*0.02*	*0*	*114*	*55 - 145*	*0.02248*	*1.45*	*30*	
Surr: Tetrachloro-m-xylene	*0.02295*	*0*	*0.02*	*0*	*115*	*52 - 142*	*0.02267*	*1.24*	*30*	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173177 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MBLK Sample ID: **MBLK-173177** Units: **ug/L** Analysis Date: **06-Dec-2021 08:51**
Client ID: Run ID: **ECD_7_396980** SeqNo: **6405999** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	U	0.0125								
Aroclor 1221	U	0.0125								
Aroclor 1232	U	0.0125								
Aroclor 1242	U	0.0125								
Aroclor 1248	U	0.0125								
Aroclor 1254	U	0.0125								
Aroclor 1260	U	0.0125								
PCBs (Total)	U	0.0125								
Surr: Decachlorobiphenyl	*0.01682*	*0.00125*	*0.02*	*0*	*84.1*	*54 - 140*				
Surr: Tetrachloro-m-xylene	*0.01532*	*0.00125*	*0.02*	*0*	*76.6*	*53 - 137*				

LCS Sample ID: **LCS-173177** Units: **ug/L** Analysis Date: **06-Dec-2021 09:09**
Client ID: Run ID: **ECD_7_396980** SeqNo: **6406000** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	0.3858	0.0125	0.5	0	77.2	54 - 138				
Aroclor 1260	0.4127	0.0125	0.5	0	82.5	57 - 136				
Surr: Decachlorobiphenyl	*0.01686*	*0.00125*	*0.02*	*0*	*84.3*	*54 - 140*				
Surr: Tetrachloro-m-xylene	*0.01588*	*0.00125*	*0.02*	*0*	*79.4*	*53 - 137*				

LCSD Sample ID: **LCSD-173177** Units: **ug/L** Analysis Date: **06-Dec-2021 09:26**
Client ID: Run ID: **ECD_7_396980** SeqNo: **6406001** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	0.4605	0.0125	0.5	0	92.1	54 - 138	0.3858	17.6	30	
Aroclor 1260	0.4725	0.0125	0.5	0	94.5	57 - 136	0.4127	13.5	30	
Surr: Decachlorobiphenyl	*0.0194*	*0.00125*	*0.02*	*0*	*97.0*	*54 - 140*	*0.01686*	*14*	*30*	
Surr: Tetrachloro-m-xylene	*0.01941*	*0.00125*	*0.02*	*0*	*97.0*	*53 - 137*	*0.01588*	*20*	*30*	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173251 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-173251** Units: **mg/L** Analysis Date: **07-Dec-2021 13:10**
Client ID: Run ID: **HG03_397086** SeqNo: **6409318** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury		U	0.000200								

LCS Sample ID: **LCS-173251** Units: **mg/L** Analysis Date: **07-Dec-2021 13:12**
Client ID: Run ID: **HG03_397086** SeqNo: **6409319** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00521	0.000200	0.005	0	104	80 - 120				

MS Sample ID: **HS21120107-08MS** Units: **mg/L** Analysis Date: **07-Dec-2021 13:40**
Client ID: Run ID: **HG03_397086** SeqNo: **6409323** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00524	0.000200	0.005	0.000034	104	75 - 125				

MSD Sample ID: **HS21120107-08MSD** Units: **mg/L** Analysis Date: **07-Dec-2021 13:42**
Client ID: Run ID: **HG03_397086** SeqNo: **6409324** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00518	0.000200	0.005	0.000034	103	75 - 125	0.00524	1.15	20	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173450 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-173450** Units: **mg/L** Analysis Date: **13-Dec-2021 20:04**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419060** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Copper	U	0.00200								
Iron	U	0.200								
Lead	U	0.00200								
Manganese	U	0.00500								
Nickel	U	0.00200								
Potassium	U	0.200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173450 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-173450** Units: **mg/L** Analysis Date: **13-Dec-2021 20:06**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419061** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05293	0.00200	0.05	0	106	80 - 120				
Arsenic	0.05133	0.00200	0.05	0	103	80 - 120				
Beryllium	0.05221	0.00200	0.05	0	104	80 - 120				
Cadmium	0.0557	0.00200	0.05	0	111	80 - 120				
Chromium	0.05111	0.00400	0.05	0	102	80 - 120				
Copper	0.054	0.00200	0.05	0	108	80 - 120				
Iron	5.101	0.200	5	0	102	80 - 120				
Lead	0.05361	0.00200	0.05	0	107	80 - 120				
Manganese	0.05184	0.00500	0.05	0	104	80 - 120				
Nickel	0.05401	0.00200	0.05	0	108	80 - 120				
Potassium	4.916	0.200	5	0	98.3	80 - 120				
Selenium	0.05066	0.00200	0.05	0	101	80 - 120				
Silver	0.04991	0.00200	0.05	0	99.8	80 - 120				
Thallium	0.05464	0.00200	0.05	0	109	80 - 120				
Zinc	0.05695	0.00400	0.05	0	114	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173450 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21111351-22MS** Units: **mg/L** Analysis Date: **13-Dec-2021 20:12**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419064** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05401	0.00200	0.05	0.000289	107	80 - 120				
Arsenic	0.05892	0.00200	0.05	0.004921	108	80 - 120				
Beryllium	0.05224	0.00200	0.05	0.000014	104	80 - 120				
Cadmium	0.05404	0.00200	0.05	0.000003	108	80 - 120				
Chromium	0.06924	0.00400	0.05	0.01861	101	80 - 120				
Copper	0.0548	0.00200	0.05	0.00332	103	80 - 120				
Iron	5.282	0.200	5	0.193	102	80 - 120				
Lead	0.0553	0.00200	0.05	0.001094	108	80 - 120				
Manganese	0.05999	0.00500	0.05	0.008812	102	80 - 120				
Nickel	0.07362	0.00200	0.05	0.02206	103	80 - 120				
Potassium	7.322	0.200	5	2.438	97.7	80 - 120				
Selenium	0.05258	0.00200	0.05	-0.000456	106	80 - 120				
Silver	0.0493	0.00200	0.05	-0.000039	98.7	80 - 120				
Thallium	0.05562	0.00200	0.05	0.000067	111	80 - 120				
Zinc	0.1418	0.00400	0.05	0.08687	110	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173450 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21111351-22MSD** Units: **mg/L** Analysis Date: **13-Dec-2021 20:14**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419065** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05318	0.00200	0.05	0.000289	106	80 - 120	0.05401	1.55	20	
Arsenic	0.05872	0.00200	0.05	0.004921	108	80 - 120	0.05892	0.328	20	
Beryllium	0.0527	0.00200	0.05	0.000014	105	80 - 120	0.05224	0.873	20	
Cadmium	0.05388	0.00200	0.05	0.000003	108	80 - 120	0.05404	0.296	20	
Chromium	0.07021	0.00400	0.05	0.01861	103	80 - 120	0.06924	1.4	20	
Copper	0.0548	0.00200	0.05	0.00332	103	80 - 120	0.0548	0.00912	20	
Iron	5.311	0.200	5	0.193	102	80 - 120	5.282	0.559	20	
Lead	0.05552	0.00200	0.05	0.001094	109	80 - 120	0.0553	0.393	20	
Manganese	0.06025	0.00500	0.05	0.008812	103	80 - 120	0.05999	0.432	20	
Nickel	0.07271	0.00200	0.05	0.02206	101	80 - 120	0.07362	1.23	20	
Potassium	7.304	0.200	5	2.438	97.3	80 - 120	7.322	0.237	20	
Selenium	0.05282	0.00200	0.05	-0.000456	107	80 - 120	0.05258	0.448	20	
Silver	0.04944	0.00200	0.05	-0.000039	99.0	80 - 120	0.0493	0.282	20	
Thallium	0.05608	0.00200	0.05	0.000067	112	80 - 120	0.05562	0.834	20	
Zinc	0.1408	0.00400	0.05	0.08687	108	80 - 120	0.1418	0.734	20	

PDS Sample ID: **HS21111351-22PDS** Units: **mg/L** Analysis Date: **13-Dec-2021 20:16**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419066** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Iron	12.68	0.200	10	0.193	125	75 - 125				
Potassium	14.36	0.200	10	2.438	119	75 - 125				
Silver	0.1008	0.00200	0.1	-0.000039	101	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173450 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21111351-22SD** Units: **mg/L** Analysis Date: **13-Dec-2021 20:10**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419063** PrepDate: **13-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000289	0	10	
Arsenic	0.005578	0.0100					0.004921	0	10	J
Beryllium	U	0.0100					0.000014	0	10	
Cadmium	U	0.0100					0.000003	0	10	
Chromium	0.0183	0.0200					0.01861	0	10	J
Copper	U	0.0100					0.00332	0	10	
Iron	0.1925	1.00					0.193	0	10	J
Lead	U	0.0100					0.001094	0	10	
Manganese	0.01006	0.0250					0.008812	0	10	J
Nickel	0.02261	0.0100					0.02206	2.47	10	
Potassium	2.402	1.00					2.438	1.48	10	
Selenium	U	0.0100					-0.000456	0	10	
Silver	U	0.0100					-0.000039	0	10	
Thallium	U	0.0100					0.000067	0	10	
Zinc	0.09037	0.0200					0.08687	4.02	10	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 11:52**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415760** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.10								
2-Methylnaphthalene	U	0.10								
Acenaphthene	U	0.10								
Acenaphthylene	U	0.10								
Anthracene	U	0.10								
Benz(a)anthracene	U	0.10								
Benzo(a)pyrene	U	0.10								
Benzo(b)fluoranthene	U	0.10								
Benzo(g,h,i)perylene	U	0.10								
Benzo(k)fluoranthene	U	0.10								
Chrysene	U	0.10								
Dibenz(a,h)anthracene	U	0.10								
Fluoranthene	U	0.10								
Fluorene	U	0.10								
Indeno(1,2,3-cd)pyrene	U	0.10								
Isophorone	U	0.20								
Naphthalene	U	0.10								
Phenanthrene	U	0.10								
Pyrene	U	0.10								
Surr: 2,4,6-Tribromophenol	*4.056*	*0.20*	*5*	*0*	*81.1*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.197*	*0.20*	*5*	*0*	*83.9*	*40 - 125*				
Surr: 2-Fluorophenol	*4.81*	*0.20*	*5*	*0*	*96.2*	*20 - 120*				
Surr: 4-Terphenyl-d14	*5.105*	*0.20*	*5*	*0*	*102*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.041*	*0.20*	*5*	*0*	*80.8*	*41 - 120*				
Surr: Phenol-d6	*4.249*	*0.20*	*5*	*0*	*85.0*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCS Sample ID: **LCS-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 12:11**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415761** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	3.498	0.10	5	0	70.0	45 - 120				
2-Methylnaphthalene	3.437	0.10	5	0	68.7	50 - 120				
Acenaphthene	3.164	0.10	5	0	63.3	45 - 120				
Acenaphthylene	3.439	0.10	5	0	68.8	47 - 120				
Anthracene	3.694	0.10	5	0	73.9	45 - 120				
Benz(a)anthracene	4.17	0.10	5	0	83.4	40 - 120				
Benzo(a)pyrene	4.36	0.10	5	0	87.2	45 - 120				
Benzo(b)fluoranthene	3.998	0.10	5	0	80.0	50 - 120				
Benzo(g,h,i)perylene	4.078	0.10	5	0	81.6	42 - 127				
Benzo(k)fluoranthene	3.994	0.10	5	0	79.9	45 - 127				
Chrysene	3.905	0.10	5	0	78.1	43 - 120				
Dibenz(a,h)anthracene	3.887	0.10	5	0	77.7	45 - 125				
Fluoranthene	3.949	0.10	5	0	79.0	45 - 125				
Fluorene	3.485	0.10	5	0	69.7	49 - 120				
Indeno(1,2,3-cd)pyrene	4.072	0.10	5	0	81.4	41 - 128				
Isophorone	3.407	0.20	5	0	68.1	40 - 121				
Naphthalene	3.368	0.10	5	0	67.4	45 - 120				
Phenanthrene	3.593	0.10	5	0	71.9	45 - 121				
Pyrene	4.065	0.10	5	0	81.3	40 - 130				
Surr: 2,4,6-Tribromophenol	*3.536*	*0.20*	*5*	*0*	*70.7*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*3.226*	*0.20*	*5*	*0*	*64.5*	*40 - 125*				
Surr: 2-Fluorophenol	*3.309*	*0.20*	*5*	*0*	*66.2*	*20 - 120*				
Surr: 4-Terphenyl-d14	*4.125*	*0.20*	*5*	*0*	*82.5*	*40 - 135*				
Surr: Nitrobenzene-d5	*3.167*	*0.20*	*5*	*0*	*63.3*	*41 - 120*				
Surr: Phenol-d6	*3.164*	*0.20*	*5*	*0*	*63.3*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCSD Sample ID: **LCSD-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 13:29**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415764** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	3.718	0.10	5	0	74.4	45 - 120	3.498	6.09	20	
2-Methylnaphthalene	3.562	0.10	5	0	71.2	50 - 120	3.437	3.58	20	
Acenaphthene	3.034	0.10	5	0	60.7	45 - 120	3.164	4.18	20	
Acenaphthylene	3.434	0.10	5	0	68.7	47 - 120	3.439	0.163	20	
Anthracene	3.79	0.10	5	0	75.8	45 - 120	3.694	2.57	20	
Benz(a)anthracene	4.299	0.10	5	0	86.0	40 - 120	4.17	3.05	20	
Benzo(a)pyrene	4.456	0.10	5	0	89.1	45 - 120	4.36	2.17	20	
Benzo(b)fluoranthene	3.951	0.10	5	0	79.0	50 - 120	3.998	1.16	20	
Benzo(g,h,i)perylene	4.466	0.10	5	0	89.3	42 - 127	4.078	9.08	20	
Benzo(k)fluoranthene	3.923	0.10	5	0	78.5	45 - 127	3.994	1.78	20	
Chrysene	3.995	0.10	5	0	79.9	43 - 120	3.905	2.29	20	
Dibenz(a,h)anthracene	3.899	0.10	5	0	78.0	45 - 125	3.887	0.295	20	
Fluoranthene	4.116	0.10	5	0	82.3	45 - 125	3.949	4.15	20	
Fluorene	3.572	0.10	5	0	71.4	49 - 120	3.485	2.46	20	
Indeno(1,2,3-cd)pyrene	4.256	0.10	5	0	85.1	41 - 128	4.072	4.4	20	
Isophorone	3.85	0.20	5	0	77.0	40 - 121	3.407	12.2	20	
Naphthalene	3.346	0.10	5	0	66.9	45 - 120	3.368	0.64	20	
Phenanthrene	3.601	0.10	5	0	72.0	45 - 121	3.593	0.228	20	
Pyrene	4.245	0.10	5	0	84.9	40 - 130	4.065	4.34	20	
Surr: 2,4,6-Tribromophenol	*3.43*	*0.20*	*5*	*0*	*68.6*	*34 - 129*	*3.536*	*3.04*	*20*	
Surr: 2-Fluorobiphenyl	*3.142*	*0.20*	*5*	*0*	*62.8*	*40 - 125*	*3.226*	*2.63*	*20*	
Surr: 2-Fluorophenol	*3.516*	*0.20*	*5*	*0*	*70.3*	*20 - 120*	*3.309*	*6.07*	*20*	
Surr: 4-Terphenyl-d14	*4.434*	*0.20*	*5*	*0*	*88.7*	*40 - 135*	*4.125*	*7.24*	*20*	
Surr: Nitrobenzene-d5	*3.651*	*0.20*	*5*	*0*	*73.0*	*41 - 120*	*3.167*	*14.2*	*20*	
Surr: Phenol-d6	*3.285*	*0.20*	*5*	*0*	*65.7*	*20 - 120*	*3.164*	*3.74*	*20*	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397189 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-211206** Units: **ug/L** Analysis Date: **06-Dec-2021 20:00**
Client ID: Run ID: **VOA6_397189** SeqNo: **6411051** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	1.0								
1,1,2,2-Tetrachloroethane	U	1.0								
1,1,2-Trichlor-1,2,2-trifluoroethane	U	1.0								
1,1,2-Trichloroethane	U	1.0								
1,1-Dichloroethane	U	1.0								
1,1-Dichloroethene	U	1.0								
1,2,3-Trichlorobenzene	U	1.0								
1,2,4-Trichlorobenzene	U	1.0								
1,2-Dibromo-3-chloropropane	U	1.0								
1,2-Dibromoethane	U	1.0								
1,2-Dichlorobenzene	U	1.0								
1,2-Dichloroethane	U	1.0								
1,2-Dichloropropane	U	1.0								
1,3-Dichlorobenzene	U	1.0								
1,4-Dichlorobenzene	U	1.0								
2-Butanone	U	2.0								
2-Hexanone	U	2.0								
4-Methyl-2-pentanone	U	2.0								
Acetone	U	2.0								
Benzene	U	1.0								
Bromochloromethane	U	1.0								
Bromodichloromethane	U	1.0								
Bromoform	U	1.0								
Bromomethane	U	1.0								
Carbon disulfide	U	2.0								
Carbon tetrachloride	U	1.0								
Chlorobenzene	U	1.0								
Chloroethane	U	1.0								
Chloroform	U	1.0								
Chloromethane	U	1.0								
cis-1,2-Dichloroethene	U	1.0								
cis-1,3-Dichloropropene	U	1.0								
Cyclohexane	U	1.0								
Dibromochloromethane	U	1.0								

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397189 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-211206** Units: **ug/L** Analysis Date: **06-Dec-2021 20:00**
Client ID: Run ID: **VOA6_397189** SeqNo: **6411051** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Dichlorodifluoromethane	U	1.0							
Ethylbenzene	U	1.0							
Isopropylbenzene	U	1.0							
m,p-Xylene	U	2.0							
Methyl acetate	U	1.0							
Methyl tert-butyl ether	U	1.0							
Methylcyclohexane	U	1.0							
Methylene chloride	U	2.0							
o-Xylene	U	1.0							
Styrene	U	1.0							
Tetrachloroethene	U	1.0							
Toluene	U	1.0							
trans-1,2-Dichloroethene	U	1.0							
trans-1,3-Dichloropropene	U	1.0							
Trichloroethene	U	1.0							
Trichlorofluoromethane	U	1.0							
Vinyl chloride	U	1.0							
Xylenes, Total	U	1.0							
Surr: 1,2-Dichloroethane-d4	*47.49*	*1.0*	*50*	*0*	*95.0*	*70 - 123*			
Surr: 4-Bromofluorobenzene	*42.42*	*1.0*	*50*	*0*	*84.8*	*82 - 115*			
Surr: Dibromofluoromethane	*48.69*	*1.0*	*50*	*0*	*97.4*	*73 - 126*			
Surr: Toluene-d8	*52.61*	*1.0*	*50*	*0*	*105*	*81 - 120*			

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397189 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-211206** Units: **ug/L** Analysis Date: **06-Dec-2021 18:57**
Client ID: Run ID: **VOA6_397189** SeqNo: **6411050** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	16.38	1.0	20	0	81.9	70 - 130				
1,1,2,2-Tetrachloroethane	23.17	1.0	20	0	116	70 - 120				
1,1,2-Trichlor-1,2,2-trifluoroethane	14.4	1.0	20	0	72.0	70 - 130				
1,1,2-Trichloroethane	19.36	1.0	20	0	96.8	77 - 113				
1,1-Dichloroethane	16.19	1.0	20	0	81.0	71 - 122				
1,1-Dichloroethene	16.38	1.0	20	0	81.9	70 - 130				
1,2,3-Trichlorobenzene	24.03	1.0	20	0	120	70 - 130				
1,2,4-Trichlorobenzene	22.54	1.0	20	0	113	77 - 126				
1,2-Dibromo-3-chloropropane	22.36	1.0	20	0	112	70 - 130				
1,2-Dibromoethane	19.78	1.0	20	0	98.9	76 - 123				
1,2-Dichlorobenzene	19.69	1.0	20	0	98.5	77 - 113				
1,2-Dichloroethane	17.21	1.0	20	0	86.1	70 - 124				
1,2-Dichloropropane	17.5	1.0	20	0	87.5	72 - 119				
1,3-Dichlorobenzene	19.39	1.0	20	0	96.9	78 - 118				
1,4-Dichlorobenzene	18.08	1.0	20	0	90.4	79 - 113				
2-Butanone	32.56	2.0	40	0	81.4	70 - 130				
2-Hexanone	38.94	2.0	40	0	97.4	70 - 130				
4-Methyl-2-pentanone	41.1	2.0	40	0	103	70 - 130				
Acetone	43.19	2.0	40	0	108	70 - 130				
Benzene	18.71	1.0	20	0	93.6	74 - 120				
Bromochloromethane	19.32	1.0	20	0	96.6	76 - 124				
Bromodichloromethane	17.93	1.0	20	0	89.6	74 - 122				
Bromoform	18.66	1.0	20	0	93.3	73 - 128				
Bromomethane	23.25	1.0	20	0	116	70 - 130				
Carbon disulfide	34.38	2.0	40	0	85.9	70 - 130				
Carbon tetrachloride	14.72	1.0	20	0	73.6	71 - 125				
Chlorobenzene	18.2	1.0	20	0	91.0	76 - 113				
Chloroethane	17.08	1.0	20	0	85.4	70 - 130				
Chloroform	17.93	1.0	20	0	89.6	71 - 121				
Chloromethane	22.96	1.0	20	0	115	70 - 129				
cis-1,2-Dichloroethene	17.77	1.0	20	0	88.8	75 - 122				
cis-1,3-Dichloropropene	18.27	1.0	20	0	91.4	73 - 127				
Cyclohexane	15.53	1.0	20	0	77.6	70 - 130				
Dibromochloromethane	19.73	1.0	20	0	98.6	77 - 122				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397189 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-211206** Units: **ug/L** Analysis Date: **06-Dec-2021 18:57**
Client ID: Run ID: **VOA6_397189** SeqNo: **6411050** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	18.71	1.0	20	0	93.6	70 - 130				
Ethylbenzene	17.84	1.0	20	0	89.2	77 - 117				
Isopropylbenzene	16.18	1.0	20	0	80.9	73 - 127				
m,p-Xylene	32.97	2.0	40	0	82.4	77 - 122				
Methyl acetate	16.76	1.0	20	0	83.8	76 - 122				
Methyl tert-butyl ether	18.73	1.0	20	0	93.7	70 - 130				
Methylcyclohexane	19.06	1.0	20	0	95.3	61 - 157				
Methylene chloride	17.35	2.0	20	0	86.7	70 - 127				
o-Xylene	17.33	1.0	20	0	86.7	75 - 119				
Styrene	17.67	1.0	20	0	88.4	72 - 126				
Tetrachloroethene	16.45	1.0	20	0	82.3	76 - 119				
Toluene	18.15	1.0	20	0	90.8	77 - 118				
trans-1,2-Dichloroethene	17.7	1.0	20	0	88.5	72 - 127				
trans-1,3-Dichloropropene	16.81	1.0	20	0	84.1	77 - 119				
Trichloroethene	16.48	1.0	20	0	82.4	77 - 121				
Trichlorofluoromethane	17.28	1.0	20	0	86.4	70 - 130				
Vinyl chloride	19.49	1.0	20	0	97.4	70 - 130				
Xylenes, Total	50.3	1.0	60	0	83.8	75 - 122				
Surr: 1,2-Dichloroethane-d4	*45.61*	*1.0*	*50*	*0*	*91.2*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*46.73*	*1.0*	*50*	*0*	*93.5*	*82 - 115*				
Surr: Dibromofluoromethane	*47.58*	*1.0*	*50*	*0*	*95.2*	*73 - 126*				
Surr: Toluene-d8	*51.22*	*1.0*	*50*	*0*	*102*	*81 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397189 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21120222-04MS** Units: **ug/L** Analysis Date: **06-Dec-2021 21:45**
Client ID: Run ID: **VOA6_397189** SeqNo: **6418246** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	21.11	1.0	20	0	106	70 - 130				
1,1,2,2-Tetrachloroethane	21.24	1.0	20	0	106	70 - 123				
1,1,2-Trichlor-1,2,2-trifluoroethane	22.46	1.0	20	0	112	70 - 130				
1,1,2-Trichloroethane	20.05	1.0	20	0	100	70 - 117				
1,1-Dichloroethane	20.19	1.0	20	0	101	70 - 127				
1,1-Dichloroethene	20.22	1.0	20	0	101	70 - 130				
1,2,3-Trichlorobenzene	19.63	1.0	20	0	98.1	70 - 130				
1,2,4-Trichlorobenzene	20.56	1.0	20	0	103	70 - 125				
1,2-Dibromo-3-chloropropane	23.71	1.0	20	0	119	70 - 130				
1,2-Dibromoethane	20.2	1.0	20	0	101	70 - 124				
1,2-Dichlorobenzene	19.77	1.0	20	0	98.8	70 - 115				
1,2-Dichloroethane	18.5	1.0	20	0	92.5	70 - 127				
1,2-Dichloropropane	19.3	1.0	20	0	96.5	70 - 122				
1,3-Dichlorobenzene	19.49	1.0	20	0	97.5	70 - 119				
1,4-Dichlorobenzene	20.38	1.0	20	0	102	70 - 114				
2-Butanone	34.24	2.0	40	0	85.6	70 - 130				
2-Hexanone	37.52	2.0	40	0	93.8	70 - 130				
4-Methyl-2-pentanone	39.54	2.0	40	0	98.9	70 - 130				
Acetone	52.79	2.0	40	9.885	107	70 - 130				
Benzene	20.98	1.0	20	0	105	70 - 127				
Bromochloromethane	19.15	1.0	20	0	95.7	70 - 127				
Bromodichloromethane	20.13	1.0	20	0	101	70 - 124				
Bromoform	18.92	1.0	20	0	94.6	70 - 129				
Bromomethane	19.61	1.0	20	0	98.1	70 - 130				
Carbon disulfide	37.69	2.0	40	0	94.2	70 - 130				
Carbon tetrachloride	21.85	1.0	20	0	109	70 - 130				
Chlorobenzene	20.22	1.0	20	0	101	70 - 114				
Chloroethane	18.09	1.0	20	0	90.5	70 - 130				
Chloroform	19.16	1.0	20	0	95.8	70 - 125				
Chloromethane	12.63	1.0	20	0	63.2	70 - 130				S
cis-1,2-Dichloroethene	19.88	1.0	20	0	99.4	70 - 128				
cis-1,3-Dichloropropene	19.1	1.0	20	0	95.5	70 - 125				
Cyclohexane	22.36	1.0	20	0	112	70 - 130				
Dibromochloromethane	20.06	1.0	20	0	100	70 - 124				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397189 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21120222-04MS** Units: **ug/L** Analysis Date: **06-Dec-2021 21:45**
Client ID: Run ID: **VOA6_397189** SeqNo: **6418246** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	7.44	1.0	20	0	37.2	70 - 130				S
Ethylbenzene	20.77	1.0	20	0	104	70 - 124				
Isopropylbenzene	20.32	1.0	20	0	102	70 - 130				
m,p-Xylene	40.4	2.0	40	0	101	70 - 130				
Methyl acetate	16.65	1.0	20	0	83.3	76 - 122				
Methyl tert-butyl ether	18.78	1.0	20	0	93.9	70 - 130				
Methylcyclohexane	19.18	1.0	20	0	95.9	61 - 158				
Methylene chloride	18.5	2.0	20	0	92.5	70 - 128				
o-Xylene	19.68	1.0	20	0	98.4	70 - 124				
Styrene	19.1	1.0	20	0	95.5	70 - 130				
Tetrachloroethene	23.43	1.0	20	0	117	70 - 130				
Toluene	20	1.0	20	0	100	70 - 123				
trans-1,2-Dichloroethene	20.34	1.0	20	0	102	70 - 130				
trans-1,3-Dichloropropene	17.69	1.0	20	0	88.4	70 - 121				
Trichloroethene	23.53	1.0	20	3.132	102	70 - 129				
Trichlorofluoromethane	19.85	1.0	20	0	99.2	70 - 130				
Vinyl chloride	14.33	1.0	20	0	71.6	70 - 130				
Xylenes, Total	60.08	1.0	60	0	100	70 - 130				
Surr: 1,2-Dichloroethane-d4	*45.99*	*1.0*	*50*	*0*	*92.0*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*45.52*	*1.0*	*50*	*0*	*91.0*	*81 - 113*				
Surr: Dibromofluoromethane	*47.98*	*1.0*	*50*	*0*	*96.0*	*77 - 123*				
Surr: Toluene-d8	*50.36*	*1.0*	*50*	*0*	*101*	*82 - 127*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397189 (0) **Instrument:** VOA6 **Method:** LOW LEVEL VOLATILES BY SW8260C

MSD Sample ID: **HS21120222-04MSD** Units: **ug/L** Analysis Date: **06-Dec-2021 22:06**
Client ID: Run ID: **VOA6_397189** SeqNo: **6418247** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	20.49	1.0	20	0	102	70 - 130	21.11	2.97	20	
1,1,2,2-Tetrachloroethane	21.11	1.0	20	0	106	70 - 123	21.24	0.633	20	
1,1,2-Trichlor-1,2,2-trifluoroethane	21.2	1.0	20	0	106	70 - 130	22.46	5.75	20	
1,1,2-Trichloroethane	21.36	1.0	20	0	107	70 - 117	20.05	6.32	20	
1,1-Dichloroethane	20.02	1.0	20	0	100	70 - 127	20.19	0.842	20	
1,1-Dichloroethene	19.64	1.0	20	0	98.2	70 - 130	20.22	2.94	20	
1,2,3-Trichlorobenzene	24.2	1.0	20	0	121	70 - 130	19.63	20.9	20	R
1,2,4-Trichlorobenzene	24.35	1.0	20	0	122	70 - 125	20.56	16.9	20	
1,2-Dibromo-3-chloropropane	21.21	1.0	20	0	106	70 - 130	23.71	11.1	20	
1,2-Dibromoethane	20.88	1.0	20	0	104	70 - 124	20.2	3.31	20	
1,2-Dichlorobenzene	20.21	1.0	20	0	101	70 - 115	19.77	2.22	20	
1,2-Dichloroethane	18.51	1.0	20	0	92.5	70 - 127	18.5	0.0418	20	
1,2-Dichloropropane	19.43	1.0	20	0	97.2	70 - 122	19.3	0.714	20	
1,3-Dichlorobenzene	19.79	1.0	20	0	98.9	70 - 119	19.49	1.49	20	
1,4-Dichlorobenzene	20.66	1.0	20	0	103	70 - 114	20.38	1.35	20	
2-Butanone	37.12	2.0	40	0	92.8	70 - 130	34.24	8.05	20	
2-Hexanone	40.84	2.0	40	0	102	70 - 130	37.52	8.47	20	
4-Methyl-2-pentanone	40.51	2.0	40	0	101	70 - 130	39.54	2.43	20	
Acetone	54.3	2.0	40	9.885	111	70 - 130	52.79	2.82	20	
Benzene	21.25	1.0	20	0	106	70 - 127	20.98	1.28	20	
Bromochloromethane	20.04	1.0	20	0	100	70 - 127	19.15	4.57	20	
Bromodichloromethane	20.56	1.0	20	0	103	70 - 124	20.13	2.1	20	
Bromoform	19.9	1.0	20	0	99.5	70 - 129	18.92	5.08	20	
Bromomethane	18.22	1.0	20	0	91.1	70 - 130	19.61	7.35	20	
Carbon disulfide	37.93	2.0	40	0	94.8	70 - 130	37.69	0.647	20	
Carbon tetrachloride	21.36	1.0	20	0	107	70 - 130	21.85	2.28	20	
Chlorobenzene	19.69	1.0	20	0	98.4	70 - 114	20.22	2.64	20	
Chloroethane	29.14	1.0	20	0	146	70 - 130	18.09	46.8	20	SR
Chloroform	19.51	1.0	20	0	97.6	70 - 125	19.16	1.79	20	
Chloromethane	12.09	1.0	20	0	60.4	70 - 130	12.63	4.41	20	S
cis-1,2-Dichloroethene	18.82	1.0	20	0	94.1	70 - 128	19.88	5.44	20	
cis-1,3-Dichloropropene	20	1.0	20	0	100.0	70 - 125	19.1	4.62	20	
Cyclohexane	22.05	1.0	20	0	110	70 - 130	22.36	1.4	20	
Dibromochloromethane	21.38	1.0	20	0	107	70 - 124	20.06	6.37	20	

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397189 (0) **Instrument: VOA6** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21120222-04MSD** Units: **ug/L** Analysis Date: **06-Dec-2021 22:06**
Client ID: Run ID: **VOA6_397189** SeqNo: **6418247** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Dichlorodifluoromethane	7.988	1.0	20	0	39.9	70 - 130	7.44	7.11	20	S
Ethylbenzene	21.11	1.0	20	0	106	70 - 124	20.77	1.61	20	
Isopropylbenzene	20.52	1.0	20	0	103	70 - 130	20.32	0.971	20	
m,p-Xylene	41.38	2.0	40	0	103	70 - 130	40.4	2.38	20	
Methyl acetate	16.21	1.0	20	0	81.1	76 - 122	16.65	2.7	20	
Methyl tert-butyl ether	19.61	1.0	20	0	98.0	70 - 130	18.78	4.31	20	
Methylcyclohexane	19.05	1.0	20	0	95.2	61 - 158	19.18	0.684	20	
Methylene chloride	18.52	2.0	20	0	92.6	70 - 128	18.5	0.116	20	
o-Xylene	19.66	1.0	20	0	98.3	70 - 124	19.68	0.0796	20	
Styrene	19.61	1.0	20	0	98.0	70 - 130	19.1	2.62	20	
Tetrachloroethene	24.22	1.0	20	0	121	70 - 130	23.43	3.33	20	
Toluene	20.21	1.0	20	0	101	70 - 123	20	1.03	20	
trans-1,2-Dichloroethene	20.2	1.0	20	0	101	70 - 130	20.34	0.692	20	
trans-1,3-Dichloropropene	18.28	1.0	20	0	91.4	70 - 121	17.69	3.33	20	
Trichloroethene	23.67	1.0	20	3.132	103	70 - 129	23.53	0.561	20	
Trichlorofluoromethane	18.92	1.0	20	0	94.6	70 - 130	19.85	4.77	20	
Vinyl chloride	13.55	1.0	20	0	67.7	70 - 130	14.33	5.61	20	S
Xylenes, Total	61.04	1.0	60	0	102	70 - 130	60.08	1.58	20	
Surr: 1,2-Dichloroethane-d4	*46.66*	*1.0*	*50*	*0*	*93.3*	*70 - 126*	*45.99*	*1.44*	*20*	
Surr: 4-Bromofluorobenzene	*46.9*	*1.0*	*50*	*0*	*93.8*	*81 - 113*	*45.52*	*2.98*	*20*	
Surr: Dibromofluoromethane	*48.33*	*1.0*	*50*	*0*	*96.7*	*77 - 123*	*47.98*	*0.73*	*20*	
Surr: Toluene-d8	*51.84*	*1.0*	*50*	*0*	*104*	*82 - 127*	*50.36*	*2.91*	*20*	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: 173609 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173609** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422754** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-173609** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422753** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.217	0.0500	0.25	0	86.8	80 - 120				

MS Sample ID: **HS21120297-02MS** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422751** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.254	0.0500	0.25	0	102	80 - 120				

MSD Sample ID: **HS21120297-02MSD** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422752** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.252	0.0500	0.25	0	101	80 - 120	0.254	0.791	20	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R396853 (0) **Instrument: WetChem_HS** **Method: PH BY SM4500H+ B-2011**

DUP Sample ID: **HS21120123-01DUP** Units: **pH Units** Analysis Date: **02-Dec-2021 19:10**
Client ID: Run ID: **WetChem_HS_396853** SeqNo: **6403058** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	8.04	0.100					8.02	0.249	10	
Temp Deg C @pH	22	0					22.7	3.13	10	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397104 (0) **Instrument: WetChem_HS** **Method: SPECIFIC CONDUCTANCE BY E120.1, 1982**

MBLK Sample ID: **MBLK-R397104** Units: **umhos/cm** Analysis Date: **07-Dec-2021 12:13**
Client ID: Run ID: **WetChem_HS_397104** SeqNo: **6408962** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	U	5.00								

LCS Sample ID: **LCS-R397104** Units: **umhos/cm** Analysis Date: **07-Dec-2021 12:13**
Client ID: Run ID: **WetChem_HS_397104** SeqNo: **6408961** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	1458	5.00	1413	0	103	80 - 120				

DUP Sample ID: **HS21120083-01DUP** Units: **umhos/cm** Analysis Date: **07-Dec-2021 12:13**
Client ID: Run ID: **WetChem_HS_397104** SeqNo: **6408963** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	1669	5.00					1678	0.538	20	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397214 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **08-Dec-2021 09:44**
Client ID: Run ID: **ICS-Integrion_397214** SeqNo: **6411629** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	U	0.100								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **08-Dec-2021 09:51**
Client ID: Run ID: **ICS-Integrion_397214** SeqNo: **6411630** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	4.121	0.100	4	0	103	80 - 120				

MS Sample ID: **HS21120072-01MS** Units: **mg/L** Analysis Date: **08-Dec-2021 10:35**
Client ID: **G-P04** Run ID: **ICS-Integrion_397214** SeqNo: **6411633** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	1.953	0.100	2	0	97.6	80 - 120				

MSD Sample ID: **HS21120072-01MSD** Units: **mg/L** Analysis Date: **08-Dec-2021 10:42**
Client ID: **G-P04** Run ID: **ICS-Integrion_397214** SeqNo: **6411634** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	1.897	0.100	2	0	94.8	80 - 120	1.953	2.9	20	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397215 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY IC BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **08-Dec-2021 09:59**
Client ID: Run ID: **ICS-Integrion_397215** SeqNo: **6411641** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **08-Dec-2021 10:06**
Client ID: Run ID: **ICS-Integrion_397215** SeqNo: **6411642** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	8.021	0.200	8	0	100	90 - 110				

MS Sample ID: **HS21111356-01MS** Units: **mg/L** Analysis Date: **08-Dec-2021 11:27**
Client ID: Run ID: **ICS-Integrion_397215** SeqNo: **6411646** PrepDate: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	80.47	4.00	80	1.758	98.4	80 - 120				

MSD Sample ID: **HS21111356-01MSD** Units: **mg/L** Analysis Date: **08-Dec-2021 11:35**
Client ID: Run ID: **ICS-Integrion_397215** SeqNo: **6411647** PrepDate: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	75.7	4.00	80	1.758	92.4	80 - 120	80.47	6.1	20	

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120072

QC BATCH REPORT

Batch ID: R397633 (0) **Instrument: TOC_04** **Method: TOTAL ORGANIC CARBON BY SW9060A**

MBLK Sample ID: **MBLK-12142021** Units: **mg/L** Analysis Date: **15-Dec-2021 01:13**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421526** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	U	1.00								

LCS Sample ID: **LCS-12142021** Units: **mg/L** Analysis Date: **15-Dec-2021 01:29**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421527** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.8	1.00	10	0	108	85 - 115				

LCSD Sample ID: **LCSD-12142021** Units: **mg/L** Analysis Date: **15-Dec-2021 01:45**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421528** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.82	1.00	10	0	108	85 - 115	10.8	0.185	20	

MS Sample ID: **HS21120083-01MS** Units: **mg/L** Analysis Date: **15-Dec-2021 02:54**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421532** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	30.9	1.00	10	21.11	97.9	80 - 120				

The following samples were analyzed in this batch: HS21120072-01 HS21120072-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: **HS21120072**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
Date	
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Dept of Defense	PJLA L20-507-R2	22-Dec-2021
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21120072

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS21120072-01	G-P04	Login	12/2/2021 9:28:53 AM	EW	WET140
HS21120072-01	G-P04	Login	12/2/2021 9:28:53 AM	EW	MET095
HS21120072-01	G-P04	Login	12/2/2021 9:28:53 AM	EW	EXT106
HS21120072-01	G-P04	Login	12/2/2021 9:28:53 AM	EW	EXT106
HS21120072-01	G-P04	Login	12/2/2021 9:28:53 AM	EW	EXT106
HS21120072-01	G-P04	Login	12/2/2021 9:28:53 AM	EW	EXT106
HS21120072-01	G-P04	Login	12/2/2021 9:28:53 AM	EW	WET140
HS21120072-01	G-P04	Login	12/2/2021 9:28:53 AM	EW	WET140
HS21120072-01	G-P04	Login	12/2/2021 9:28:53 AM	EW	VOA197
HS21120072-01	G-P04	Login	12/2/2021 9:28:53 AM	EW	WET182
HS21120072-02	G-P05	Login	12/2/2021 9:28:53 AM	EW	WET140
HS21120072-02	G-P05	Login	12/2/2021 9:28:53 AM	EW	MET095
HS21120072-02	G-P05	Login	12/2/2021 9:28:53 AM	EW	EXT106
HS21120072-02	G-P05	Login	12/2/2021 9:28:53 AM	EW	EXT106
HS21120072-02	G-P05	Login	12/2/2021 9:28:53 AM	EW	EXT106
HS21120072-02	G-P05	Login	12/2/2021 9:28:53 AM	EW	EXT106
HS21120072-02	G-P05	Login	12/2/2021 9:28:53 AM	EW	WET140
HS21120072-02	G-P05	Login	12/2/2021 9:28:53 AM	EW	WET140
HS21120072-02	G-P05	Login	12/2/2021 9:28:53 AM	EW	VOA197
HS21120072-02	G-P05	Login	12/2/2021 9:28:53 AM	EW	WET182

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS21120072 **Date/Time Received:** 01-Dec-2021 17:15

Client Name: ERM Annapolis **Received by:** Pablo Marinez

Completed By: /S/ Eric Widjaja (eSignature) 02-Dec-2021 10:24 (Date/Time) **Reviewed by:** /S/ Corey Grandits (eSignature)

Matrices: **Groundwater** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	2 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:N/A
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	19.9°C, 19.3°C UC/C	IR #31	
Cooler(s)/Kit(s):	48007, 48005		
Date/Time sample(s) sent to storage:	12/02/2021 10:45		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☑	N/A ☐
pH adjusted?	Yes ☑	No ☐	N/A ☐
pH adjusted by:	Eric Widjaja		

Login Notes: Initial pH >2 (4) on HNO3 metals sample for sample G-P04.
pH adjusted by adding 0.5mL HNO3 to sample.
Final pH = 1. Acid Lot #316135911. Preserved 12/02/2021 10:15.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS21120072 **Date/Time Received:** **01-Dec-2021 17:15**

Client Name: ERM Annapolis **Received by:** **Pablo Marinez**

Completed By: */S/ Jared R. Makan* (eSignature) 02-Dec-2021 12:08 (Date/Time) **Reviewed by:** */S/ Corey Grandits* (eSignature)

Matrices: **Water** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	19.9°C, 19.3°C UC/C	IR31	
Cooler(s)/Kit(s):	48007, 48005		
Date/Time sample(s) sent to storage:	12/02/2021 12:20		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☑	N/A ☐
pH adjusted?	Yes ☑	No ☐	N/A ☐
pH adjusted by:	Eric Widjaja		

Login Notes: Samples logged in for analysis out of hold.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

HS21120072

ERM

Gas to Energy Environmental Impact Assessment S

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	Gas to Energy Environmental Impact Assessment Study
Work Order		Project Number	0590231
Company Name	ERM	Bill To Company	ERM
Send Report To	Herbert Pirela	Invoice Attn.	AP
Address	190 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401
Phone	(410) 972-4124	Phone	(410) 972-4124
Fax		Fax	
e-Mail Address	herbert.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

Parameter/Method Request for Analysis

A	8081_Water_Low (8081 Pesticides)
B	8151_Water (8151 Herbicides)
C	8260_LL_ Water (8260 TCL VOCs)
D	8270_LOW_Water (8270 PAHs)
E	9056_Water-NO2-NO3 Combined & NO3 *NEAT*
F	COND_Water (Conductivity) & pH
G	ICP_TWater (6020/7470 Metals 16)
H	P-TWater (Phosphorous)
I	PCB_Water_Low (8082 PCBs)
J	TOC_Water 9060 (Total Organic Carbon)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	G-P04	23/11/2021	11:22 AM	GW	1,2,3,8	13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2	G-P05	23/11/2021	1:44 PM	GW	1,2,3,8	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Lalita Gopaul

Shipment Method:

Required Turnaround Time:
☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other _____

Results Due Date:

Relinquished by: Lalita Gopaul — Date: 2021/11/25 — Time:

Received by:

Notes:

Relinquished by: x — Date: 2021/11/25 — Time:

Received by (Laboratory):

Logged by (Laboratory): — Date: 12-1-21 — Time: 17:15

Checked by (Laboratory):

Cooler Temp. 19.3C

QC Package: (Check Box Below)

x	Level II: Standard QC	TRRP-Checklist
	Level III: Std QC + Raw Data	TRRP Level IV
	Level IV: SW846 CLP-Like	
	Other: _____	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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48005
1R31CFO

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ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

HS21120072

ERM

Gas to Energy Environmental Impact Assessment S

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name	Gas to Energy Environmental Impact Assessment Study	
Work Order		Project Number	0590231	
Company Name	ERM	Bill To Company	ERM	
Send Report To	Herbert Pirela	Invoice Attn.	AP	
Address	190 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr	
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401	
Phone	(410) 972-4124	Phone	(410) 972-4124	
Fax		Fax		
e-Mail Address	herbert.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	

Parameter/Method Request

A	8081_Water_Low (8081 Pesticides)
B	8151_Water (8151 Herbicides)
C	8260_LL_ Water (8260 TCL VOCs)
D	8270_LOW_Water (8270 PAHs)
E	9056_Water-NO2-NO3 Combined & NO3 *NEAT*
F	COND_Water (Conductivity) & pH
G	ICP_TWater (6020/7470 Metals 16)
H	P-TWater (Phosphorous)
I	PCB_Water_Low (8082 PCBs)
J	TOC_Water 9060 (Total Organic Carbon)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	G-P04	23/11/2021	11:22 AM	GW	1,2,3,8	13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2	G-P05	23/11/2021	1:44 PM	GW	1,2,3,8	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Lalita Gopaul

Shipment Method:

Required Turnaround Time:
☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other ____

Results Due Date:

Relinquished by: Lalita Gopaul	Date: 2021/11/25	Time:	Received by:	Notes:
Relinquished by:	Date: 2021/11/25	Time:	Received by (Laboratory):	Cooler Temp.
Logged by (Laboratory):	Date: 12/1/21	Time: 17:15	Checked by (Laboratory):	19.9C

QC Package: (Check Box Below)

x	Level II: Standard QC	TRRP-Checklist
	Level III: Std QC + Raw Data	TRRP Level IV
	Level IV: SW846 CLP-Like	
	Other: ____	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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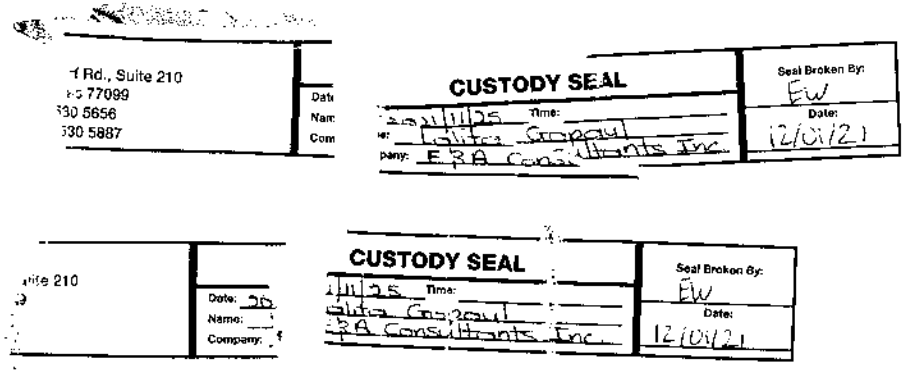

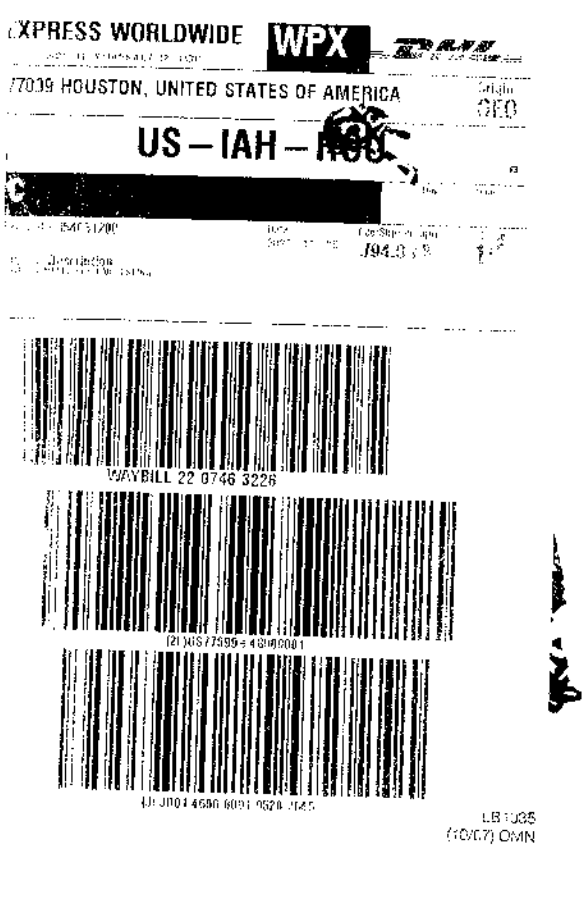

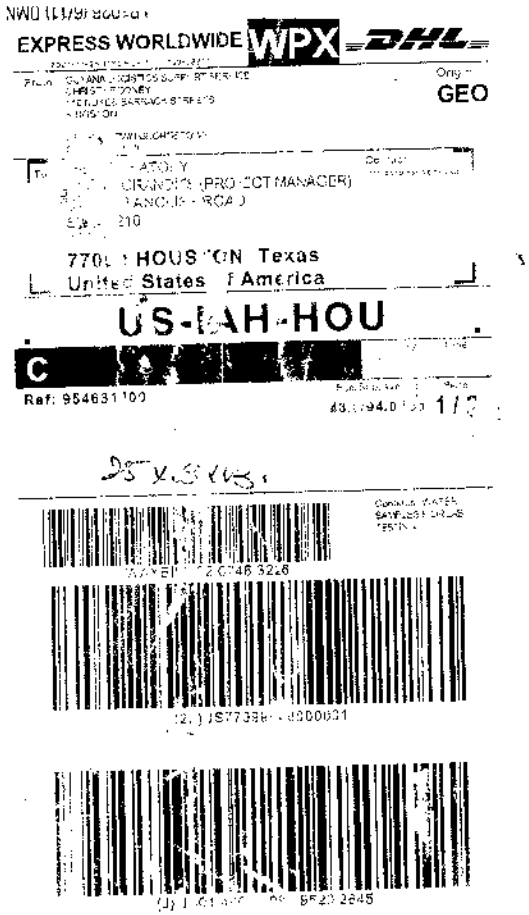

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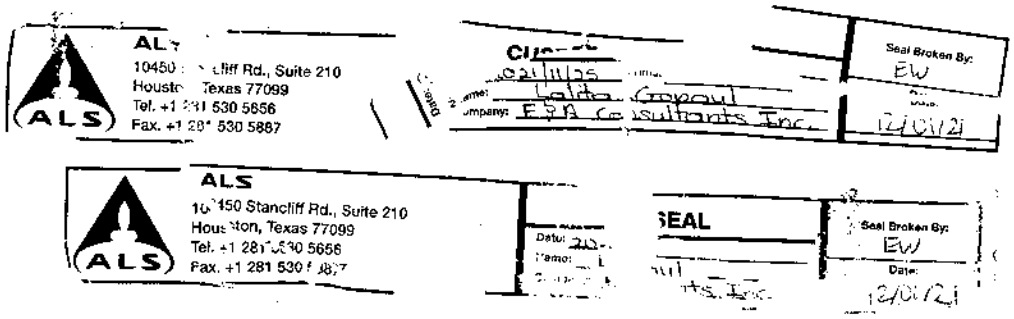

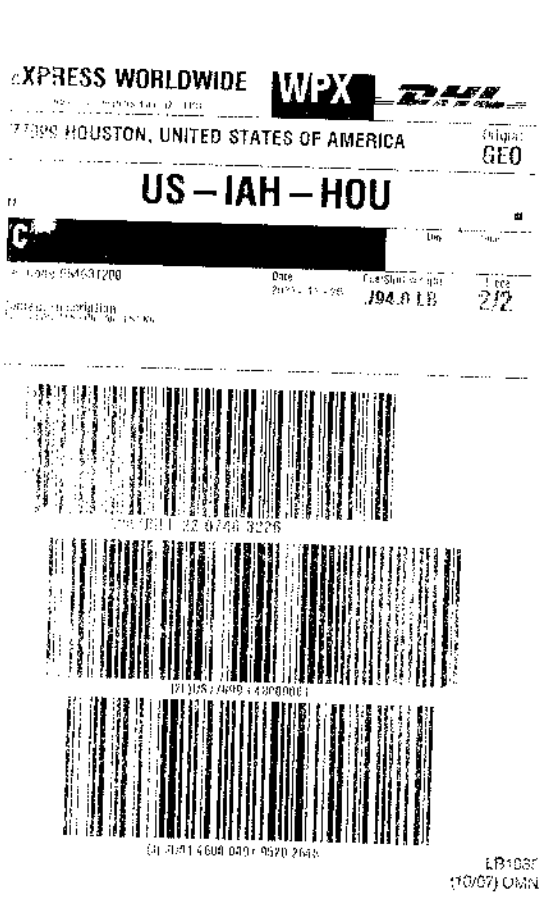

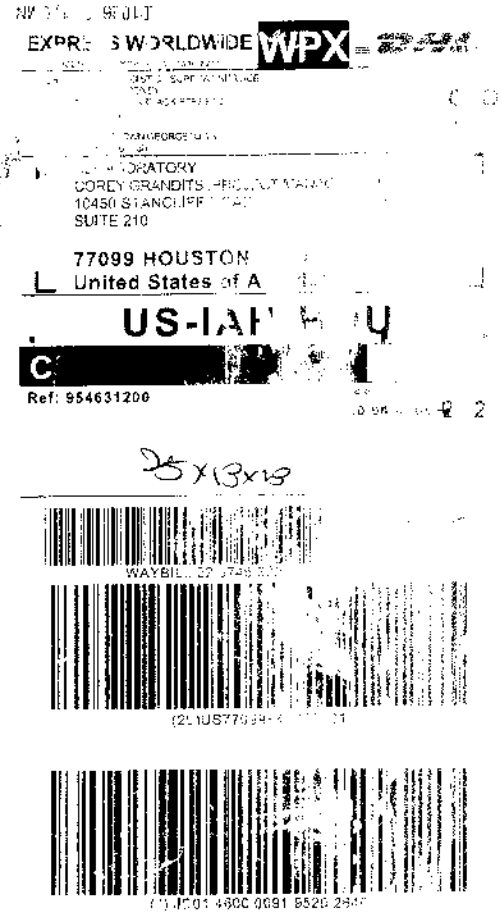

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
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December 20, 2021

Herbert Pirela
ERM
180 Admiral Cochrance Dr
Suite 400
Annapolis, MD 21401

Work Order: **HS21120083**

Laboratory Results for: **Gas to Energy Environmental Impact Assessment Study**

Dear Herbert Pirela,

ALS Environmental received 1 sample(s) on Dec 01, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: DAYNA.FISHER
Corey Grandits
Project Manager

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21120083

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21120083-01	GW-P02	Groundwater		20-Nov-2021 10:58	01-Dec-2021 17:15	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21120083

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

ECD Organics by Method SW8082

Batch ID: 173177

Sample ID: MBLK-173177

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

ECD Organics by Method SW8081

Batch ID: 173176

Sample ID: GW-P02 (HS21120083-01)

• Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: LCS-173176

• The multi-response compounds toxaphene and chlordane were not included in the spiking solution for the LCS.

Sample ID: MBLK-173176

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

ECD Organics by Method SW8151

Batch ID: 173175

Sample ID: GW-P02 (HS21120083-01)

• Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: MBLK-173175

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

GCMS Semivolatiles by Method SW8270

Batch ID: 173242

Sample ID: GW-P02 (HS21120083-01)

• Sample extracted or prepared outside of hold time.

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

GCMS Volatiles by Method SW8260

Batch ID: R396955

Sample ID: HS21111523-12MS

• MS and MSD are for an unrelated sample

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Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21120083

Metals by Method SW6020A

Batch ID: 173450

Sample ID: GW-P02 (HS21120083-01)

- Sample ran at 2x due to sample matrix.

Metals by Method SW7470A

Batch ID: 173295

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9056

Batch ID: R397215

Sample ID: GW-P02 (HS21120083-01)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Batch ID: R397214

Sample ID: GW-P02 (HS21120083-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method SW9060

Batch ID: R397633

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E120.1

Batch ID: R397104

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R396853

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 173609

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120083
Sample ID: GW-P02 Lab ID:HS21120083-01
Collection Date: 20-Nov-2021 10:58 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: AKP
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
1,1,2,2-Tetrachloroethane	U		0.50	1.0	ug/L	1	03-Dec-2021 17:21
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.50	1.0	ug/L	1	03-Dec-2021 17:21
1,1,2-Trichloroethane	U		0.30	1.0	ug/L	1	03-Dec-2021 17:21
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
1,2,3-Trichlorobenzene	U		0.40	1.0	ug/L	1	03-Dec-2021 17:21
1,2,4-Trichlorobenzene	U		0.50	1.0	ug/L	1	03-Dec-2021 17:21
1,2-Dibromo-3-chloropropane	U		1.0	1.0	ug/L	1	03-Dec-2021 17:21
1,2-Dibromoethane	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
1,2-Dichlorobenzene	U		0.50	1.0	ug/L	1	03-Dec-2021 17:21
1,2-Dichloroethane	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
1,2-Dichloropropane	U		0.50	1.0	ug/L	1	03-Dec-2021 17:21
1,3-Dichlorobenzene	U		0.40	1.0	ug/L	1	03-Dec-2021 17:21
1,4-Dichlorobenzene	U		0.40	1.0	ug/L	1	03-Dec-2021 17:21
2-Butanone	U		0.50	2.0	ug/L	1	03-Dec-2021 17:21
2-Hexanone	U		1.0	2.0	ug/L	1	03-Dec-2021 17:21
4-Methyl-2-pentanone	U		0.70	2.0	ug/L	1	03-Dec-2021 17:21
Acetone	**13**		**2.0**	**2.0**	**ug/L**	1	03-Dec-2021 17:21
Benzene	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
Bromochloromethane	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
Bromodichloromethane	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
Bromoform	U		0.40	1.0	ug/L	1	03-Dec-2021 17:21
Bromomethane	U		0.40	1.0	ug/L	1	03-Dec-2021 17:21
Carbon disulfide	U		0.60	2.0	ug/L	1	03-Dec-2021 17:21
Carbon tetrachloride	U		0.50	1.0	ug/L	1	03-Dec-2021 17:21
Chlorobenzene	U		0.30	1.0	ug/L	1	03-Dec-2021 17:21
Chloroethane	U		0.30	1.0	ug/L	1	03-Dec-2021 17:21
Chloroform	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
Chloromethane	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
cis-1,2-Dichloroethene	U		0.20	1.0	ug/L	1	03-Dec-2021 17:21
cis-1,3-Dichloropropene	U		0.10	1.0	ug/L	1	03-Dec-2021 17:21
Cyclohexane	U		0.30	1.0	ug/L	1	03-Dec-2021 17:21
Dibromochloromethane	U		0.30	1.0	ug/L	1	03-Dec-2021 17:21
Dichlorodifluoromethane	U		0.30	1.0	ug/L	1	03-Dec-2021 17:21
Ethylbenzene	U		0.30	1.0	ug/L	1	03-Dec-2021 17:21
Isopropylbenzene	U		0.30	1.0	ug/L	1	03-Dec-2021 17:21
m,p-Xylene	U		0.50	2.0	ug/L	1	03-Dec-2021 17:21
Methyl acetate	U		1.0	1.0	ug/L	1	03-Dec-2021 17:21

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120083
Sample ID: GW-P02 Lab ID:HS21120083-01
Collection Date: 20-Nov-2021 10:58 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: AKP
Methyl tert-butyl ether		U	0.20	1.0	ug/L	1	03-Dec-2021 17:21
Methylcyclohexane		U	0.30	1.0	ug/L	1	03-Dec-2021 17:21
Methylene chloride		U	1.0	2.0	ug/L	1	03-Dec-2021 17:21
o-Xylene		U	0.30	1.0	ug/L	1	03-Dec-2021 17:21
Styrene		U	0.30	1.0	ug/L	1	03-Dec-2021 17:21
Tetrachloroethene		U	0.30	1.0	ug/L	1	03-Dec-2021 17:21
Toluene		U	0.20	1.0	ug/L	1	03-Dec-2021 17:21
trans-1,2-Dichloroethene		U	0.20	1.0	ug/L	1	03-Dec-2021 17:21
trans-1,3-Dichloropropene		U	0.20	1.0	ug/L	1	03-Dec-2021 17:21
Trichloroethene		U	0.20	1.0	ug/L	1	03-Dec-2021 17:21
Trichlorofluoromethane		U	0.30	1.0	ug/L	1	03-Dec-2021 17:21
Vinyl chloride		U	0.20	1.0	ug/L	1	03-Dec-2021 17:21
Xylenes, Total		U	0.30	1.0	ug/L	1	03-Dec-2021 17:21
Surr: 1,2-Dichloroethane-d4	*102*			*70-126*	*%REC*	*1*	*03-Dec-2021 17:21*
Surr: 4-Bromofluorobenzene	*95.4*			*81-113*	*%REC*	*1*	*03-Dec-2021 17:21*
Surr: Dibromofluoromethane	*97.3*			*77-123*	*%REC*	*1*	*03-Dec-2021 17:21*
Surr: Toluene-d8	*101*			*82-127*	*%REC*	*1*	*03-Dec-2021 17:21*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120083
Sample ID: GW-P02 Lab ID:HS21120083-01
Collection Date: 20-Nov-2021 10:58 Matrix:Groundwater

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**					Prep:SW3510 / 07-Dec-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	08-Dec-2021 23:47
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	08-Dec-2021 23:47
Acenaphthene	U	H		0.027	0.10	ug/L	1	08-Dec-2021 23:47
Acenaphthylene	U	H		0.015	0.10	ug/L	1	08-Dec-2021 23:47
Anthracene	U	H		0.014	0.10	ug/L	1	08-Dec-2021 23:47
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	08-Dec-2021 23:47
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	08-Dec-2021 23:47
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	08-Dec-2021 23:47
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	08-Dec-2021 23:47
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	08-Dec-2021 23:47
Chrysene	U	H		0.021	0.10	ug/L	1	08-Dec-2021 23:47
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	08-Dec-2021 23:47
Fluoranthene	U	H		0.010	0.10	ug/L	1	08-Dec-2021 23:47
Fluorene	U	H		0.030	0.10	ug/L	1	08-Dec-2021 23:47
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	08-Dec-2021 23:47
Isophorone	U	H		0.025	0.20	ug/L	1	08-Dec-2021 23:47
Naphthalene	U	H		0.020	0.10	ug/L	1	08-Dec-2021 23:47
Phenanthrene	U	H		0.021	0.10	ug/L	1	08-Dec-2021 23:47
Pyrene	U	H		0.019	0.10	ug/L	1	08-Dec-2021 23:47
Surr: 2,4,6-Tribromophenol	*63.1*				*34-129*	*%REC*	*1*	*08-Dec-2021 23:47*
Surr: 2-Fluorobiphenyl	*73.4*				*40-125*	*%REC*	*1*	*08-Dec-2021 23:47*
Surr: 2-Fluorophenol	*81.5*				*20-120*	*%REC*	*1*	*08-Dec-2021 23:47*
Surr: 4-Terphenyl-d14	*90.1*				*40-135*	*%REC*	*1*	*08-Dec-2021 23:47*
Surr: Nitrobenzene-d5	*57.0*				*41-120*	*%REC*	*1*	*08-Dec-2021 23:47*
Surr: Phenol-d6	*55.8*				*20-120*	*%REC*	*1*	*08-Dec-2021 23:47*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120083
Sample ID: GW-P02 Lab ID:HS21120083-01
Collection Date: 20-Nov-2021 10:58 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3510 / 03-Dec-2021		Analyst: JBA
4,4´-DDD	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
4,4´-DDE	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
4,4´-DDT	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
Aldrin	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 07:12
alpha-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 07:12
alpha-Chlordane	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
beta-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 07:12
Chlordane	U	H	0.025	0.025	ug/L	1	09-Dec-2021 07:12
delta-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 07:12
Dieldrin	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
Endosulfan I	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 07:12
Endosulfan II	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
Endosulfan sulfate	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
Endrin	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
Endrin aldehyde	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
Endrin ketone	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
gamma-BHC	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 07:12
gamma-Chlordane	U	H	0.0025	0.0025	ug/L	1	09-Dec-2021 07:12
Heptachlor	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 07:12
Heptachlor epoxide	U	H	0.0012	0.0012	ug/L	1	09-Dec-2021 07:12
Methoxychlor	U	H	0.012	0.012	ug/L	1	09-Dec-2021 07:12
Toxaphene	U	H	0.025	0.025	ug/L	1	09-Dec-2021 07:12
Surr: Decachlorobiphenyl	*129*			*55-145*	*%REC*	*1*	*09-Dec-2021 07:12*
Surr: Tetrachloro-m-xylene	*128*			*52-142*	*%REC*	*1*	*09-Dec-2021 07:12*
PCBS BY SW8082A	**Method:SW8082**				Prep:SW3510C/3665A / 03-Dec-2021		Analyst: JBA
Aroclor 1016	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:35
Aroclor 1221	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:35
Aroclor 1232	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:35
Aroclor 1242	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:35
Aroclor 1248	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:35
Aroclor 1254	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:35
Aroclor 1260	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:35
PCBs (Total)	U		0.0125	0.0125	ug/L	1	06-Dec-2021 10:35
Surr: Decachlorobiphenyl	*108*			*54-140*	*%REC*	*1*	*06-Dec-2021 10:35*
Surr: Tetrachloro-m-xylene	*86.6*			*53-137*	*%REC*	*1*	*06-Dec-2021 10:35*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120083
Sample ID: GW-P02 Lab ID:HS21120083-01
Collection Date: 20-Nov-2021 10:58 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
CHLORINATED HERBICIDES BY SW8151A		**Method:SW8151**			Prep:SW8151 / 03-Dec-2021		Analyst: JBA
2,4,5-T	U	H	0.0500	0.200	ug/L	1	10-Dec-2021 11:25
2,4,5-TP (Silvex)	U	H	0.0500	0.200	ug/L	1	10-Dec-2021 11:25
2,4-D	U	H	0.0600	0.200	ug/L	1	10-Dec-2021 11:25
2,4-DB	U	H	0.0800	0.400	ug/L	1	10-Dec-2021 11:25
Dalapon	**0.102**	JHP	**0.0700**	**0.200**	**ug/L**	1	10-Dec-2021 11:25
Dicamba	U	H	0.0500	0.200	ug/L	1	10-Dec-2021 11:25
Dichlorprop	U	H	0.0800	0.400	ug/L	1	10-Dec-2021 11:25
Dinoseb	U	H	0.0500	0.300	ug/L	1	10-Dec-2021 11:25
MCPA	U	H	8.10	30.0	ug/L	1	10-Dec-2021 11:25
MCPP	U	H	8.10	30.0	ug/L	1	10-Dec-2021 11:25
Surr: DCAA	*108*			*50-130*	*%REC*	*1*	*10-Dec-2021 11:25*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 13-Dec-2021		Analyst: JHD
Antimony	U		0.000800	0.00400	mg/L	2	14-Dec-2021 12:49
Arsenic	**0.0320**		**0.000800**	**0.00400**	**mg/L**	2	14-Dec-2021 12:49
Beryllium	**0.0111**		**0.000400**	**0.00400**	**mg/L**	2	14-Dec-2021 12:49
Cadmium	U		0.000400	0.00400	mg/L	2	14-Dec-2021 12:49
Chromium	**0.0226**		**0.000800**	**0.00800**	**mg/L**	2	14-Dec-2021 12:49
Copper	**0.0367**		**0.00200**	**0.00400**	**mg/L**	2	14-Dec-2021 12:49
Iron	**283**		**0.0600**	**1.00**	**mg/L**	5	13-Dec-2021 21:03
Lead	**0.0973**		**0.00120**	**0.00400**	**mg/L**	2	14-Dec-2021 12:49
Manganese	**8.33**		**0.0700**	**0.500**	**mg/L**	100	14-Dec-2021 12:56
Nickel	**0.138**		**0.00120**	**0.00400**	**mg/L**	2	14-Dec-2021 12:49
Potassium	**7.48**		**0.0360**	**0.400**	**mg/L**	2	14-Dec-2021 12:49
Selenium	U		0.00220	0.00400	mg/L	2	14-Dec-2021 12:49
Silver	U		0.000400	0.00400	mg/L	2	14-Dec-2021 12:49
Thallium	U		0.000400	0.00400	mg/L	2	14-Dec-2021 12:49
Zinc	**0.925**		**0.00400**	**0.00800**	**mg/L**	2	14-Dec-2021 12:49
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 08-Dec-2021		Analyst: MSC
Mercury	**0.0000330**	J	**0.0000300**	**0.000200**	**mg/L**	1	08-Dec-2021 12:17
SPECIFIC CONDUCTANCE BY E120.1, 1982		**Method:E120.1**					Analyst: MZD
Specific Conductance	**1,680**		**5.00**	**5.00**	**umhos/cm**	1	07-Dec-2021 12:13
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 15-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	15-Dec-2021 13:45
PH BY SW9040C		**Method:SW9040C**					Analyst: SH
pH	**7.31**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 19:10
Temp Deg C @pH	**22.6**	H	**0**	**0**	**DEG C**	1	02-Dec-2021 19:10
ANIONS BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate (As N)	**0.0824**	JH	**0.0300**	**0.100**	**mg/L**	1	08-Dec-2021 10:57

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21120083
Sample ID: GW-P02 Lab ID:HS21120083-01
Collection Date: 20-Nov-2021 10:58 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
NITRATE/NITRITE BY IC BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate-Nitrite	**2.60**	J	**0.600**	**4.00**	**mg/L**	20	08-Dec-2021 12:12
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**					Analyst: JAC
Organic Carbon, Total	**21.1**		**0.500**	**1.00**	**mg/L**	1	15-Dec-2021 02:36

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

Batch ID: 173175 **Start Date:** 03 Dec 2021 07:00 **End Date:** 03 Dec 2021 15:30
Method: HERBICIDE AQ SEP FUN EXTRACT-SW8151 **Prep Code:** 3510_H

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120083-01	1	1000 (mL)	10 (mL)	0.01	1-liter amber glass, Neat

Batch ID: 173176 **Start Date:** 03 Dec 2021 08:00 **End Date:** 03 Dec 2021 14:00
Method: PEST AQ SEP FUN EXTRACT-SW3510C **Prep Code:** 3510_P_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120083-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173177 **Start Date:** 03 Dec 2021 08:00 **End Date:** 03 Dec 2021 14:00
Method: PCBS AQ SEP FUN EXTRACT-SW3510C **Prep Code:** 3510_PCB_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120083-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173242 **Start Date:** 07 Dec 2021 07:00 **End Date:** 07 Dec 2021 12:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120083-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173295 **Start Date:** 08 Dec 2021 08:00 **End Date:** 08 Dec 2021 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120083-01		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173450 **Start Date:** 13 Dec 2021 08:30 **End Date:** 13 Dec 2021 12:30
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120083-01		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173609 **Start Date:** 15 Dec 2021 10:30 **End Date:** 15 Dec 2021 12:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120083-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173175 (0)	**Test Name :** CHLORINATED HERBICIDES BY SW8151A				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58		03 Dec 2021 12:58	10 Dec 2021 11:25	1
Batch ID: 173176 (0)	**Test Name :** ORGANOCHLORINE PESTICIDES BY SW8081B				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58		03 Dec 2021 12:58	09 Dec 2021 07:12	1
Batch ID: 173177 (0)	**Test Name :** PCBS BY SW8082A				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58		03 Dec 2021 12:58	06 Dec 2021 10:35	1
Batch ID: 173242 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58		07 Dec 2021 09:02	08 Dec 2021 23:47	1
Batch ID: 173295 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58		08 Dec 2021 08:00	08 Dec 2021 12:17	1
Batch ID: 173450 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58		13 Dec 2021 12:30	14 Dec 2021 12:56	100
HS21120083-01	GW-P02	20 Nov 2021 10:58		13 Dec 2021 12:30	14 Dec 2021 12:49	2
HS21120083-01	GW-P02	20 Nov 2021 10:58		13 Dec 2021 12:30	13 Dec 2021 21:03	5
Batch ID: 173609 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58		15 Dec 2021 10:30	15 Dec 2021 13:45	1
Batch ID: R396853 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58			02 Dec 2021 19:10	1
Batch ID: R396955 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58			03 Dec 2021 17:21	1
Batch ID: R397104 (0)	**Test Name :** SPECIFIC CONDUCTANCE BY E120.1, 1982				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58			07 Dec 2021 12:13	1
Batch ID: R397214 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58			08 Dec 2021 10:57	1
Batch ID: R397215 (0)	**Test Name :** NITRATE/NITRITE BY IC BY SW9056A				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58			08 Dec 2021 12:12	20
Batch ID: R397633 (0)	**Test Name :** TOTAL ORGANIC CARBON BY SW9060A				**Matrix:** Groundwater	
HS21120083-01	GW-P02	20 Nov 2021 10:58			15 Dec 2021 02:36	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173175 (0) **Instrument: ECD_13** **Method: CHLORINATED HERBICIDES BY SW8151A**

MBLK Sample ID: **MBLK-173175** Units: **ug/L** Analysis Date: **10-Dec-2021 10:15**
Client ID: Run ID: **ECD_13_397500** SeqNo: **6418519** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	U	0.200								
2,4,5-TP (Silvex)	U	0.200								
2,4-D	U	0.200								
2,4-DB	U	0.400								
Dalapon	U	0.200								
Dicamba	U	0.200								
Dichlorprop	U	0.400								
Dinoseb	U	0.300								
MCPA	U	30.0								
MCPP	U	30.0								
Surr: DCAA	*4.43*	*0*	*5*	*0*	*88.6*	*50 - 130*				

LCS Sample ID: **LCS-173175** Units: **ug/L** Analysis Date: **10-Dec-2021 09:57**
Client ID: Run ID: **ECD_13_397500** SeqNo: **6418518** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	2.549	0.200	2.5	0	102	44 - 122				
2,4,5-TP (Silvex)	2.522	0.200	2.5	0	101	49 - 126				
2,4-D	2.333	0.200	2.5	0	93.3	39 - 120				
2,4-DB	2.553	0.400	2.5	0	102	44 - 120				
Dalapon	2.514	0.200	2.5	0	101	40 - 120				
Dicamba	2.451	0.200	2.5	0	98.0	60 - 120				
Dichlorprop	2.422	0.400	2.5	0	96.9	68 - 122				
Dinoseb	1.877	0.300	2.5	0	75.1	28 - 115				
MCPA	265.4	30.0	250	0	106	62 - 144				
MCPP	315.4	30.0	250	0	126	60 - 133				
Surr: DCAA	*4.136*	*0*	*5*	*0*	*82.7*	*50 - 130*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173175 (0) **Instrument: ECD_13** **Method: CHLORINATED HERBICIDES BY SW8151A**

LCSD Sample ID: **LCSD-173175** Units: **ug/L** Analysis Date: **10-Dec-2021 10:32**
Client ID: Run ID: **ECD_13_397500** SeqNo: **6418520** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	2.995	0.200	2.5	0	120	44 - 122	2.549	16.1	30	
2,4,5-TP (Silvex)	2.989	0.200	2.5	0	120	49 - 126	2.522	16.9	30	
2,4-D	2.9	0.200	2.5	0	116	39 - 120	2.333	21.7	30	
2,4-DB	2.812	0.400	2.5	0	112	44 - 120	2.553	9.62	30	
Dalapon	2.643	0.200	2.5	0	106	40 - 120	2.514	4.98	30	
Dicamba	2.756	0.200	2.5	0	110	60 - 120	2.451	11.7	30	
Dichlorprop	2.844	0.400	2.5	0	114	68 - 122	2.422	16	30	
Dinoseb	2.438	0.300	2.5	0	97.5	28 - 115	1.877	26	30	
MCPA	324.2	30.0	250	0	130	62 - 144	265.4	20	30	
MCPP	314.6	30.0	250	0	126	60 - 133	315.4	0.247	30	
Surr: DCAA	*5.099*	*0*	*5*	*0*	*102*	*50 - 130*	*4.136*	*20.9*	*30*	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173176 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MBLK Sample ID: **MBLK-173176** Units: **ug/L** Analysis Date: **09-Dec-2021 00:09**
Client ID: Run ID: **ECD_11_397354** SeqNo: **6414904** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	U	0.0025								
4,4´-DDE	U	0.0025								
4,4´-DDT	U	0.0025								
Aldrin	U	0.0012								
alpha-BHC	U	0.0012								
alpha-Chlordane	U	0.0025								
beta-BHC	U	0.0012								
Chlordane	U	0.025								
delta-BHC	U	0.0012								
Dieldrin	U	0.0025								
Endosulfan I	U	0.0012								
Endosulfan II	U	0.0025								
Endosulfan sulfate	U	0.0025								
Endrin	U	0.0025								
Endrin aldehyde	U	0.0025								
Endrin ketone	U	0.0025								
gamma-BHC	U	0.0012								
gamma-Chlordane	U	0.0025								
Heptachlor	U	0.0012								
Heptachlor epoxide	U	0.0012								
Methoxychlor	U	0.012								
Toxaphene	U	0.025								
Surr: Decachlorobiphenyl	*0.02183*	*0*	*0.02*	*0*	*109*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.02187*	*0*	*0.02*	*0*	*109*	*52 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173176 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS-173176** Units: **ug/L** Analysis Date: **09-Dec-2021 01:38**
Client ID: Run ID: **ECD_11_397354** SeqNo: **6414905** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	0.05224	0.0025	0.05	0	104	53 - 144				
4,4´-DDE	0.04857	0.0025	0.05	0	97.1	55 - 144				
4,4´-DDT	0.05836	0.0025	0.05	0	117	53 - 149				
Aldrin	0.02691	0.0012	0.025	0	108	47 - 141				
alpha-BHC	0.02726	0.0012	0.025	0	109	51 - 141				
alpha-Chlordane	0.02683	0.0025	0.025	0	107	55 - 141				
beta-BHC	0.0259	0.0012	0.025	0	104	58 - 144				
delta-BHC	0.02667	0.0012	0.025	0	107	48 - 146				
Dieldrin	0.05216	0.0025	0.05	0	104	56 - 144				
Endosulfan I	0.02363	0.0012	0.025	0	94.5	55 - 141				
Endosulfan II	0.04746	0.0025	0.05	0	94.9	57 - 144				
Endosulfan sulfate	0.05238	0.0025	0.05	0	105	58 - 145				
Endrin	0.05988	0.0025	0.05	0	120	60 - 163				
Endrin aldehyde	0.04774	0.0025	0.05	0	95.5	59 - 158				
Endrin ketone	0.05087	0.0025	0.05	0	102	59 - 154				
gamma-BHC	0.02728	0.0012	0.025	0	109	53 - 142				
gamma-Chlordane	0.02672	0.0025	0.025	0	107	55 - 137				
Heptachlor	0.02938	0.0012	0.025	0	118	51 - 144				
Heptachlor epoxide	0.02712	0.0012	0.025	0	108	55 - 142				
Methoxychlor	0.2777	0.012	0.25	0	111	50 - 150				
Surr: Decachlorobiphenyl	*0.02248*	*0*	*0.02*	*0*	*112*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.02267*	*0*	*0.02*	*0*	*113*	*52 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173176 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCSD Sample ID: **LCSD-173176** Units: **ug/L** Analysis Date: **09-Dec-2021 02:01**
Client ID: Run ID: **ECD_11_397354** SeqNo: **6414906** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
4,4´-DDD	0.05269	0.0025	0.05	0	105	53 - 144	0.05224	0.858	30	
4,4´-DDE	0.0488	0.0025	0.05	0	97.6	55 - 144	0.04857	0.474	30	
4,4´-DDT	0.05782	0.0025	0.05	0	116	53 - 149	0.05836	0.93	30	
Aldrin	0.02698	0.0012	0.025	0	108	47 - 141	0.02691	0.26	30	
alpha-BHC	0.02712	0.0012	0.025	0	108	51 - 141	0.02726	0.511	30	
alpha-Chlordane	0.02714	0.0025	0.025	0	109	55 - 141	0.02683	1.15	30	
beta-BHC	0.02627	0.0012	0.025	0	105	58 - 144	0.0259	1.45	30	
delta-BHC	0.02708	0.0012	0.025	0	108	48 - 146	0.02667	1.51	30	
Dieldrin	0.05241	0.0025	0.05	0	105	56 - 144	0.05216	0.474	30	
Endosulfan I	0.02388	0.0012	0.025	0	95.5	55 - 141	0.02363	1.04	30	
Endosulfan II	0.04776	0.0025	0.05	0	95.5	57 - 144	0.04746	0.622	30	
Endosulfan sulfate	0.05228	0.0025	0.05	0	105	58 - 145	0.05238	0.191	30	
Endrin	0.05988	0.0025	0.05	0	120	60 - 163	0.05988	0.00668	30	
Endrin aldehyde	0.04839	0.0025	0.05	0	96.8	59 - 158	0.04774	1.35	30	
Endrin ketone	0.05025	0.0025	0.05	0	100	59 - 154	0.05087	1.22	30	
gamma-BHC	0.0276	0.0012	0.025	0	110	53 - 142	0.02728	1.14	30	
gamma-Chlordane	0.02704	0.0025	0.025	0	108	55 - 137	0.02672	1.19	30	
Heptachlor	0.02942	0.0012	0.025	0	118	51 - 144	0.02938	0.143	30	
Heptachlor epoxide	0.02749	0.0012	0.025	0	110	55 - 142	0.02712	1.35	30	
Methoxychlor	0.2734	0.012	0.25	0	109	50 - 150	0.2777	1.57	30	
Surr: Decachlorobiphenyl	*0.02281*	*0*	*0.02*	*0*	*114*	*55 - 145*	*0.02248*	*1.45*	*30*	
Surr: Tetrachloro-m-xylene	*0.02295*	*0*	*0.02*	*0*	*115*	*52 - 142*	*0.02267*	*1.24*	*30*	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173177 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MBLK Sample ID: **MBLK-173177** Units: **ug/L** Analysis Date: **06-Dec-2021 08:51**
Client ID: Run ID: **ECD_7_396980** SeqNo: **6405999** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	U	0.0125								
Aroclor 1221	U	0.0125								
Aroclor 1232	U	0.0125								
Aroclor 1242	U	0.0125								
Aroclor 1248	U	0.0125								
Aroclor 1254	U	0.0125								
Aroclor 1260	U	0.0125								
PCBs (Total)	U	0.0125								
Surr: Decachlorobiphenyl	*0.01682*	*0.00125*	*0.02*	*0*	*84.1*	*54 - 140*				
Surr: Tetrachloro-m-xylene	*0.01532*	*0.00125*	*0.02*	*0*	*76.6*	*53 - 137*				

LCS Sample ID: **LCS-173177** Units: **ug/L** Analysis Date: **06-Dec-2021 09:09**
Client ID: Run ID: **ECD_7_396980** SeqNo: **6406000** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	0.3858	0.0125	0.5	0	77.2	54 - 138				
Aroclor 1260	0.4127	0.0125	0.5	0	82.5	57 - 136				
Surr: Decachlorobiphenyl	*0.01686*	*0.00125*	*0.02*	*0*	*84.3*	*54 - 140*				
Surr: Tetrachloro-m-xylene	*0.01588*	*0.00125*	*0.02*	*0*	*79.4*	*53 - 137*				

LCSD Sample ID: **LCSD-173177** Units: **ug/L** Analysis Date: **06-Dec-2021 09:26**
Client ID: Run ID: **ECD_7_396980** SeqNo: **6406001** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	0.4605	0.0125	0.5	0	92.1	54 - 138	0.3858	17.6	30	
Aroclor 1260	0.4725	0.0125	0.5	0	94.5	57 - 136	0.4127	13.5	30	
Surr: Decachlorobiphenyl	*0.0194*	*0.00125*	*0.02*	*0*	*97.0*	*54 - 140*	*0.01686*	*14*	*30*	
Surr: Tetrachloro-m-xylene	*0.01941*	*0.00125*	*0.02*	*0*	*97.0*	*53 - 137*	*0.01588*	*20*	*30*	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173295 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-173295** Units: **mg/L** Analysis Date: **08-Dec-2021 11:54**
Client ID: Run ID: **HG03_397205** SeqNo: **6411307** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury		U	0.000200								

LCS Sample ID: **LCS-173295** Units: **mg/L** Analysis Date: **08-Dec-2021 11:56**
Client ID: Run ID: **HG03_397205** SeqNo: **6411308** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00526		0.000200	0.005	0	105	80 - 120				

MS Sample ID: **HS21120054-02MS** Units: **mg/L** Analysis Date: **08-Dec-2021 12:03**
Client ID: Run ID: **HG03_397205** SeqNo: **6411310** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00477		0.000200	0.005	0.000095	93.5	75 - 125				

MSD Sample ID: **HS21120054-02MSD** Units: **mg/L** Analysis Date: **08-Dec-2021 12:06**
Client ID: Run ID: **HG03_397205** SeqNo: **6411311** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00439		0.000200	0.005	0.000095	85.9	75 - 125	0.00477	8.3	20	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173450 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-173450** Units: **mg/L** Analysis Date: **13-Dec-2021 20:04**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419060** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Copper	U	0.00200								
Iron	U	0.200								
Lead	U	0.00200								
Manganese	U	0.00500								
Nickel	U	0.00200								
Potassium	U	0.200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173450 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-173450** Units: **mg/L** Analysis Date: **13-Dec-2021 20:06**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419061** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05293	0.00200	0.05	0	106	80 - 120				
Arsenic	0.05133	0.00200	0.05	0	103	80 - 120				
Beryllium	0.05221	0.00200	0.05	0	104	80 - 120				
Cadmium	0.0557	0.00200	0.05	0	111	80 - 120				
Chromium	0.05111	0.00400	0.05	0	102	80 - 120				
Copper	0.054	0.00200	0.05	0	108	80 - 120				
Iron	5.101	0.200	5	0	102	80 - 120				
Lead	0.05361	0.00200	0.05	0	107	80 - 120				
Manganese	0.05184	0.00500	0.05	0	104	80 - 120				
Nickel	0.05401	0.00200	0.05	0	108	80 - 120				
Potassium	4.916	0.200	5	0	98.3	80 - 120				
Selenium	0.05066	0.00200	0.05	0	101	80 - 120				
Silver	0.04991	0.00200	0.05	0	99.8	80 - 120				
Thallium	0.05464	0.00200	0.05	0	109	80 - 120				
Zinc	0.05695	0.00400	0.05	0	114	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173450 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21111351-22MS** Units: **mg/L** Analysis Date: **13-Dec-2021 20:12**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419064** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05401	0.00200	0.05	0.000289	107	80 - 120				
Arsenic	0.05892	0.00200	0.05	0.004921	108	80 - 120				
Beryllium	0.05224	0.00200	0.05	0.000014	104	80 - 120				
Cadmium	0.05404	0.00200	0.05	0.000003	108	80 - 120				
Chromium	0.06924	0.00400	0.05	0.01861	101	80 - 120				
Copper	0.0548	0.00200	0.05	0.00332	103	80 - 120				
Iron	5.282	0.200	5	0.193	102	80 - 120				
Lead	0.0553	0.00200	0.05	0.001094	108	80 - 120				
Manganese	0.05999	0.00500	0.05	0.008812	102	80 - 120				
Nickel	0.07362	0.00200	0.05	0.02206	103	80 - 120				
Potassium	7.322	0.200	5	2.438	97.7	80 - 120				
Selenium	0.05258	0.00200	0.05	-0.000456	106	80 - 120				
Silver	0.0493	0.00200	0.05	-0.000039	98.7	80 - 120				
Thallium	0.05562	0.00200	0.05	0.000067	111	80 - 120				
Zinc	0.1418	0.00400	0.05	0.08687	110	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173450 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21111351-22MSD** Units: **mg/L** Analysis Date: **13-Dec-2021 20:14**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419065** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05318	0.00200	0.05	0.000289	106	80 - 120	0.05401	1.55	20	
Arsenic	0.05872	0.00200	0.05	0.004921	108	80 - 120	0.05892	0.328	20	
Beryllium	0.0527	0.00200	0.05	0.000014	105	80 - 120	0.05224	0.873	20	
Cadmium	0.05388	0.00200	0.05	0.000003	108	80 - 120	0.05404	0.296	20	
Chromium	0.07021	0.00400	0.05	0.01861	103	80 - 120	0.06924	1.4	20	
Copper	0.0548	0.00200	0.05	0.00332	103	80 - 120	0.0548	0.00912	20	
Iron	5.311	0.200	5	0.193	102	80 - 120	5.282	0.559	20	
Lead	0.05552	0.00200	0.05	0.001094	109	80 - 120	0.0553	0.393	20	
Manganese	0.06025	0.00500	0.05	0.008812	103	80 - 120	0.05999	0.432	20	
Nickel	0.07271	0.00200	0.05	0.02206	101	80 - 120	0.07362	1.23	20	
Potassium	7.304	0.200	5	2.438	97.3	80 - 120	7.322	0.237	20	
Selenium	0.05282	0.00200	0.05	-0.000456	107	80 - 120	0.05258	0.448	20	
Silver	0.04944	0.00200	0.05	-0.000039	99.0	80 - 120	0.0493	0.282	20	
Thallium	0.05608	0.00200	0.05	0.000067	112	80 - 120	0.05562	0.834	20	
Zinc	0.1408	0.00400	0.05	0.08687	108	80 - 120	0.1418	0.734	20	

PDS Sample ID: **HS21111351-22PDS** Units: **mg/L** Analysis Date: **13-Dec-2021 20:16**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419066** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Iron	12.68	0.200	10	0.193	125	75 - 125				
Potassium	14.36	0.200	10	2.438	119	75 - 125				
Silver	0.1008	0.00200	0.1	-0.000039	101	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173450 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21111351-22SD** Units: **mg/L** Analysis Date: **13-Dec-2021 20:10**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6419063** PrepDate: **13-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000289	0	10	
Arsenic	0.005578	0.0100					0.004921	0	10	J
Beryllium	U	0.0100					0.000014	0	10	
Cadmium	U	0.0100					0.000003	0	10	
Chromium	0.0183	0.0200					0.01861	0	10	J
Copper	U	0.0100					0.00332	0	10	
Iron	0.1925	1.00					0.193	0	10	J
Lead	U	0.0100					0.001094	0	10	
Manganese	0.01006	0.0250					0.008812	0	10	J
Nickel	0.02261	0.0100					0.02206	2.47	10	
Potassium	2.402	1.00					2.438	1.48	10	
Selenium	U	0.0100					-0.000456	0	10	
Silver	U	0.0100					-0.000039	0	10	
Thallium	U	0.0100					0.000067	0	10	
Zinc	0.09037	0.0200					0.08687	4.02	10	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 11:52**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415760** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.10								
2-Methylnaphthalene	U	0.10								
Acenaphthene	U	0.10								
Acenaphthylene	U	0.10								
Anthracene	U	0.10								
Benz(a)anthracene	U	0.10								
Benzo(a)pyrene	U	0.10								
Benzo(b)fluoranthene	U	0.10								
Benzo(g,h,i)perylene	U	0.10								
Benzo(k)fluoranthene	U	0.10								
Chrysene	U	0.10								
Dibenz(a,h)anthracene	U	0.10								
Fluoranthene	U	0.10								
Fluorene	U	0.10								
Indeno(1,2,3-cd)pyrene	U	0.10								
Isophorone	U	0.20								
Naphthalene	U	0.10								
Phenanthrene	U	0.10								
Pyrene	U	0.10								
Surr: 2,4,6-Tribromophenol	*4.056*	*0.20*	*5*	*0*	*81.1*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.197*	*0.20*	*5*	*0*	*83.9*	*40 - 125*				
Surr: 2-Fluorophenol	*4.81*	*0.20*	*5*	*0*	*96.2*	*20 - 120*				
Surr: 4-Terphenyl-d14	*5.105*	*0.20*	*5*	*0*	*102*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.041*	*0.20*	*5*	*0*	*80.8*	*41 - 120*				
Surr: Phenol-d6	*4.249*	*0.20*	*5*	*0*	*85.0*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCS Sample ID: **LCS-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 12:11**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415761** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	3.498	0.10	5	0	70.0	45 - 120				
2-Methylnaphthalene	3.437	0.10	5	0	68.7	50 - 120				
Acenaphthene	3.164	0.10	5	0	63.3	45 - 120				
Acenaphthylene	3.439	0.10	5	0	68.8	47 - 120				
Anthracene	3.694	0.10	5	0	73.9	45 - 120				
Benz(a)anthracene	4.17	0.10	5	0	83.4	40 - 120				
Benzo(a)pyrene	4.36	0.10	5	0	87.2	45 - 120				
Benzo(b)fluoranthene	3.998	0.10	5	0	80.0	50 - 120				
Benzo(g,h,i)perylene	4.078	0.10	5	0	81.6	42 - 127				
Benzo(k)fluoranthene	3.994	0.10	5	0	79.9	45 - 127				
Chrysene	3.905	0.10	5	0	78.1	43 - 120				
Dibenz(a,h)anthracene	3.887	0.10	5	0	77.7	45 - 125				
Fluoranthene	3.949	0.10	5	0	79.0	45 - 125				
Fluorene	3.485	0.10	5	0	69.7	49 - 120				
Indeno(1,2,3-cd)pyrene	4.072	0.10	5	0	81.4	41 - 128				
Isophorone	3.407	0.20	5	0	68.1	40 - 121				
Naphthalene	3.368	0.10	5	0	67.4	45 - 120				
Phenanthrene	3.593	0.10	5	0	71.9	45 - 121				
Pyrene	4.065	0.10	5	0	81.3	40 - 130				
Surr: 2,4,6-Tribromophenol	*3.536*	*0.20*	*5*	*0*	*70.7*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*3.226*	*0.20*	*5*	*0*	*64.5*	*40 - 125*				
Surr: 2-Fluorophenol	*3.309*	*0.20*	*5*	*0*	*66.2*	*20 - 120*				
Surr: 4-Terphenyl-d14	*4.125*	*0.20*	*5*	*0*	*82.5*	*40 - 135*				
Surr: Nitrobenzene-d5	*3.167*	*0.20*	*5*	*0*	*63.3*	*41 - 120*				
Surr: Phenol-d6	*3.164*	*0.20*	*5*	*0*	*63.3*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCSD Sample ID: **LCSD-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 13:29**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415764** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	3.718	0.10	5	0	74.4	45 - 120	3.498	6.09	20	
2-Methylnaphthalene	3.562	0.10	5	0	71.2	50 - 120	3.437	3.58	20	
Acenaphthene	3.034	0.10	5	0	60.7	45 - 120	3.164	4.18	20	
Acenaphthylene	3.434	0.10	5	0	68.7	47 - 120	3.439	0.163	20	
Anthracene	3.79	0.10	5	0	75.8	45 - 120	3.694	2.57	20	
Benz(a)anthracene	4.299	0.10	5	0	86.0	40 - 120	4.17	3.05	20	
Benzo(a)pyrene	4.456	0.10	5	0	89.1	45 - 120	4.36	2.17	20	
Benzo(b)fluoranthene	3.951	0.10	5	0	79.0	50 - 120	3.998	1.16	20	
Benzo(g,h,i)perylene	4.466	0.10	5	0	89.3	42 - 127	4.078	9.08	20	
Benzo(k)fluoranthene	3.923	0.10	5	0	78.5	45 - 127	3.994	1.78	20	
Chrysene	3.995	0.10	5	0	79.9	43 - 120	3.905	2.29	20	
Dibenz(a,h)anthracene	3.899	0.10	5	0	78.0	45 - 125	3.887	0.295	20	
Fluoranthene	4.116	0.10	5	0	82.3	45 - 125	3.949	4.15	20	
Fluorene	3.572	0.10	5	0	71.4	49 - 120	3.485	2.46	20	
Indeno(1,2,3-cd)pyrene	4.256	0.10	5	0	85.1	41 - 128	4.072	4.4	20	
Isophorone	3.85	0.20	5	0	77.0	40 - 121	3.407	12.2	20	
Naphthalene	3.346	0.10	5	0	66.9	45 - 120	3.368	0.64	20	
Phenanthrene	3.601	0.10	5	0	72.0	45 - 121	3.593	0.228	20	
Pyrene	4.245	0.10	5	0	84.9	40 - 130	4.065	4.34	20	
Surr: 2,4,6-Tribromophenol	*3.43*	*0.20*	*5*	*0*	*68.6*	*34 - 129*	*3.536*	*3.04*	*20*	
Surr: 2-Fluorobiphenyl	*3.142*	*0.20*	*5*	*0*	*62.8*	*40 - 125*	*3.226*	*2.63*	*20*	
Surr: 2-Fluorophenol	*3.516*	*0.20*	*5*	*0*	*70.3*	*20 - 120*	*3.309*	*6.07*	*20*	
Surr: 4-Terphenyl-d14	*4.434*	*0.20*	*5*	*0*	*88.7*	*40 - 135*	*4.125*	*7.24*	*20*	
Surr: Nitrobenzene-d5	*3.651*	*0.20*	*5*	*0*	*73.0*	*41 - 120*	*3.167*	*14.2*	*20*	
Surr: Phenol-d6	*3.285*	*0.20*	*5*	*0*	*65.7*	*20 - 120*	*3.164*	*3.74*	*20*	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R396955 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-211203** Units: **ug/L** Analysis Date: **03-Dec-2021 09:55**
Client ID: Run ID: **VOA4_396955** SeqNo: **6405408** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	1.0								
1,1,2,2-Tetrachloroethane	U	1.0								
1,1,2-Trichlor-1,2,2-trifluoroethane	U	1.0								
1,1,2-Trichloroethane	U	1.0								
1,1-Dichloroethane	U	1.0								
1,1-Dichloroethene	U	1.0								
1,2,3-Trichlorobenzene	U	1.0								
1,2,4-Trichlorobenzene	U	1.0								
1,2-Dibromo-3-chloropropane	U	1.0								
1,2-Dibromoethane	U	1.0								
1,2-Dichlorobenzene	U	1.0								
1,2-Dichloroethane	U	1.0								
1,2-Dichloropropane	U	1.0								
1,3-Dichlorobenzene	U	1.0								
1,4-Dichlorobenzene	U	1.0								
2-Butanone	U	2.0								
2-Hexanone	U	2.0								
4-Methyl-2-pentanone	U	2.0								
Acetone	U	2.0								
Benzene	U	1.0								
Bromochloromethane	U	1.0								
Bromodichloromethane	U	1.0								
Bromoform	U	1.0								
Bromomethane	U	1.0								
Carbon disulfide	U	2.0								
Carbon tetrachloride	U	1.0								
Chlorobenzene	U	1.0								
Chloroethane	U	1.0								
Chloroform	U	1.0								
Chloromethane	U	1.0								
cis-1,2-Dichloroethene	U	1.0								
cis-1,3-Dichloropropene	U	1.0								
Cyclohexane	U	1.0								
Dibromochloromethane	U	1.0								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R396955 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-211203** Units: **ug/L** Analysis Date: **03-Dec-2021 09:55**
Client ID: Run ID: **VOA4_396955** SeqNo: **6405408** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	U	1.0								
Ethylbenzene	U	1.0								
Isopropylbenzene	U	1.0								
m,p-Xylene	U	2.0								
Methyl acetate	U	1.0								
Methyl tert-butyl ether	U	1.0								
Methylcyclohexane	U	1.0								
Methylene chloride	U	2.0								
o-Xylene	U	1.0								
Styrene	U	1.0								
Tetrachloroethene	U	1.0								
Toluene	U	1.0								
trans-1,2-Dichloroethene	U	1.0								
trans-1,3-Dichloropropene	U	1.0								
Trichloroethene	U	1.0								
Trichlorofluoromethane	U	1.0								
Vinyl chloride	U	1.0								
Xylenes, Total	U	1.0								
Surr: 1,2-Dichloroethane-d4	*50.17*	*1.0*	*50*	*0*	*100*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*45.59*	*1.0*	*50*	*0*	*91.2*	*82 - 115*				
Surr: Dibromofluoromethane	*49.26*	*1.0*	*50*	*0*	*98.5*	*73 - 126*				
Surr: Toluene-d8	*50.01*	*1.0*	*50*	*0*	*100*	*81 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R396955 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-211203** Units: **ug/L** Analysis Date: **03-Dec-2021 14:46**
Client ID: Run ID: **VOA4_396955** SeqNo: **6405421** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	19.15	1.0	20	0	95.7	70 - 130				
1,1,2,2-Tetrachloroethane	18.81	1.0	20	0	94.0	70 - 120				
1,1,2-Trichlor-1,2,2-trifluoroethane	19.77	1.0	20	0	98.8	70 - 130				
1,1,2-Trichloroethane	17.31	1.0	20	0	86.6	77 - 113				
1,1-Dichloroethane	18.77	1.0	20	0	93.9	71 - 122				
1,1-Dichloroethene	18.26	1.0	20	0	91.3	70 - 130				
1,2,3-Trichlorobenzene	17.73	1.0	20	0	88.6	70 - 130				
1,2,4-Trichlorobenzene	17.58	1.0	20	0	87.9	77 - 126				
1,2-Dibromo-3-chloropropane	14.11	1.0	20	0	70.6	70 - 130				
1,2-Dibromoethane	18.9	1.0	20	0	94.5	76 - 123				
1,2-Dichlorobenzene	19.02	1.0	20	0	95.1	77 - 113				
1,2-Dichloroethane	19.19	1.0	20	0	95.9	70 - 124				
1,2-Dichloropropane	19.34	1.0	20	0	96.7	72 - 119				
1,3-Dichlorobenzene	19.32	1.0	20	0	96.6	78 - 118				
1,4-Dichlorobenzene	20.06	1.0	20	0	100	79 - 113				
2-Butanone	39.38	2.0	40	0	98.4	70 - 130				
2-Hexanone	34.06	2.0	40	0	85.1	70 - 130				
4-Methyl-2-pentanone	39.29	2.0	40	0	98.2	70 - 130				
Acetone	37.51	2.0	40	0	93.8	70 - 130				
Benzene	17.84	1.0	20	0	89.2	74 - 120				
Bromochloromethane	17.91	1.0	20	0	89.6	76 - 124				
Bromodichloromethane	18.87	1.0	20	0	94.3	74 - 122				
Bromoform	18.55	1.0	20	0	92.7	73 - 128				
Bromomethane	18.1	1.0	20	0	90.5	70 - 130				
Carbon disulfide	38.52	2.0	40	0	96.3	70 - 130				
Carbon tetrachloride	16.88	1.0	20	0	84.4	71 - 125				
Chlorobenzene	18.91	1.0	20	0	94.6	76 - 113				
Chloroethane	20.08	1.0	20	0	100	70 - 130				
Chloroform	18.2	1.0	20	0	91.0	71 - 121				
Chloromethane	18.12	1.0	20	0	90.6	70 - 129				
cis-1,2-Dichloroethene	18.92	1.0	20	0	94.6	75 - 122				
cis-1,3-Dichloropropene	19.48	1.0	20	0	97.4	73 - 127				
Cyclohexane	19.16	1.0	20	0	95.8	70 - 130				
Dibromochloromethane	18.72	1.0	20	0	93.6	77 - 122				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R396955 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-211203** Units: **ug/L** Analysis Date: **03-Dec-2021 14:46**
Client ID: Run ID: **VOA4_396955** SeqNo: **6405421** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	17.43	1.0	20	0	87.2	70 - 130				
Ethylbenzene	19.66	1.0	20	0	98.3	77 - 117				
Isopropylbenzene	18.7	1.0	20	0	93.5	73 - 127				
m,p-Xylene	35.22	2.0	40	0	88.0	77 - 122				
Methyl acetate	19.28	1.0	20	0	96.4	76 - 122				
Methyl tert-butyl ether	21.6	1.0	20	0	108	70 - 130				
Methylcyclohexane	18.12	1.0	20	0	90.6	61 - 157				
Methylene chloride	21.58	2.0	20	0	108	70 - 127				
o-Xylene	17.3	1.0	20	0	86.5	75 - 119				
Styrene	18.7	1.0	20	0	93.5	72 - 126				
Tetrachloroethene	18.45	1.0	20	0	92.3	76 - 119				
Toluene	17.72	1.0	20	0	88.6	77 - 118				
trans-1,2-Dichloroethene	19.46	1.0	20	0	97.3	72 - 127				
trans-1,3-Dichloropropene	16.73	1.0	20	0	83.7	77 - 119				
Trichloroethene	17.58	1.0	20	0	87.9	77 - 121				
Trichlorofluoromethane	18.96	1.0	20	0	94.8	70 - 130				
Vinyl chloride	19.81	1.0	20	0	99.1	70 - 130				
Xylenes, Total	52.52	1.0	60	0	87.5	75 - 122				
Surr: 1,2-Dichloroethane-d4	*49.24*	*1.0*	*50*	*0*	*98.5*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*48.82*	*1.0*	*50*	*0*	*97.6*	*82 - 115*				
Surr: Dibromofluoromethane	*48.24*	*1.0*	*50*	*0*	*96.5*	*73 - 126*				
Surr: Toluene-d8	*50.11*	*1.0*	*50*	*0*	*100*	*81 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R396955 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21111523-12MS** Units: **ug/L** Analysis Date: **03-Dec-2021 14:02**
Client ID: Run ID: **VOA4_396955** SeqNo: **6405419** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	18.56	1.0	20	0	92.8	70 - 130				
1,1,2,2-Tetrachloroethane	17.76	1.0	20	0	88.8	70 - 123				
1,1,2-Trichlor-1,2,2-trifluoroethane	19.77	1.0	20	0	98.8	70 - 130				
1,1,2-Trichloroethane	16.59	1.0	20	0	83.0	70 - 117				
1,1-Dichloroethane	18.38	1.0	20	0	91.9	70 - 127				
1,1-Dichloroethene	17.9	1.0	20	0	89.5	70 - 130				
1,2,3-Trichlorobenzene	17.18	1.0	20	0	85.9	70 - 130				
1,2,4-Trichlorobenzene	16.35	1.0	20	0	81.8	70 - 125				
1,2-Dibromo-3-chloropropane	13.24	1.0	20	0	66.2	70 - 130				S
1,2-Dibromoethane	17.89	1.0	20	0	89.4	70 - 124				
1,2-Dichlorobenzene	18.9	1.0	20	0	94.5	70 - 115				
1,2-Dichloroethane	17.75	1.0	20	0	88.8	70 - 127				
1,2-Dichloropropane	18.9	1.0	20	0	94.5	70 - 122				
1,3-Dichlorobenzene	18.73	1.0	20	0	93.6	70 - 119				
1,4-Dichlorobenzene	18.12	1.0	20	0	90.6	70 - 114				
2-Butanone	33.01	2.0	40	0	82.5	70 - 130				
2-Hexanone	31	2.0	40	0	77.5	70 - 130				
4-Methyl-2-pentanone	35	2.0	40	0	87.5	70 - 130				
Acetone	34.88	2.0	40	0	87.2	70 - 130				
Benzene	17.78	1.0	20	0	88.9	70 - 127				
Bromochloromethane	17.26	1.0	20	0	86.3	70 - 127				
Bromodichloromethane	17.47	1.0	20	0	87.4	70 - 124				
Bromoform	17.35	1.0	20	0	86.8	70 - 129				
Bromomethane	16.67	1.0	20	0	83.3	70 - 130				
Carbon disulfide	36.9	2.0	40	0	92.3	70 - 130				
Carbon tetrachloride	17.58	1.0	20	0	87.9	70 - 130				
Chlorobenzene	18.87	1.0	20	0	94.3	70 - 114				
Chloroethane	18.56	1.0	20	0	92.8	70 - 130				
Chloroform	16.54	1.0	20	0	82.7	70 - 125				
Chloromethane	15.22	1.0	20	0	76.1	70 - 130				
cis-1,2-Dichloroethene	16.89	1.0	20	0	84.4	70 - 128				
cis-1,3-Dichloropropene	18.28	1.0	20	0	91.4	70 - 125				
Cyclohexane	19.64	1.0	20	0	98.2	70 - 130				
Dibromochloromethane	16.73	1.0	20	0	83.7	70 - 124				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R396955 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21111523-12MS** Units: **ug/L** Analysis Date: **03-Dec-2021 14:02**
Client ID: Run ID: **VOA4_396955** SeqNo: **6405419** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	17.57	1.0	20	0	87.8	70 - 130				
Ethylbenzene	19.13	1.0	20	0	95.6	70 - 124				
Isopropylbenzene	19.07	1.0	20	0	95.4	70 - 130				
m,p-Xylene	36.37	2.0	40	0	90.9	70 - 130				
Methyl acetate	14.65	1.0	20	0	73.2	76 - 122				S
Methyl tert-butyl ether	12.64	1.0	20	0	63.2	70 - 130				S
Methylcyclohexane	19.62	1.0	20	0	98.1	61 - 158				
Methylene chloride	17.78	2.0	20	0	88.9	70 - 128				
o-Xylene	17.94	1.0	20	0	89.7	70 - 124				
Styrene	0.8326	1.0	20	0	4.16	70 - 130				JS
Tetrachloroethene	19.05	1.0	20	0	95.3	70 - 130				
Toluene	17.65	1.0	20	0	88.2	70 - 123				
trans-1,2-Dichloroethene	18.62	1.0	20	0	93.1	70 - 130				
trans-1,3-Dichloropropene	16.44	1.0	20	0	82.2	70 - 121				
Trichloroethene	18.34	1.0	20	0	91.7	70 - 129				
Trichlorofluoromethane	20.27	1.0	20	0	101	70 - 130				
Vinyl chloride	17.87	1.0	20	0	89.4	70 - 130				
Xylenes, Total	54.31	1.0	60	0	90.5	70 - 130				
Surr: 1,2-Dichloroethane-d4	*48.37*	*1.0*	*50*	*0*	*96.7*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*49.96*	*1.0*	*50*	*0*	*99.9*	*81 - 113*				
Surr: Dibromofluoromethane	*48.93*	*1.0*	*50*	*0*	*97.9*	*77 - 123*				
Surr: Toluene-d8	*49.65*	*1.0*	*50*	*0*	*99.3*	*82 - 127*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R396955 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21111523-12MSD** Units: **ug/L** Analysis Date: **03-Dec-2021 14:24**
Client ID: Run ID: **VOA4_396955** SeqNo: **6405420** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	18.84	1.0	20	0	94.2	70 - 130	18.56	1.47	20	
1,1,2,2-Tetrachloroethane	17.24	1.0	20	0	86.2	70 - 123	17.76	2.96	20	
1,1,2-Trichlor-1,2,2-trifluoroethane	20.36	1.0	20	0	102	70 - 130	19.77	2.95	20	
1,1,2-Trichloroethane	16.61	1.0	20	0	83.1	70 - 117	16.59	0.127	20	
1,1-Dichloroethane	17.64	1.0	20	0	88.2	70 - 127	18.38	4.11	20	
1,1-Dichloroethene	17.83	1.0	20	0	89.1	70 - 130	17.9	0.426	20	
1,2,3-Trichlorobenzene	16.77	1.0	20	0	83.8	70 - 130	17.18	2.43	20	
1,2,4-Trichlorobenzene	16.12	1.0	20	0	80.6	70 - 125	16.35	1.41	20	
1,2-Dibromo-3-chloropropane	12.78	1.0	20	0	63.9	70 - 130	13.24	3.55	20	S
1,2-Dibromoethane	16.9	1.0	20	0	84.5	70 - 124	17.89	5.65	20	
1,2-Dichlorobenzene	18.13	1.0	20	0	90.6	70 - 115	18.9	4.16	20	
1,2-Dichloroethane	17.91	1.0	20	0	89.5	70 - 127	17.75	0.864	20	
1,2-Dichloropropane	18.69	1.0	20	0	93.4	70 - 122	18.9	1.1	20	
1,3-Dichlorobenzene	18.74	1.0	20	0	93.7	70 - 119	18.73	0.0326	20	
1,4-Dichlorobenzene	18.87	1.0	20	0	94.3	70 - 114	18.12	4.06	20	
2-Butanone	30.82	2.0	40	0	77.0	70 - 130	33.01	6.85	20	
2-Hexanone	32.1	2.0	40	0	80.3	70 - 130	31	3.48	20	
4-Methyl-2-pentanone	34.64	2.0	40	0	86.6	70 - 130	35	1.05	20	
Acetone	33.88	2.0	40	0	84.7	70 - 130	34.88	2.92	20	
Benzene	17.94	1.0	20	0	89.7	70 - 127	17.78	0.889	20	
Bromochloromethane	15.38	1.0	20	0	76.9	70 - 127	17.26	11.5	20	
Bromodichloromethane	17.28	1.0	20	0	86.4	70 - 124	17.47	1.12	20	
Bromoform	17.16	1.0	20	0	85.8	70 - 129	17.35	1.11	20	
Bromomethane	16.75	1.0	20	0	83.8	70 - 130	16.67	0.484	20	
Carbon disulfide	38.05	2.0	40	0	95.1	70 - 130	36.9	3.06	20	
Carbon tetrachloride	17.89	1.0	20	0	89.4	70 - 130	17.58	1.71	20	
Chlorobenzene	18.55	1.0	20	0	92.8	70 - 114	18.87	1.68	20	
Chloroethane	20.07	1.0	20	0	100	70 - 130	18.56	7.82	20	
Chloroform	17.27	1.0	20	0	86.3	70 - 125	16.54	4.31	20	
Chloromethane	16.91	1.0	20	0	84.5	70 - 130	15.22	10.5	20	
cis-1,2-Dichloroethene	17.22	1.0	20	0	86.1	70 - 128	16.89	1.95	20	
cis-1,3-Dichloropropene	17.85	1.0	20	0	89.2	70 - 125	18.28	2.37	20	
Cyclohexane	19.57	1.0	20	0	97.8	70 - 130	19.64	0.375	20	
Dibromochloromethane	16.71	1.0	20	0	83.6	70 - 124	16.73	0.123	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R396955 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21111523-12MSD** Units: **ug/L** Analysis Date: **03-Dec-2021 14:24**
Client ID: Run ID: **VOA4_396955** SeqNo: **6405420** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Dichlorodifluoromethane	17.92	1.0	20	0	89.6	70 - 130	17.57	2.01	20	
Ethylbenzene	18.83	1.0	20	0	94.2	70 - 124	19.13	1.55	20	
Isopropylbenzene	18.25	1.0	20	0	91.3	70 - 130	19.07	4.41	20	
m,p-Xylene	35.06	2.0	40	0	87.7	70 - 130	36.37	3.67	20	
Methyl acetate	15.06	1.0	20	0	75.3	76 - 122	14.65	2.76	20	S
Methyl tert-butyl ether	10.94	1.0	20	0	54.7	70 - 130	12.64	14.5	20	S
Methylcyclohexane	19.13	1.0	20	0	95.7	61 - 158	19.62	2.5	20	
Methylene chloride	19.39	2.0	20	0	96.9	70 - 128	17.78	8.63	20	
o-Xylene	17.26	1.0	20	0	86.3	70 - 124	17.94	3.88	20	
Styrene	0.7054	1.0	20	0	3.53	70 - 130	0.8326	0	20	JS
Tetrachloroethene	18.72	1.0	20	0	93.6	70 - 130	19.05	1.74	20	
Toluene	17.41	1.0	20	0	87.1	70 - 123	17.65	1.35	20	
trans-1,2-Dichloroethene	18.94	1.0	20	0	94.7	70 - 130	18.62	1.67	20	
trans-1,3-Dichloropropene	15.83	1.0	20	0	79.2	70 - 121	16.44	3.72	20	
Trichloroethene	17.75	1.0	20	0	88.8	70 - 129	18.34	3.23	20	
Trichlorofluoromethane	20.61	1.0	20	0	103	70 - 130	20.27	1.65	20	
Vinyl chloride	18.79	1.0	20	0	94.0	70 - 130	17.87	5.01	20	
Xylenes, Total	52.32	1.0	60	0	87.2	70 - 130	54.31	3.74	20	
Surr: 1,2-Dichloroethane-d4	*48.38*	*1.0*	*50*	*0*	*96.8*	*70 - 126*	*48.37*	*0.0198*	*20*	
Surr: 4-Bromofluorobenzene	*47.97*	*1.0*	*50*	*0*	*95.9*	*81 - 113*	*49.96*	*4.06*	*20*	
Surr: Dibromofluoromethane	*48.14*	*1.0*	*50*	*0*	*96.3*	*77 - 123*	*48.93*	*1.63*	*20*	
Surr: Toluene-d8	*49.99*	*1.0*	*50*	*0*	*100.0*	*82 - 127*	*49.65*	*0.677*	*20*	

The following samples were analyzed in this batch: HS21120083-01

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: 173609 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173609** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422754** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-173609** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422753** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.217	0.0500	0.25	0	86.8	80 - 120				

MS Sample ID: **HS21120297-02MS** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422751** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.254	0.0500	0.25	0	102	80 - 120				

MSD Sample ID: **HS21120297-02MSD** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422752** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.252	0.0500	0.25	0	101	80 - 120	0.254	0.791	20	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R396853 (0) **Instrument: WetChem_HS** **Method: PH BY SM4500H+ B-2011**

DUP Sample ID: **HS21120123-01DUP** Units: **pH Units** Analysis Date: **02-Dec-2021 19:10**
Client ID: Run ID: **WetChem_HS_396853** SeqNo: **6403058** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	8.04	0.100					8.02	0.249	10	
Temp Deg C @pH	22	0					22.7	3.13	10	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R397104 (0) **Instrument: WetChem_HS** **Method: SPECIFIC CONDUCTANCE BY E120.1, 1982**

MBLK Sample ID: **MBLK-R397104** Units: **umhos/cm** Analysis Date: **07-Dec-2021 12:13**
Client ID: Run ID: **WetChem_HS_397104** SeqNo: **6408962** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	U	5.00								

LCS Sample ID: **LCS-R397104** Units: **umhos/cm** Analysis Date: **07-Dec-2021 12:13**
Client ID: Run ID: **WetChem_HS_397104** SeqNo: **6408961** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	1458	5.00	1413	0	103	80 - 120				

DUP Sample ID: **HS21120083-01DUP** Units: **umhos/cm** Analysis Date: **07-Dec-2021 12:13**
Client ID: **GW-P02** Run ID: **WetChem_HS_397104** SeqNo: **6408963** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	1669	5.00					1678	0.538	20	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R397214 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **08-Dec-2021 09:44**
Client ID: Run ID: **ICS-Integrion_397214** SeqNo: **6411629** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	U	0.100								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **08-Dec-2021 09:51**
Client ID: Run ID: **ICS-Integrion_397214** SeqNo: **6411630** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	4.121	0.100	4	0	103	80 - 120				

MS Sample ID: **HS21120072-01MS** Units: **mg/L** Analysis Date: **08-Dec-2021 10:35**
Client ID: Run ID: **ICS-Integrion_397214** SeqNo: **6411633** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	1.953	0.100	2	0	97.6	80 - 120				

MSD Sample ID: **HS21120072-01MSD** Units: **mg/L** Analysis Date: **08-Dec-2021 10:42**
Client ID: Run ID: **ICS-Integrion_397214** SeqNo: **6411634** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	1.897	0.100	2	0	94.8	80 - 120	1.953	2.9	20	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R397215 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY IC BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **08-Dec-2021 09:59**
Client ID: Run ID: **ICS-Integrion_397215** SeqNo: **6411641** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **08-Dec-2021 10:06**
Client ID: Run ID: **ICS-Integrion_397215** SeqNo: **6411642** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	8.021	0.200	8	0	100	90 - 110				

MS Sample ID: **HS21111356-01MS** Units: **mg/L** Analysis Date: **08-Dec-2021 11:27**
Client ID: Run ID: **ICS-Integrion_397215** SeqNo: **6411646** PrepDate: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	80.47	4.00	80	1.758	98.4	80 - 120				

MSD Sample ID: **HS21111356-01MSD** Units: **mg/L** Analysis Date: **08-Dec-2021 11:35**
Client ID: Run ID: **ICS-Integrion_397215** SeqNo: **6411647** PrepDate: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	75.7	4.00	80	1.758	92.4	80 - 120	80.47	6.1	20	

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21120083

QC BATCH REPORT

Batch ID: R397633 (0) **Instrument: TOC_04** **Method: TOTAL ORGANIC CARBON BY SW9060A**

MBLK Sample ID: **MBLK-12142021** Units: **mg/L** Analysis Date: **15-Dec-2021 01:13**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421526** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	U	1.00								

LCS Sample ID: **LCS-12142021** Units: **mg/L** Analysis Date: **15-Dec-2021 01:29**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421527** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.8	1.00	10	0	108	85 - 115				

LCSD Sample ID: **LCSD-12142021** Units: **mg/L** Analysis Date: **15-Dec-2021 01:45**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421528** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.82	1.00	10	0	108	85 - 115	10.8	0.185	20	

MS Sample ID: **HS21120083-01MS** Units: **mg/L** Analysis Date: **15-Dec-2021 02:54**
Client ID: **GW-P02** Run ID: **TOC_04_397633** SeqNo: **6421532** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	30.9	1.00	10	21.11	97.9	80 - 120				

The following samples were analyzed in this batch: HS21120083-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: **HS21120083**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
Date	
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Dept of Defense	PJLA L20-507-R2	22-Dec-2021
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21120083

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS21120083-01	GW-P02	Login	12/2/2021 11:00:42 AM	NDR	WET140
HS21120083-01	GW-P02	Login	12/2/2021 11:00:42 AM	NDR	MET095
HS21120083-01	GW-P02	Login	12/2/2021 11:00:42 AM	NDR	EXT106
HS21120083-01	GW-P02	Login	12/2/2021 11:00:42 AM	NDR	EXT106
HS21120083-01	GW-P02	Login	12/2/2021 11:00:42 AM	NDR	EXT106
HS21120083-01	GW-P02	Login	12/2/2021 11:00:42 AM	NDR	EXT106
HS21120083-01	GW-P02	Login	12/2/2021 11:00:42 AM	NDR	WET140
HS21120083-01	GW-P02	Login	12/2/2021 11:00:42 AM	NDR	WET140
HS21120083-01	GW-P02	Login	12/2/2021 11:00:42 AM	NDR	VOA197
HS21120083-01	GW-P02	Login	12/2/2021 11:00:42 AM	NDR	WET182

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Sample Receipt Checklist

Work Order ID: HS21120083 **Date/Time Received:** 01-Dec-2021 17:15

Client Name: ERM Annapolis **Received by:** Pablo Marinez

Completed By: /S/ Nilesh D. Ranchod (eSignature) 02-Dec-2021 11:05 (Date/Time) **Reviewed by:** /S/ Corey Grandits (eSignature)

Matrices: **GW** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	20.2C U/C	IR31	
Cooler(s)/Kit(s):	47955		
Date/Time sample(s) sent to storage:	12/02/2021 12:00		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: Analyze out of hold.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

HS21120083

ERM

Gas to Energy Environmental Impact Assessment S

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	Gas to Energy Environmental Impact Assesment Study
Work Order		Project Number	0590231
Company Name	ERM	Bill To Company	ERM
Send Report To	Herbert Pirela	Invoice Attn.	AP
Address	190 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401
Phone	(410) 972-4124	Phone	(410) 972-4124
Fax		Fax	
e-Mail Address	herbet.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

Parameter/Method Request for Analysis

A	8081_Water_Low (8081 Pesticides)
B	8151_Water (8151 Herbicides)
C	8260_LL_Water (8260 TCL VOCs)
D	8270_LOW_Water (8270 PAHs)
E	9056_Water-NO2-NO3 Combined & NO3 *NEAT*
F	COND_Water (Conductivity) & pH
G	ICP_TWater (6020/7470 Metals 16)
H	P_TWater (Phosphorous)
I	PCB_Water_Low (8082 PCBs)
J	TOC_Water 9060 (Total Organic Carbon)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	GW-P02	20/11/2021	10:58 AM	GW	1,2,3,8	14	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Delshah Hamid Delshah Hamid

Shipment Method:

Required Turnaround Time: ☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other _____

Results Due Date:

Relinquished by: Lalita Gopaul	Date: 22/11/2021	Time: 16:04	Received by:	Notes:	
Relinquished by: DHL	Date: 12-1-21	Time: 17:15	Received by (Laboratory): Patti	Cooler Temp. 20.2C	QC Package: (Check Box Below)
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):		x Level II: Standard QC ☐ TRRP-Checklist ☐ Level III: Std QC + Raw Data ☐ TRRP Level IV ☐ Level IV: SW846 CLP-Like ☐ Other: _____

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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47955 IR31 CF

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47955

EXPRESS WORLDWIDE WPX

77099 HOUSTON, UNITED STATES OF AMERICA

Origin: GEO

US – IAH – HOU

Date: 2021 – 11 – 23

Piece(s)/Weight: 199.0 LB

Piece: 2/2

Content Description

47955

WAYBILL 36 3591 6060

(2L)US77099+46000001

(9) JD014600 0092 0367 5865

LB1035
(10/07) OMN

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ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

47955

ODY SEAL

Seal Broken By:
Date: 12/01/21

47955

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

47955

CUSTODY SEAL

Seal Broken By:
Date: 12/01/21

LB1026 (6/11) CAN

EXPRESS WORLDWIDE WPX DHL

From: GLOBAL LOGISTICS SUPPORT SERVICE
CHRISTI ROONEY
[redacted]
ARLINGTON
SERGEANT A SECRETARY
Origin: GEO

To: ALS ABORATORY
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210
47955
77099 HOUSTON Texas
United States of America

US-IAH-HOU

C [redacted]

Ref: 954831200

51.0/99.0 lbs 2 / 2

25 X 15 X 5

WAYBILL 36 3591 8050

(2L)US77099+46000001

(J) JD01 4600 0092 0367 5856

RIGHT SOLUTIONS | RIGHT PARTNER

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

January 05, 2022

Herbert Pirela
ERM
180 Admiral Cochrance Dr
Suite 400
Annapolis, MD 21401

Work Order: **HS21120616**

Laboratory Results for: **Gas to Energy Environmental Impact**

Dear Herbert Pirela,

ALS Environmental received 1 sample(s) on Dec 10, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM
Project: Gas to Energy Environmental Impact
Work Order: HS21120616

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21120616-01	G-P1	Groundwater		02-Dec-2021 10:56	10-Dec-2021 12:30	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact
Work Order: HS21120616

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

ECD Organics by Method SW8082

Batch ID: 173532

Sample ID: MBLK-173532

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

ECD Organics by Method SW8151

Batch ID: 173439

Sample ID: G-P1 (HS21120616-01)

• Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: MBLK-173439

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

ECD Organics by Method SW8081

Batch ID: 173438

Sample ID: G-P1 (HS21120616-01)

• Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Sample ID: LCSD2-173438

• LCSD recovered above the control limit 4,4´-DDE.

Sample ID: MBLK-173438

• Insufficient sample received to perform MS/MSD. LCS/LCSD provided as batch quality control.

GCMS Semivolatiles by Method SW8270

Batch ID: 173442

Sample ID: G-P1 (HS21120616-01)

• Sample extracted or prepared outside of hold time.

Sample ID: HS21120529-18MS/HS21120529-

• MS and MSD are for an unrelated sample

GCMS Volatiles by Method SW8260

Batch ID: R397814

Sample ID: HS21120514-01MS

• MS and MSD are for an unrelated sample

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact
Work Order: HS21120616

Metals by Method SW6020A

Batch ID: 173917

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 173629

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E120.1

Batch ID: R397643

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9060

Batch ID: R397633

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R397515

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9056

Batch ID: R397472

Sample ID: G-P1 (HS21120616-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Batch ID: R398121

Sample ID: G-P1 (HS21120616-01MS)

- The recovery of the Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) associated with this analyte was outside of the established control limits. However, the LCS was within control limits. The recovery of the MS/MSD may be due to sample matrix interference. (Nitrogen, Nitrate-Nitrite)

WetChemistry by Method E365.3

Batch ID: 173837

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
Sample ID: G-P1
Collection Date: 02-Dec-2021 10:56

ANALYTICAL REPORT
WorkOrder:HS21120616
Lab ID:HS21120616-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: AKP
1,1,1-Trichloroethane	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
1,1,2,2-Tetrachloroethane	U		0.50	1.0	ug/L	1	16-Dec-2021 16:38
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.50	1.0	ug/L	1	16-Dec-2021 16:38
1,1,2-Trichloroethane	U		0.30	1.0	ug/L	1	16-Dec-2021 16:38
1,1-Dichloroethane	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
1,1-Dichloroethene	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
1,2,3-Trichlorobenzene	U		0.40	1.0	ug/L	1	16-Dec-2021 16:38
1,2,4-Trichlorobenzene	U		0.50	1.0	ug/L	1	16-Dec-2021 16:38
1,2-Dibromo-3-chloropropane	U		1.0	1.0	ug/L	1	16-Dec-2021 16:38
1,2-Dibromoethane	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
1,2-Dichlorobenzene	U		0.50	1.0	ug/L	1	16-Dec-2021 16:38
1,2-Dichloroethane	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
1,2-Dichloropropane	U		0.50	1.0	ug/L	1	16-Dec-2021 16:38
1,3-Dichlorobenzene	U		0.40	1.0	ug/L	1	16-Dec-2021 16:38
1,4-Dichlorobenzene	U		0.40	1.0	ug/L	1	16-Dec-2021 16:38
2-Butanone	U		0.50	2.0	ug/L	1	16-Dec-2021 16:38
2-Hexanone	U		1.0	2.0	ug/L	1	16-Dec-2021 16:38
4-Methyl-2-pentanone	U		0.70	2.0	ug/L	1	16-Dec-2021 16:38
Acetone	**5.6**		**2.0**	**2.0**	**ug/L**	1	16-Dec-2021 16:38
Benzene	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
Bromochloromethane	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
Bromodichloromethane	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
Bromoform	U		0.40	1.0	ug/L	1	16-Dec-2021 16:38
Bromomethane	U		0.40	1.0	ug/L	1	16-Dec-2021 16:38
Carbon disulfide	U		0.60	2.0	ug/L	1	16-Dec-2021 16:38
Carbon tetrachloride	U		0.50	1.0	ug/L	1	16-Dec-2021 16:38
Chlorobenzene	U		0.30	1.0	ug/L	1	16-Dec-2021 16:38
Chloroethane	U		0.30	1.0	ug/L	1	16-Dec-2021 16:38
Chloroform	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
Chloromethane	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
cis-1,2-Dichloroethene	U		0.20	1.0	ug/L	1	16-Dec-2021 16:38
cis-1,3-Dichloropropene	U		0.10	1.0	ug/L	1	16-Dec-2021 16:38
Cyclohexane	U		0.30	1.0	ug/L	1	16-Dec-2021 16:38
Dibromochloromethane	U		0.30	1.0	ug/L	1	16-Dec-2021 16:38
Dichlorodifluoromethane	U		0.30	1.0	ug/L	1	16-Dec-2021 16:38
Ethylbenzene	U		0.30	1.0	ug/L	1	16-Dec-2021 16:38
Isopropylbenzene	U		0.30	1.0	ug/L	1	16-Dec-2021 16:38
m,p-Xylene	U		0.50	2.0	ug/L	1	16-Dec-2021 16:38
Methyl acetate	U		1.0	1.0	ug/L	1	16-Dec-2021 16:38

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
Sample ID: G-P1
Collection Date: 02-Dec-2021 10:56

ANALYTICAL REPORT
WorkOrder:HS21120616
Lab ID:HS21120616-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: AKP
Methyl tert-butyl ether		U	0.20	1.0	ug/L	1	16-Dec-2021 16:38
Methylcyclohexane		U	0.30	1.0	ug/L	1	16-Dec-2021 16:38
Methylene chloride		U	1.0	2.0	ug/L	1	16-Dec-2021 16:38
o-Xylene		U	0.30	1.0	ug/L	1	16-Dec-2021 16:38
Styrene		U	0.30	1.0	ug/L	1	16-Dec-2021 16:38
Tetrachloroethene		U	0.30	1.0	ug/L	1	16-Dec-2021 16:38
Toluene		U	0.20	1.0	ug/L	1	16-Dec-2021 16:38
trans-1,2-Dichloroethene		U	0.20	1.0	ug/L	1	16-Dec-2021 16:38
trans-1,3-Dichloropropene		U	0.20	1.0	ug/L	1	16-Dec-2021 16:38
Trichloroethene		U	0.20	1.0	ug/L	1	16-Dec-2021 16:38
Trichlorofluoromethane		U	0.30	1.0	ug/L	1	16-Dec-2021 16:38
Vinyl chloride		U	0.20	1.0	ug/L	1	16-Dec-2021 16:38
Xylenes, Total		U	0.30	1.0	ug/L	1	16-Dec-2021 16:38
Surr: 1,2-Dichloroethane-d4	*98.4*			*70-126*	*%REC*	*1*	*16-Dec-2021 16:38*
Surr: 4-Bromofluorobenzene	*97.4*			*81-113*	*%REC*	*1*	*16-Dec-2021 16:38*
Surr: Dibromofluoromethane	*92.2*			*77-123*	*%REC*	*1*	*16-Dec-2021 16:38*
Surr: Toluene-d8	*100*			*82-127*	*%REC*	*1*	*16-Dec-2021 16:38*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
Sample ID: G-P1
Collection Date: 02-Dec-2021 10:56

ANALYTICAL REPORT
WorkOrder:HS21120616
Lab ID:HS21120616-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D		**Method:SW8270**				Prep:SW3510 / 11-Dec-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	03-Jan-2022 22:31
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	03-Jan-2022 22:31
Acenaphthene	U	H		0.027	0.10	ug/L	1	03-Jan-2022 22:31
Acenaphthylene	U	H		0.015	0.10	ug/L	1	03-Jan-2022 22:31
Anthracene	U	H		0.014	0.10	ug/L	1	03-Jan-2022 22:31
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	03-Jan-2022 22:31
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	03-Jan-2022 22:31
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	03-Jan-2022 22:31
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	03-Jan-2022 22:31
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	03-Jan-2022 22:31
Chrysene	U	H		0.021	0.10	ug/L	1	03-Jan-2022 22:31
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	03-Jan-2022 22:31
Fluoranthene	U	H		0.010	0.10	ug/L	1	03-Jan-2022 22:31
Fluorene	U	H		0.030	0.10	ug/L	1	03-Jan-2022 22:31
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	03-Jan-2022 22:31
Isophorone	U	H		0.025	0.20	ug/L	1	03-Jan-2022 22:31
Naphthalene	U	H		0.020	0.10	ug/L	1	03-Jan-2022 22:31
Phenanthrene	U	H		0.021	0.10	ug/L	1	03-Jan-2022 22:31
Pyrene	U	H		0.019	0.10	ug/L	1	03-Jan-2022 22:31
Surr: 2,4,6-Tribromophenol	*104*				*34-129*	*%REC*	*1*	*03-Jan-2022 22:31*
Surr: 2-Fluorobiphenyl	*96.5*				*40-125*	*%REC*	*1*	*03-Jan-2022 22:31*
Surr: 2-Fluorophenol	*113*				*20-120*	*%REC*	*1*	*03-Jan-2022 22:31*
Surr: 4-Terphenyl-d14	*116*				*40-135*	*%REC*	*1*	*03-Jan-2022 22:31*
Surr: Nitrobenzene-d5	*104*				*41-120*	*%REC*	*1*	*03-Jan-2022 22:31*
Surr: Phenol-d6	*54.1*				*20-120*	*%REC*	*1*	*03-Jan-2022 22:31*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
Sample ID: G-P1
Collection Date: 02-Dec-2021 10:56

ANALYTICAL REPORT
WorkOrder:HS21120616
Lab ID:HS21120616-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3510 / 10-Dec-2021		Analyst: JBA
4,4´-DDD	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
4,4´-DDE	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
4,4´-DDT	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
Aldrin	U	H	0.0012	0.0012	ug/L	1	15-Dec-2021 12:42
alpha-BHC	U	H	0.0012	0.0012	ug/L	1	15-Dec-2021 12:42
alpha-Chlordane	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
beta-BHC	U	H	0.0012	0.0012	ug/L	1	15-Dec-2021 12:42
Chlordane	U	H	0.025	0.025	ug/L	1	15-Dec-2021 12:42
delta-BHC	U	H	0.0012	0.0012	ug/L	1	15-Dec-2021 12:42
Dieldrin	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
Endosulfan I	U	H	0.0012	0.0012	ug/L	1	15-Dec-2021 12:42
Endosulfan II	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
Endosulfan sulfate	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
Endrin	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
Endrin aldehyde	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
Endrin ketone	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
gamma-BHC	U	H	0.0012	0.0012	ug/L	1	15-Dec-2021 12:42
gamma-Chlordane	U	H	0.0025	0.0025	ug/L	1	15-Dec-2021 12:42
Heptachlor	U	H	0.0012	0.0012	ug/L	1	15-Dec-2021 12:42
Heptachlor epoxide	U	H	0.0012	0.0012	ug/L	1	15-Dec-2021 12:42
Methoxychlor	U	H	0.012	0.012	ug/L	1	15-Dec-2021 12:42
Toxaphene	U	H	0.025	0.025	ug/L	1	15-Dec-2021 12:42
Surr: Decachlorobiphenyl	*128*			*55-145*	*%REC*	*1*	*15-Dec-2021 12:42*
Surr: Tetrachloro-m-xylene	*109*			*52-142*	*%REC*	*1*	*15-Dec-2021 12:42*
PCBS BY SW8082A	**Method:SW8082**				Prep:SW3510C/3665A / 14-Dec-2021		Analyst: JBA
Aroclor 1016	U		0.0125	0.0125	ug/L	1	14-Dec-2021 20:05
Aroclor 1221	U		0.0125	0.0125	ug/L	1	14-Dec-2021 20:05
Aroclor 1232	U		0.0125	0.0125	ug/L	1	14-Dec-2021 20:05
Aroclor 1242	U		0.0125	0.0125	ug/L	1	14-Dec-2021 20:05
Aroclor 1248	U		0.0125	0.0125	ug/L	1	14-Dec-2021 20:05
Aroclor 1254	U		0.0125	0.0125	ug/L	1	14-Dec-2021 20:05
Aroclor 1260	U		0.0125	0.0125	ug/L	1	14-Dec-2021 20:05
PCBs (Total)	U		0.0125	0.0125	ug/L	1	14-Dec-2021 20:05
Surr: Decachlorobiphenyl	*101*			*54-140*	*%REC*	*1*	*14-Dec-2021 20:05*
Surr: Tetrachloro-m-xylene	*81.3*			*53-137*	*%REC*	*1*	*14-Dec-2021 20:05*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
Sample ID: G-P1
Collection Date: 02-Dec-2021 10:56

ANALYTICAL REPORT
WorkOrder:HS21120616
Lab ID:HS21120616-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
CHLORINATED HERBICIDES BY SW8151A		**Method:SW8151**			Prep:SW8151 / 11-Dec-2021		Analyst: JBA
2,4,5-T	U	H	0.0500	0.200	ug/L	1	21-Dec-2021 22:40
2,4,5-TP (Silvex)	U	H	0.0500	0.200	ug/L	1	21-Dec-2021 22:40
2,4-D	U	H	0.0600	0.200	ug/L	1	21-Dec-2021 22:40
2,4-DB	U	H	0.0800	0.400	ug/L	1	21-Dec-2021 22:40
Dalapon	**0.118**	JH	**0.0700**	**0.200**	**ug/L**	1	21-Dec-2021 22:40
Dicamba	U	H	0.0500	0.200	ug/L	1	21-Dec-2021 22:40
Dichlorprop	U	H	0.0800	0.400	ug/L	1	21-Dec-2021 22:40
Dinoseb	U	H	0.0500	0.300	ug/L	1	21-Dec-2021 22:40
MCPA	U	H	8.10	30.0	ug/L	1	21-Dec-2021 22:40
MCPP	U	H	8.10	30.0	ug/L	1	21-Dec-2021 22:40
Surr: DCAA	*83.6*			*50-130*	*%REC*	*1*	*21-Dec-2021 22:40*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 23-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	28-Dec-2021 13:34
Arsenic	**0.0724**		**0.000400**	**0.00200**	**mg/L**	1	28-Dec-2021 13:34
Beryllium	**0.0255**		**0.000200**	**0.00200**	**mg/L**	1	28-Dec-2021 13:34
Cadmium	**0.000628**	J	**0.000200**	**0.00200**	**mg/L**	1	28-Dec-2021 13:34
Chromium	**0.0442**		**0.000400**	**0.00400**	**mg/L**	1	28-Dec-2021 13:34
Copper	**0.0318**		**0.00100**	**0.00200**	**mg/L**	1	28-Dec-2021 13:34
Iron	U		0.0120	0.200	mg/L	1	28-Dec-2021 13:34
Lead	**0.177**		**0.000600**	**0.00200**	**mg/L**	1	28-Dec-2021 13:34
Manganese	**25.0**		**0.0700**	**0.500**	**mg/L**	100	28-Dec-2021 13:36
Nickel	**0.244**		**0.000600**	**0.00200**	**mg/L**	1	28-Dec-2021 13:34
Potassium	**9.38**		**0.0180**	**0.200**	**mg/L**	1	28-Dec-2021 13:34
Selenium	**0.00710**		**0.00110**	**0.00200**	**mg/L**	1	28-Dec-2021 13:34
Silver	U		0.000200	0.00200	mg/L	1	28-Dec-2021 13:34
Thallium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 13:34
Zinc	**1.67**		**0.00200**	**0.00400**	**mg/L**	1	28-Dec-2021 13:34
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 16-Dec-2021		Analyst: MSC
Mercury	**0.0000330**	J	**0.0000300**	**0.000200**	**mg/L**	1	16-Dec-2021 11:34
SPECIFIC CONDUCTANCE BY E120.1, 1982		**Method:E120.1**					Analyst: MZD
Specific Conductance	**2,060**		**5.00**	**5.00**	**umhos/cm**	1	15-Dec-2021 10:43
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 21-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	21-Dec-2021 15:00
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**6.54**	H	**0.100**	**0.100**	**pH Units**	1	13-Dec-2021 16:19
Temp Deg C @pH	**23.6**	H	**0**	**0**	**DEG C**	1	13-Dec-2021 16:19
ANIONS BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate (As N)	**0.0971**	JH	**0.0300**	**0.100**	**mg/L**	1	10-Dec-2021 19:52

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
Sample ID: G-P1
Collection Date: 02-Dec-2021 10:56

ANALYTICAL REPORT
WorkOrder:HS21120616
Lab ID:HS21120616-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
NITRATE/NITRITE BY IC BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate-Nitrite	**0.836**	J	**0.300**	**2.00**	**mg/L**	10	19-Dec-2021 11:24
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**					Analyst: JAC
Organic Carbon, Total	**34.0**		**0.500**	**1.00**	**mg/L**	1	15-Dec-2021 06:24

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

Batch ID: 173438 **Start Date:** 10 Dec 2021 13:16 **End Date:** 10 Dec 2021 15:00
Method: PEST AQ SEP FUN EXTRACT-SW3510C **Prep Code:** 3510_P_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120616-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173439 **Start Date:** 11 Dec 2021 07:00 **End Date:** 11 Dec 2021 15:00
Method: HERBICIDE AQ SEP FUN EXTRACT-SW8151 **Prep Code:** 3510_H

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120616-01	1	1000 (mL)	10 (mL)	0.01	1-liter amber glass, Neat

Batch ID: 173442 **Start Date:** 11 Dec 2021 11:30 **End Date:** 11 Dec 2021 15:00
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120616-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173532 **Start Date:** 14 Dec 2021 11:41 **End Date:** 14 Dec 2021 14:00
Method: PCBS AQ SEP FUN EXTRACT-SW3510C **Prep Code:** 3510_PCB_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120616-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173629 **Start Date:** 16 Dec 2021 07:30 **End Date:** 16 Dec 2021 10:30
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120616-01		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173837 **Start Date:** 21 Dec 2021 11:00 **End Date:** 21 Dec 2021 13:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120616-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

Batch ID: 173917 **Start Date:** 23 Dec 2021 10:00 **End Date:** 23 Dec 2021 14:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120616-01		10 (mL)	10 (mL)	1	120 plastic HNO3

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173438 (0)	**Test Name :** ORGANOCHLORINE PESTICIDES BY SW8081B				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56		10 Dec 2021 13:16	15 Dec 2021 12:42	1
Batch ID: 173439 (0)	**Test Name :** CHLORINATED HERBICIDES BY SW8151A				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56		11 Dec 2021 13:17	21 Dec 2021 22:40	1
Batch ID: 173442 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56		11 Dec 2021 13:23	03 Jan 2022 22:31	1
Batch ID: 173532 (0)	**Test Name :** PCBS BY SW8082A				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56		14 Dec 2021 11:41	14 Dec 2021 20:05	1
Batch ID: 173629 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56		16 Dec 2021 07:30	16 Dec 2021 11:34	1
Batch ID: 173837 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56		21 Dec 2021 11:00	21 Dec 2021 15:00	1
Batch ID: 173917 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56		23 Dec 2021 14:00	28 Dec 2021 13:36	100
HS21120616-01	G-P1	02 Dec 2021 10:56		23 Dec 2021 14:00	28 Dec 2021 13:34	1
Batch ID: R397472 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56			10 Dec 2021 19:52	1
Batch ID: R397515 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56			13 Dec 2021 16:19	1
Batch ID: R397633 (0)	**Test Name :** TOTAL ORGANIC CARBON BY SW9060A				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56			15 Dec 2021 06:24	1
Batch ID: R397643 (0)	**Test Name :** SPECIFIC CONDUCTANCE BY E120.1, 1982				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56			15 Dec 2021 10:43	1
Batch ID: R397814 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56			16 Dec 2021 16:38	1
Batch ID: R398121 (0)	**Test Name :** NITRATE/NITRITE BY IC BY SW9056A				**Matrix:** Groundwater	
HS21120616-01	G-P1	02 Dec 2021 10:56			19 Dec 2021 11:24	10

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173438 (0) **Instrument: ECD_15** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MBLK Sample ID: **MBLK-173438** Units: **ug/L** Analysis Date: **15-Dec-2021 08:15**
Client ID: Run ID: **ECD_15_397958** SeqNo: **6429741** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	U	0.0025								
4,4´-DDE	U	0.0025								
4,4´-DDT	U	0.0025								
Aldrin	U	0.0012								
alpha-BHC	U	0.0012								
alpha-Chlordane	U	0.0025								
beta-BHC	U	0.0012								
Chlordane	U	0.025								
delta-BHC	U	0.0012								
Dieldrin	U	0.0025								
Endosulfan I	U	0.0012								
Endosulfan II	U	0.0025								
Endosulfan sulfate	U	0.0025								
Endrin	U	0.0025								
Endrin aldehyde	U	0.0025								
Endrin ketone	U	0.0025								
gamma-BHC	U	0.0012								
gamma-Chlordane	U	0.0025								
Heptachlor	U	0.0012								
Heptachlor epoxide	U	0.0012								
Methoxychlor	U	0.012								
Toxaphene	U	0.025								
Surr: Decachlorobiphenyl	*0.01581*	*0*	*0.02*	*0*	*79.0*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.01768*	*0*	*0.02*	*0*	*88.4*	*52 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173438 (0) **Instrument: ECD_15** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS-173438** Units: **ug/L** Analysis Date: **15-Dec-2021 06:21**
Client ID: Run ID: **ECD_15_397958** SeqNo: **6429735** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	0.05526	0.0025	0.05	0	111	53 - 144				
4,4´-DDE	0.05797	0.0025	0.05	0	116	55 - 144				
4,4´-DDT	0.05366	0.0025	0.05	0	107	53 - 149				
Aldrin	0.02559	0.0012	0.025	0	102	47 - 141				
alpha-BHC	0.02644	0.0012	0.025	0	106	51 - 141				
alpha-Chlordane	0.02618	0.0025	0.025	0	105	55 - 141				
beta-BHC	0.02529	0.0012	0.025	0	101	58 - 144				
delta-BHC	0.0271	0.0012	0.025	0	108	48 - 146				
Dieldrin	0.05533	0.0025	0.05	0	111	56 - 144				
Endosulfan I	0.0247	0.0012	0.025	0	98.8	55 - 141				
Endosulfan II	0.0487	0.0025	0.05	0	97.4	57 - 144				
Endosulfan sulfate	0.05462	0.0025	0.05	0	109	58 - 145				
Endrin	0.0523	0.0025	0.05	0	105	60 - 163				
Endrin aldehyde	0.05503	0.0025	0.05	0	110	59 - 158				
Endrin ketone	0.05641	0.0025	0.05	0	113	59 - 154				
gamma-BHC	0.02634	0.0012	0.025	0	105	53 - 142				
gamma-Chlordane	0.02355	0.0025	0.025	0	94.2	55 - 137				
Heptachlor	0.02561	0.0012	0.025	0	102	51 - 144				
Heptachlor epoxide	0.02756	0.0012	0.025	0	110	55 - 142				
Methoxychlor	0.26	0.012	0.25	0	104	50 - 150				
Surr: Decachlorobiphenyl	*0.02068*	*0*	*0.02*	*0*	*103*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.02026*	*0*	*0.02*	*0*	*101*	*52 - 142*				

LCS Sample ID: **LCS1-173438** Units: **ug/L** Analysis Date: **15-Dec-2021 06:59**
Client ID: Run ID: **ECD_15_397958** SeqNo: **6429737** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chlordane	0.2145	0.025	0.25	0	85.8	50 - 150				
Surr: Decachlorobiphenyl	*0.02331*	*0*	*0.02*	*0*	*117*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.01899*	*0*	*0.02*	*0*	*94.9*	*52 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173438 (0) **Instrument: ECD_15** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS2-173438** Units: **ug/L** Analysis Date: **15-Dec-2021 07:37**
Client ID: Run ID: **ECD_15_397958** SeqNo: **6429739** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Toxaphene	0.1606	0.025	0.25	0	64.2	50 - 150				
Surr: Decachlorobiphenyl	*0.02374*	*0*	*0.02*	*0*	*119*	*55 - 145*				
Surr: Tetrachloro-m-xylene	*0.02387*	*0*	*0.02*	*0*	*119*	*52 - 142*				

LCSD Sample ID: **LCSD-173438** Units: **ug/L** Analysis Date: **15-Dec-2021 06:40**
Client ID: Run ID: **ECD_15_397958** SeqNo: **6429736** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	0.07019	0.0025	0.05	0	140	53 - 144	0.05526	23.8	30	
4,4´-DDE	0.07304	0.0025	0.05	0	146	55 - 144	0.05797	23	30	S
4,4´-DDT	0.0704	0.0025	0.05	0	141	53 - 149	0.05366	27	30	
Aldrin	0.03284	0.0012	0.025	0	131	47 - 141	0.02559	24.8	30	
alpha-BHC	0.03412	0.0012	0.025	0	136	51 - 141	0.02644	25.4	30	
alpha-Chlordane	0.0331	0.0025	0.025	0	132	55 - 141	0.02618	23.3	30	
beta-BHC	0.03223	0.0012	0.025	0	129	58 - 144	0.02529	24.1	30	
delta-BHC	0.03512	0.0012	0.025	0	140	48 - 146	0.0271	25.8	30	
Dieldrin	0.06983	0.0025	0.05	0	140	56 - 144	0.05533	23.2	30	
Endosulfan I	0.03127	0.0012	0.025	0	125	55 - 141	0.0247	23.5	30	
Endosulfan II	0.06319	0.0025	0.05	0	126	57 - 144	0.0487	25.9	30	
Endosulfan sulfate	0.06973	0.0025	0.05	0	139	58 - 145	0.05462	24.3	30	
Endrin	0.0671	0.0025	0.05	0	134	60 - 163	0.0523	24.8	30	
Endrin aldehyde	0.0685	0.0025	0.05	0	137	59 - 158	0.05503	21.8	30	
Endrin ketone	0.0713	0.0025	0.05	0	143	59 - 154	0.05641	23.3	30	
gamma-BHC	0.03411	0.0012	0.025	0	136	53 - 142	0.02634	25.7	30	
gamma-Chlordane	0.02938	0.0025	0.025	0	118	55 - 137	0.02355	22	30	
Heptachlor	0.03332	0.0012	0.025	0	133	51 - 144	0.02561	26.2	30	
Heptachlor epoxide	0.03484	0.0012	0.025	0	139	55 - 142	0.02756	23.3	30	
Methoxychlor	0.331	0.012	0.25	0	132	50 - 150	0.26	24	30	
Surr: Decachlorobiphenyl	*0.02575*	*0*	*0.02*	*0*	*129*	*55 - 145*	*0.02068*	*21.9*	*30*	
Surr: Tetrachloro-m-xylene	*0.0258*	*0*	*0.02*	*0*	*129*	*52 - 142*	*0.02026*	*24*	*30*	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173438 (0) **Instrument: ECD_15** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCSD Sample ID: **LCSD1-173438** Units: **ug/L** Analysis Date: **15-Dec-2021 07:18**
Client ID: Run ID: **ECD_15_397958** SeqNo: **6429738** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chlordane	0.2055	0.025	0.25	0	82.2	50 - 150	0.2145	4.31	30	
Surr: Decachlorobiphenyl	*0.02037*	*0*	*0.02*	*0*	*102*	*55 - 145*	*0.02331*	*13.5*	*30*	
Surr: Tetrachloro-m-xylene	*0.01672*	*0*	*0.02*	*0*	*83.6*	*52 - 142*	*0.01899*	*12.7*	*30*	

LCSD Sample ID: **LCSD2-173438** Units: **ug/L** Analysis Date: **15-Dec-2021 07:56**
Client ID: Run ID: **ECD_15_397958** SeqNo: **6429740** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Toxaphene	0.2016	0.025	0.25	0	80.6	50 - 150	0.1606	22.6	30	
Surr: Decachlorobiphenyl	*0.02042*	*0*	*0.02*	*0*	*102*	*55 - 145*	*0.02374*	*15*	*30*	
Surr: Tetrachloro-m-xylene	*0.01987*	*0*	*0.02*	*0*	*99.4*	*52 - 142*	*0.02387*	*18.3*	*30*	

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173439 (0) **Instrument: ECD_13** **Method: CHLORINATED HERBICIDES BY SW8151A**

MBLK Sample ID: **MBLK-173439** Units: **ug/L** Analysis Date: **21-Dec-2021 23:33**
Client ID: Run ID: **ECD_13_398352** SeqNo: **6439405** PrepDate: **11-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	U	0.200								
2,4,5-TP (Silvex)	U	0.200								
2,4-D	U	0.200								
2,4-DB	U	0.400								
Dalapon	U	0.200								
Dicamba	U	0.200								
Dichlorprop	U	0.400								
Dinoseb	U	0.300								
MCPA	U	30.0								
MCPP	U	30.0								
Surr: DCAA	*4.185*	*0*	*5*	*0*	*83.7*	*50 - 130*				

LCS Sample ID: **LCS-173439** Units: **ug/L** Analysis Date: **21-Dec-2021 22:57**
Client ID: Run ID: **ECD_13_398352** SeqNo: **6439403** PrepDate: **11-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	2.594	0.200	2.5	0	104	44 - 122				
2,4,5-TP (Silvex)	2.553	0.200	2.5	0	102	49 - 126				
2,4-D	2.363	0.200	2.5	0	94.5	39 - 120				
2,4-DB	2.758	0.400	2.5	0	110	44 - 120				
Dalapon	2.595	0.200	2.5	0	104	40 - 120				
Dicamba	2.488	0.200	2.5	0	99.5	60 - 120				
Dichlorprop	2.435	0.400	2.5	0	97.4	68 - 122				
Dinoseb	1.863	0.300	2.5	0	74.5	28 - 115				
MCPA	278.1	30.0	250	0	111	62 - 144				
MCPP	308.7	30.0	250	0	123	60 - 133				
Surr: DCAA	*4.155*	*0*	*5*	*0*	*83.1*	*50 - 130*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173439 (0) **Instrument: ECD_13** **Method: CHLORINATED HERBICIDES BY SW8151A**

LCSD Sample ID: **LCSD-173439** Units: **ug/L** Analysis Date: **21-Dec-2021 23:15**
Client ID: Run ID: **ECD_13_398352** SeqNo: **6439404** PrepDate: **11-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-T	2.679	0.200	2.5	0	107	44 - 122	2.594	3.24	30	
2,4,5-TP (Silvex)	2.604	0.200	2.5	0	104	49 - 126	2.553	1.97	30	
2,4-D	2.452	0.200	2.5	0	98.1	39 - 120	2.363	3.69	30	
2,4-DB	2.842	0.400	2.5	0	114	44 - 120	2.758	2.99	30	
Dalapon	2.665	0.200	2.5	0	107	40 - 120	2.595	2.68	30	
Dicamba	2.547	0.200	2.5	0	102	60 - 120	2.488	2.36	30	
Dichlorprop	2.499	0.400	2.5	0	100.0	68 - 122	2.435	2.59	30	
Dinoseb	1.949	0.300	2.5	0	78.0	28 - 115	1.863	4.51	30	
MCPA	286.8	30.0	250	0	115	62 - 144	278.1	3.08	30	
MCPP	315.9	30.0	250	0	126	60 - 133	308.7	2.32	30	
Surr: DCAA	*4.24*	*0*	*5*	*0*	*84.8*	*50 - 130*	*4.155*	*2.01*	*30*	

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173532 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MBLK Sample ID: **MBLK-173532** Units: **ug/L** Analysis Date: **14-Dec-2021 20:23**
Client ID: Run ID: **ECD_7_397646** SeqNo: **6421724** PrepDate: **14-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	U	0.0125								
Aroclor 1221	U	0.0125								
Aroclor 1232	U	0.0125								
Aroclor 1242	U	0.0125								
Aroclor 1248	U	0.0125								
Aroclor 1254	U	0.0125								
Aroclor 1260	U	0.0125								
PCBs (Total)	U	0.0125								
Surr: Decachlorobiphenyl	*0.01936*	*0.00125*	*0.02*	*0*	*96.8*	*54 - 140*				
Surr: Tetrachloro-m-xylene	*0.01771*	*0.00125*	*0.02*	*0*	*88.6*	*53 - 137*				

LCS Sample ID: **LCS-173532** Units: **ug/L** Analysis Date: **14-Dec-2021 20:40**
Client ID: Run ID: **ECD_7_397646** SeqNo: **6421725** PrepDate: **14-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	0.4478	0.0125	0.5	0	89.6	54 - 138				
Aroclor 1260	0.4275	0.0125	0.5	0	85.5	57 - 136				
Surr: Decachlorobiphenyl	*0.02002*	*0.00125*	*0.02*	*0*	*100*	*54 - 140*				
Surr: Tetrachloro-m-xylene	*0.01886*	*0.00125*	*0.02*	*0*	*94.3*	*53 - 137*				

LCSD Sample ID: **LCSD-173532** Units: **ug/L** Analysis Date: **14-Dec-2021 20:57**
Client ID: Run ID: **ECD_7_397646** SeqNo: **6421726** PrepDate: **14-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	0.4633	0.0125	0.5	0	92.7	54 - 138	0.4478	3.4	30	
Aroclor 1260	0.4692	0.0125	0.5	0	93.8	57 - 136	0.4275	9.31	30	
Surr: Decachlorobiphenyl	*0.02292*	*0.00125*	*0.02*	*0*	*115*	*54 - 140*	*0.02002*	*13.5*	*30*	
Surr: Tetrachloro-m-xylene	*0.01965*	*0.00125*	*0.02*	*0*	*98.2*	*53 - 137*	*0.01886*	*4.08*	*30*	

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173629 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-173629** Units: **mg/L** Analysis Date: **16-Dec-2021 10:48**
Client ID: Run ID: **HG03_397753** SeqNo: **6424456** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-173629** Units: **mg/L** Analysis Date: **16-Dec-2021 10:50**
Client ID: Run ID: **HG03_397753** SeqNo: **6424457** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00515	0.000200	0.005	0	103	80 - 120				

MS Sample ID: **HS21120781-01MS** Units: **mg/L** Analysis Date: **16-Dec-2021 10:55**
Client ID: Run ID: **HG03_397753** SeqNo: **6424459** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00447	0.000200	0.005	0.000074	87.9	75 - 125				

MSD Sample ID: **HS21120781-01MSD** Units: **mg/L** Analysis Date: **16-Dec-2021 10:57**
Client ID: Run ID: **HG03_397753** SeqNo: **6424460** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00445	0.000200	0.005	0.000074	87.5	75 - 125	0.00447	0.448	20	

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173917 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-173917** Units: **mg/L** Analysis Date: **27-Dec-2021 21:00**
Client ID: Run ID: **ICPMS06_398396** SeqNo: **6441039** PrepDate: **23-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Copper	U	0.00200								
Iron	U	0.200								
Lead	U	0.00200								
Nickel	U	0.00200								
Potassium	U	0.200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Zinc	U	0.00400								

LCS Sample ID: **LCS-173917** Units: **mg/L** Analysis Date: **27-Dec-2021 21:02**
Client ID: Run ID: **ICPMS06_398396** SeqNo: **6441040** PrepDate: **23-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05289	0.00200	0.05	0	106	80 - 120				
Arsenic	0.05442	0.00200	0.05	0	109	80 - 120				
Beryllium	0.05229	0.00200	0.05	0	105	80 - 120				
Cadmium	0.05509	0.00200	0.05	0	110	80 - 120				
Chromium	0.05446	0.00400	0.05	0	109	80 - 120				
Copper	0.05356	0.00200	0.05	0	107	80 - 120				
Iron	5.442	0.200	5	0	109	80 - 120				
Lead	0.05219	0.00200	0.05	0	104	80 - 120				
Nickel	0.05358	0.00200	0.05	0	107	80 - 120				
Potassium	5.522	0.200	5	0	110	80 - 120				
Selenium	0.05692	0.00200	0.05	0	114	80 - 120				
Silver	0.05303	0.00200	0.05	0	106	80 - 120				
Thallium	0.05386	0.00200	0.05	0	108	80 - 120				
Zinc	0.05704	0.00400	0.05	0	114	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173917 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21120601-01MS** Units: **mg/L** Analysis Date: **27-Dec-2021 21:08**
Client ID: Run ID: **ICPMS06_398396** SeqNo: **6441043** PrepDate: **23-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0548	0.00200	0.05	0.000373	109	80 - 120				
Arsenic	0.06001	0.00200	0.05	0.003836	112	80 - 120				
Beryllium	0.05716	0.00200	0.05	0.000012	114	80 - 120				
Cadmium	0.05567	0.00200	0.05	0.000013	111	80 - 120				
Chromium	0.05511	0.00400	0.05	0.000525	109	80 - 120				
Copper	0.05301	0.00200	0.05	0.000301	105	80 - 120				
Iron	5.465	0.200	5	0.00328	109	80 - 120				
Lead	0.05448	0.00200	0.05	-0.000009	109	80 - 120				
Nickel	0.05462	0.00200	0.05	0.001209	107	80 - 120				
Potassium	13.34	0.200	5	7.587	115	80 - 120				
Selenium	0.0643	0.00200	0.05	0.008202	112	80 - 120				
Silver	0.0523	0.00200	0.05	-0.000002	105	80 - 120				
Thallium	0.05607	0.00200	0.05	0.00004	112	80 - 120				
Zinc	0.05637	0.00400	0.05	0.000594	112	80 - 120				

MSD Sample ID: **HS21120601-01MSD** Units: **mg/L** Analysis Date: **27-Dec-2021 21:10**
Client ID: Run ID: **ICPMS06_398396** SeqNo: **6441044** PrepDate: **23-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05271	0.00200	0.05	0.000373	105	80 - 120	0.0548	3.88	20	
Arsenic	0.0576	0.00200	0.05	0.003836	108	80 - 120	0.06001	4.1	20	
Beryllium	0.05346	0.00200	0.05	0.000012	107	80 - 120	0.05716	6.7	20	
Cadmium	0.05341	0.00200	0.05	0.000013	107	80 - 120	0.05567	4.14	20	
Chromium	0.05264	0.00400	0.05	0.000525	104	80 - 120	0.05511	4.57	20	
Copper	0.05012	0.00200	0.05	0.000301	99.6	80 - 120	0.05301	5.6	20	
Iron	5.211	0.200	5	0.00328	104	80 - 120	5.465	4.76	20	
Lead	0.05158	0.00200	0.05	-0.000009	103	80 - 120	0.05448	5.46	20	
Nickel	0.05193	0.00200	0.05	0.001209	101	80 - 120	0.05462	5.05	20	
Potassium	12.85	0.200	5	7.587	105	80 - 120	13.34	3.75	20	
Selenium	0.06229	0.00200	0.05	0.008202	108	80 - 120	0.0643	3.18	20	
Silver	0.04977	0.00200	0.05	-0.000002	99.5	80 - 120	0.0523	4.95	20	
Thallium	0.05321	0.00200	0.05	0.00004	106	80 - 120	0.05607	5.24	20	
Zinc	0.05458	0.00400	0.05	0.000594	108	80 - 120	0.05637	3.22	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173917 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

PDS Sample ID: **HS21120601-01PDS** Units: **mg/L** Analysis Date: **27-Dec-2021 21:12**
Client ID: Run ID: **ICPMS06_398396** SeqNo: **6441045** PrepDate: **23-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1108	0.00200	0.1	0.000373	110	75 - 125				
Arsenic	0.1181	0.00200	0.1	0.003836	114	75 - 125				
Beryllium	0.1112	0.00200	0.1	0.000012	111	75 - 125				
Cadmium	0.1131	0.00200	0.1	0.000013	113	75 - 125				
Chromium	0.112	0.00400	0.1	0.000525	111	75 - 125				
Copper	0.1053	0.00200	0.1	0.000301	105	75 - 125				
Iron	11	0.200	10	0.00328	110	75 - 125				
Lead	0.1105	0.00200	0.1	-0.000009	110	75 - 125				
Nickel	0.1081	0.00200	0.1	0.001209	107	75 - 125				
Potassium	18.62	0.200	10	7.587	110	75 - 125				
Selenium	0.1235	0.00200	0.1	0.008202	115	75 - 125				
Silver	0.1024	0.00200	0.1	-0.000002	102	75 - 125				
Thallium	0.1136	0.00200	0.1	0.00004	114	75 - 125				
Zinc	0.1146	0.00400	0.1	0.000594	114	75 - 125				

SD Sample ID: **HS21120601-01SD** Units: **mg/L** Analysis Date: **27-Dec-2021 21:06**
Client ID: Run ID: **ICPMS06_398396** SeqNo: **6441042** PrepDate: **23-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000373	0	10	
Arsenic	0.003916	0.0100					0.003836	0	10	J
Beryllium	U	0.0100					0.000012	0	10	
Cadmium	U	0.0100					0.000013	0	10	
Chromium	U	0.0200					0.000525	0	10	
Copper	U	0.0100					0.000301	0	10	
Iron	U	1.00					0.00328	0	10	
Lead	U	0.0100					-0.000009	0	10	
Nickel	U	0.0100					0.001209	0	10	
Potassium	7.991	1.00					7.587	5.34	10	
Selenium	0.01018	0.0100					0.008202	0	10	
Silver	U	0.0100					-0.000002	0	10	
Thallium	U	0.0100					0.00004	0	10	
Zinc	U	0.0200					0.000594	0	10	

The following samples were analyzed in this batch: HS21120616-01

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Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173442 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-173442** Units: **ug/L** Analysis Date: **23-Dec-2021 12:12**
Client ID: Run ID: **SV-7_398343** SeqNo: **6439278** PrepDate: **11-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.10								
2-Methylnaphthalene	U	0.10								
Acenaphthene	U	0.10								
Acenaphthylene	U	0.10								
Anthracene	U	0.10								
Benz(a)anthracene	U	0.10								
Benzo(a)pyrene	U	0.10								
Benzo(b)fluoranthene	U	0.10								
Benzo(g,h,i)perylene	U	0.10								
Benzo(k)fluoranthene	U	0.10								
Chrysene	U	0.10								
Dibenz(a,h)anthracene	U	0.10								
Fluoranthene	U	0.10								
Fluorene	U	0.10								
Indeno(1,2,3-cd)pyrene	U	0.10								
Isophorone	U	0.20								
Naphthalene	U	0.10								
Phenanthrene	U	0.10								
Pyrene	U	0.10								
Surr: 2,4,6-Tribromophenol	*4.457*	*0.20*	*5*	*0*	*89.1*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.367*	*0.20*	*5*	*0*	*87.3*	*40 - 125*				
Surr: 2-Fluorophenol	*4.494*	*0.20*	*5*	*0*	*89.9*	*20 - 120*				
Surr: 4-Terphenyl-d14	*4.992*	*0.20*	*5*	*0*	*99.8*	*40 - 135*				
Surr: Nitrobenzene-d5	*3.845*	*0.20*	*5*	*0*	*76.9*	*41 - 120*				
Surr: Phenol-d6	*3.862*	*0.20*	*5*	*0*	*77.2*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173442 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCS Sample ID: **LCS-173442** Units: **ug/L** Analysis Date: **23-Dec-2021 12:31**
Client ID: Run ID: **SV-7_398343** SeqNo: **6439279** PrepDate: **11-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	4.533	0.10	5	0	90.7	45 - 120				
2-Methylnaphthalene	4.48	0.10	5	0	89.6	50 - 120				
Acenaphthene	4.587	0.10	5	0	91.7	45 - 120				
Acenaphthylene	5.047	0.10	5	0	101	47 - 120				
Anthracene	5.211	0.10	5	0	104	45 - 120				
Benz(a)anthracene	5.887	0.10	5	0	118	40 - 120				
Benzo(a)pyrene	5.75	0.10	5	0	115	45 - 120				
Benzo(b)fluoranthene	5.367	0.10	5	0	107	50 - 120				
Benzo(g,h,i)perylene	5.528	0.10	5	0	111	42 - 127				
Benzo(k)fluoranthene	5.174	0.10	5	0	103	45 - 127				
Chrysene	5.468	0.10	5	0	109	43 - 120				
Dibenz(a,h)anthracene	5.821	0.10	5	0	116	45 - 125				
Fluoranthene	5.617	0.10	5	0	112	45 - 125				
Fluorene	5.016	0.10	5	0	100	49 - 120				
Indeno(1,2,3-cd)pyrene	5.616	0.10	5	0	112	41 - 128				
Isophorone	4.501	0.20	5	0	90.0	40 - 121				
Naphthalene	4.849	0.10	5	0	97.0	45 - 120				
Phenanthrene	5.097	0.10	5	0	102	45 - 121				
Pyrene	5.473	0.10	5	0	109	40 - 130				
Surr: 2,4,6-Tribromophenol	*5.107*	*0.20*	*5*	*0*	*102*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.54*	*0.20*	*5*	*0*	*90.8*	*40 - 125*				
Surr: 2-Fluorophenol	*4.919*	*0.20*	*5*	*0*	*98.4*	*20 - 120*				
Surr: 4-Terphenyl-d14	*5.653*	*0.20*	*5*	*0*	*113*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.214*	*0.20*	*5*	*0*	*84.3*	*41 - 120*				
Surr: Phenol-d6	*4.607*	*0.20*	*5*	*0*	*92.1*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173442 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MS Sample ID: **HS21120529-18MS** Units: **ug/L** Analysis Date: **27-Dec-2021 20:31**
Client ID: Run ID: **SV-7_398459** SeqNo: **6442184** PrepDate: **11-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	68.84	0.10	5	69.48	-12.8	45 - 120				SEO
2-Methylnaphthalene	4.325	0.10	5	0.315	80.2	50 - 120				
Acenaphthene	61.5	0.10	5	65.67	-83.5	45 - 120				SEO
Acenaphthylene	5.819	0.10	5	2.017	76.0	47 - 120				
Anthracene	6.347	0.10	5	1.888	89.2	45 - 120				
Benz(a)anthracene	5.11	0.10	5	0	102	40 - 120				
Benzo(a)pyrene	5.668	0.10	5	0	113	45 - 120				
Benzo(b)fluoranthene	5.638	0.10	5	0	113	50 - 120				
Benzo(g,h,i)perylene	5.44	0.10	5	0	109	42 - 127				
Benzo(k)fluoranthene	5.465	0.10	5	0	109	45 - 127				
Chrysene	4.99	0.10	5	0	99.8	43 - 120				
Dibenz(a,h)anthracene	5.793	0.10	5	0	116	45 - 125				
Fluoranthene	5.241	0.10	5	0.3354	98.1	45 - 125				
Fluorene	29.83	0.10	5	31.91	-41.7	49 - 120				SEO
Indeno(1,2,3-cd)pyrene	5.881	0.10	5	0	118	41 - 128				
Isophorone	3.972	0.20	5	0	79.4	40 - 121				
Naphthalene	181.6	0.10	5	213.4	-636	45 - 120				SEO
Phenanthrene	25.31	0.10	5	23.74	31.3	45 - 121				SEO
Pyrene	5.001	0.10	5	0.1549	96.9	40 - 130				
Surr: 2,4,6-Tribromophenol	*4.457*	*0.20*	*5*	*0*	*89.1*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*3.965*	*0.20*	*5*	*0*	*79.3*	*40 - 125*				
Surr: 2-Fluorophenol	*4.345*	*0.20*	*5*	*0*	*86.9*	*20 - 120*				
Surr: 4-Terphenyl-d14	*5.216*	*0.20*	*5*	*0*	*104*	*40 - 135*				
Surr: Nitrobenzene-d5	*3.702*	*0.20*	*5*	*0*	*74.0*	*41 - 120*				
Surr: Phenol-d6	*4.127*	*0.20*	*5*	*0*	*82.5*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173442 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MS Sample ID: **HS21120529-12MS** Units: **ug/L** Analysis Date: **23-Dec-2021 17:54**
Client ID: Run ID: **SV-7_398343** SeqNo: **6442873** PrepDate: **11-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	3.361	0.10	5	0.1275	64.7	45 - 120				
2-Methylnaphthalene	3.059	0.10	5	0	61.2	50 - 120				
Acenaphthene	12.84	0.10	5	9.536	66.1	45 - 120				E
Acenaphthylene	4.213	0.10	5	0.5692	72.9	47 - 120				
Anthracene	4.027	0.10	5	0	80.5	45 - 120				
Benz(a)anthracene	4.921	0.10	5	0	98.4	40 - 120				
Benzo(a)pyrene	5.312	0.10	5	0	106	45 - 120				
Benzo(b)fluoranthene	4.657	0.10	5	0	93.1	50 - 120				
Benzo(g,h,i)perylene	5.41	0.10	5	0	108	42 - 127				
Benzo(k)fluoranthene	4.462	0.10	5	0	89.2	45 - 127				
Chrysene	4.351	0.10	5	0	87.0	43 - 120				
Dibenz(a,h)anthracene	4.785	0.10	5	0	95.7	45 - 125				
Fluoranthene	4.392	0.10	5	0.3286	81.3	45 - 125				
Fluorene	15.77	0.10	5	12.02	74.9	49 - 120				E
Indeno(1,2,3-cd)pyrene	4.785	0.10	5	0	95.7	41 - 128				
Isophorone	2.765	0.20	5	0	55.3	40 - 121				
Naphthalene	3.691	0.10	5	0.5786	62.3	45 - 120				
Phenanthrene	3.86	0.10	5	0	77.2	45 - 121				
Pyrene	5.136	0.10	5	0.09193	101	40 - 130				
Surr: 2,4,6-Tribromophenol	*4.084*	*0.20*	*5*	*0*	*81.7*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*3.054*	*0.20*	*5*	*0*	*61.1*	*40 - 125*				
Surr: 2-Fluorophenol	*2.992*	*0.20*	*5*	*0*	*59.8*	*20 - 120*				
Surr: 4-Terphenyl-d14	*4.695*	*0.20*	*5*	*0*	*93.9*	*40 - 135*				
Surr: Nitrobenzene-d5	*2.827*	*0.20*	*5*	*0*	*56.5*	*41 - 120*				
Surr: Phenol-d6	*2.84*	*0.20*	*5*	*0*	*56.8*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173442 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MSD Sample ID: **HS21120529-18MSD** Units: **ug/L** Analysis Date: **27-Dec-2021 20:50**
Client ID: Run ID: **SV-7_398459** SeqNo: **6442185** PrepDate: **11-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	59.61	0.10	5	69.48	-197	45 - 120	68.84	14.4	20	SEO
2-Methylnaphthalene	3.945	0.10	5	0.315	72.6	50 - 120	4.325	9.18	20	
Acenaphthene	65.34	0.10	5	65.67	-6.65	45 - 120	61.5	6.06	20	SEO
Acenaphthylene	6.012	0.10	5	2.017	79.9	47 - 120	5.819	3.26	20	
Anthracene	6.317	0.10	5	1.888	88.6	45 - 120	6.347	0.467	20	
Benz(a)anthracene	5.313	0.10	5	0	106	40 - 120	5.11	3.89	20	
Benzo(a)pyrene	5.585	0.10	5	0	112	45 - 120	5.668	1.48	20	
Benzo(b)fluoranthene	5.32	0.10	5	0	106	50 - 120	5.638	5.8	20	
Benzo(g,h,i)perylene	5.818	0.10	5	0	116	42 - 127	5.44	6.73	20	
Benzo(k)fluoranthene	5.786	0.10	5	0	116	45 - 127	5.465	5.71	20	
Chrysene	5.012	0.10	5	0	100	43 - 120	4.99	0.442	20	
Dibenz(a,h)anthracene	5.353	0.10	5	0	107	45 - 125	5.793	7.9	20	
Fluoranthene	5.488	0.10	5	0.3354	103	45 - 125	5.241	4.61	20	
Fluorene	33.11	0.10	5	31.91	23.8	49 - 120	29.83	10.4	20	SEO
Indeno(1,2,3-cd)pyrene	6.97	0.10	5	0	139	41 - 128	5.881	16.9	20	S
Isophorone	3.313	0.20	5	0	66.3	40 - 121	3.972	18.1	20	
Naphthalene	193.4	0.10	5	213.4	-400	45 - 120	181.6	6.28	20	SEO
Phenanthrene	27.24	0.10	5	23.74	70.0	45 - 121	25.31	7.37	20	EO
Pyrene	4.81	0.10	5	0.1549	93.1	40 - 130	5.001	3.91	20	
Surr: 2,4,6-Tribromophenol	*4.263*	*0.20*	*5*	*0*	*85.3*	*34 - 129*	*4.457*	*4.43*	*20*	
Surr: 2-Fluorobiphenyl	*3.431*	*0.20*	*5*	*0*	*68.6*	*40 - 125*	*3.965*	*14.4*	*20*	
Surr: 2-Fluorophenol	*4.413*	*0.20*	*5*	*0*	*88.3*	*20 - 120*	*4.345*	*1.54*	*20*	
Surr: 4-Terphenyl-d14	*5.104*	*0.20*	*5*	*0*	*102*	*40 - 135*	*5.216*	*2.17*	*20*	
Surr: Nitrobenzene-d5	*3.389*	*0.20*	*5*	*0*	*67.8*	*41 - 120*	*3.702*	*8.81*	*20*	
Surr: Phenol-d6	*4.775*	*0.20*	*5*	*0*	*95.5*	*20 - 120*	*4.127*	*14.6*	*20*	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173442 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MSD Sample ID: **HS21120529-12MSD** Units: **ug/L** Analysis Date: **23-Dec-2021 18:13**
Client ID: Run ID: **SV-7_398343** SeqNo: **6442874** PrepDate: **11-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	3.883	0.10	5	0.1275	75.1	45 - 120	3.361	14.4	20	
2-Methylnaphthalene	3.64	0.10	5	0	72.8	50 - 120	3.059	17.3	20	
Acenaphthene	13.23	0.10	5	9.536	73.8	45 - 120	12.84	2.96	20	E
Acenaphthylene	4.254	0.10	5	0.5692	73.7	47 - 120	4.213	0.98	20	
Anthracene	4.514	0.10	5	0	90.3	45 - 120	4.027	11.4	20	
Benz(a)anthracene	5.407	0.10	5	0	108	40 - 120	4.921	9.42	20	
Benzo(a)pyrene	6.052	0.10	5	0	121	45 - 120	5.312	13	20	S
Benzo(b)fluoranthene	5.198	0.10	5	0	104	50 - 120	4.657	11	20	
Benzo(g,h,i)perylene	5.768	0.10	5	0	115	42 - 127	5.41	6.4	20	
Benzo(k)fluoranthene	5.139	0.10	5	0	103	45 - 127	4.462	14.1	20	
Chrysene	4.817	0.10	5	0	96.3	43 - 120	4.351	10.2	20	
Dibenz(a,h)anthracene	5.719	0.10	5	0	114	45 - 125	4.785	17.8	20	
Fluoranthene	5.539	0.10	5	0.3286	104	45 - 125	4.392	23.1	20	R
Fluorene	15.32	0.10	5	12.02	65.9	49 - 120	15.77	2.9	20	E
Indeno(1,2,3-cd)pyrene	4.955	0.10	5	0	99.1	41 - 128	4.785	3.49	20	
Isophorone	3.552	0.20	5	0	71.0	40 - 121	2.765	24.9	20	R
Naphthalene	4.11	0.10	5	0.5786	70.6	45 - 120	3.691	10.7	20	
Phenanthrene	4.49	0.10	5	0	89.8	45 - 121	3.86	15.1	20	
Pyrene	5.101	0.10	5	0.09193	100	40 - 130	5.136	0.674	20	
Surr: 2,4,6-Tribromophenol	*4.305*	*0.20*	*5*	*0*	*86.1*	*34 - 129*	*4.084*	*5.29*	*20*	
Surr: 2-Fluorobiphenyl	*3.344*	*0.20*	*5*	*0*	*66.9*	*40 - 125*	*3.054*	*9.05*	*20*	
Surr: 2-Fluorophenol	*3.473*	*0.20*	*5*	*0*	*69.5*	*20 - 120*	*2.992*	*14.9*	*20*	
Surr: 4-Terphenyl-d14	*5.168*	*0.20*	*5*	*0*	*103*	*40 - 135*	*4.695*	*9.58*	*20*	
Surr: Nitrobenzene-d5	*3.286*	*0.20*	*5*	*0*	*65.7*	*41 - 120*	*2.827*	*15*	*20*	
Surr: Phenol-d6	*3.283*	*0.20*	*5*	*0*	*65.7*	*20 - 120*	*2.84*	*14.5*	*20*	

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397814 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-211216** Units: **ug/L** Analysis Date: **16-Dec-2021 11:07**
Client ID: Run ID: **VOA4_397814** SeqNo: **6426178** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	1.0								
1,1,2,2-Tetrachloroethane	U	1.0								
1,1,2-Trichlor-1,2,2-trifluoroethane	U	1.0								
1,1,2-Trichloroethane	U	1.0								
1,1-Dichloroethane	U	1.0								
1,1-Dichloroethene	U	1.0								
1,2,3-Trichlorobenzene	U	1.0								
1,2,4-Trichlorobenzene	U	1.0								
1,2-Dibromo-3-chloropropane	U	1.0								
1,2-Dibromoethane	U	1.0								
1,2-Dichlorobenzene	U	1.0								
1,2-Dichloroethane	U	1.0								
1,2-Dichloropropane	U	1.0								
1,3-Dichlorobenzene	U	1.0								
1,4-Dichlorobenzene	U	1.0								
2-Butanone	U	2.0								
2-Hexanone	U	2.0								
4-Methyl-2-pentanone	U	2.0								
Acetone	U	2.0								
Benzene	U	1.0								
Bromochloromethane	U	1.0								
Bromodichloromethane	U	1.0								
Bromoform	U	1.0								
Bromomethane	U	1.0								
Carbon disulfide	U	2.0								
Carbon tetrachloride	U	1.0								
Chlorobenzene	U	1.0								
Chloroethane	U	1.0								
Chloroform	U	1.0								
Chloromethane	U	1.0								
cis-1,2-Dichloroethene	U	1.0								
cis-1,3-Dichloropropene	U	1.0								
Cyclohexane	U	1.0								
Dibromochloromethane	U	1.0								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397814 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-211216** Units: **ug/L** Analysis Date: **16-Dec-2021 11:07**
Client ID: Run ID: **VOA4_397814** SeqNo: **6426178** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	U	1.0								
Ethylbenzene	U	1.0								
Isopropylbenzene	U	1.0								
m,p-Xylene	U	2.0								
Methyl acetate	U	1.0								
Methyl tert-butyl ether	U	1.0								
Methylcyclohexane	U	1.0								
Methylene chloride	U	2.0								
o-Xylene	U	1.0								
Styrene	U	1.0								
Tetrachloroethene	U	1.0								
Toluene	U	1.0								
trans-1,2-Dichloroethene	U	1.0								
trans-1,3-Dichloropropene	U	1.0								
Trichloroethene	U	1.0								
Trichlorofluoromethane	U	1.0								
Vinyl chloride	U	1.0								
Xylenes, Total	U	1.0								
Surr: 1,2-Dichloroethane-d4	*49.44*	*1.0*	*50*	*0*	*98.9*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*48.56*	*1.0*	*50*	*0*	*97.1*	*82 - 115*				
Surr: Dibromofluoromethane	*45.2*	*1.0*	*50*	*0*	*90.4*	*73 - 126*				
Surr: Toluene-d8	*50.31*	*1.0*	*50*	*0*	*101*	*81 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397814 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-211216** Units: **ug/L** Analysis Date: **16-Dec-2021 10:22**
Client ID: Run ID: **VOA4_397814** SeqNo: **6426177** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	18.28	1.0	20	0	91.4	70 - 130				
1,1,2,2-Tetrachloroethane	19	1.0	20	0	95.0	70 - 120				
1,1,2-Trichlor-1,2,2-trifluoroethane	18.26	1.0	20	0	91.3	70 - 130				
1,1,2-Trichloroethane	18.1	1.0	20	0	90.5	77 - 113				
1,1-Dichloroethane	17.51	1.0	20	0	87.5	71 - 122				
1,1-Dichloroethene	17.12	1.0	20	0	85.6	70 - 130				
1,2,3-Trichlorobenzene	20.32	1.0	20	0	102	70 - 130				
1,2,4-Trichlorobenzene	19.87	1.0	20	0	99.4	77 - 126				
1,2-Dibromo-3-chloropropane	18.18	1.0	20	0	90.9	70 - 130				
1,2-Dibromoethane	19.62	1.0	20	0	98.1	76 - 123				
1,2-Dichlorobenzene	18.52	1.0	20	0	92.6	77 - 113				
1,2-Dichloroethane	18.4	1.0	20	0	92.0	70 - 124				
1,2-Dichloropropane	18.19	1.0	20	0	90.9	72 - 119				
1,3-Dichlorobenzene	19.05	1.0	20	0	95.3	78 - 118				
1,4-Dichlorobenzene	18.73	1.0	20	0	93.6	79 - 113				
2-Butanone	35.45	2.0	40	0	88.6	70 - 130				
2-Hexanone	39.16	2.0	40	0	97.9	70 - 130				
4-Methyl-2-pentanone	41.1	2.0	40	0	103	70 - 130				
Acetone	39.34	2.0	40	0	98.3	70 - 130				
Benzene	18.61	1.0	20	0	93.0	74 - 120				
Bromochloromethane	16.83	1.0	20	0	84.1	76 - 124				
Bromodichloromethane	19.6	1.0	20	0	98.0	74 - 122				
Bromoform	18.14	1.0	20	0	90.7	73 - 128				
Bromomethane	19.74	1.0	20	0	98.7	70 - 130				
Carbon disulfide	35.18	2.0	40	0	88.0	70 - 130				
Carbon tetrachloride	19.24	1.0	20	0	96.2	71 - 125				
Chlorobenzene	18.68	1.0	20	0	93.4	76 - 113				
Chloroethane	17.7	1.0	20	0	88.5	70 - 130				
Chloroform	17.93	1.0	20	0	89.7	71 - 121				
Chloromethane	17.47	1.0	20	0	87.4	70 - 129				
cis-1,2-Dichloroethene	16.88	1.0	20	0	84.4	75 - 122				
cis-1,3-Dichloropropene	20.76	1.0	20	0	104	73 - 127				
Cyclohexane	18.43	1.0	20	0	92.1	70 - 130				
Dibromochloromethane	19.9	1.0	20	0	99.5	77 - 122				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397814 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-211216** Units: **ug/L** Analysis Date: **16-Dec-2021 10:22**
Client ID: Run ID: **VOA4_397814** SeqNo: **6426177** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	17.8	1.0	20	0	89.0	70 - 130				
Ethylbenzene	19.43	1.0	20	0	97.2	77 - 117				
Isopropylbenzene	19.9	1.0	20	0	99.5	73 - 127				
m,p-Xylene	38.96	2.0	40	0	97.4	77 - 122				
Methyl acetate	17.72	1.0	20	0	88.6	76 - 122				
Methyl tert-butyl ether	19.42	1.0	20	0	97.1	70 - 130				
Methylcyclohexane	19.21	1.0	20	0	96.0	61 - 157				
Methylene chloride	18.48	2.0	20	0	92.4	70 - 127				
o-Xylene	19.16	1.0	20	0	95.8	75 - 119				
Styrene	20.53	1.0	20	0	103	72 - 126				
Tetrachloroethene	18.22	1.0	20	0	91.1	76 - 119				
Toluene	19.56	1.0	20	0	97.8	77 - 118				
trans-1,2-Dichloroethene	17.4	1.0	20	0	87.0	72 - 127				
trans-1,3-Dichloropropene	18.54	1.0	20	0	92.7	77 - 119				
Trichloroethene	18.25	1.0	20	0	91.3	77 - 121				
Trichlorofluoromethane	19.72	1.0	20	0	98.6	70 - 130				
Vinyl chloride	17.26	1.0	20	0	86.3	70 - 130				
Xylenes, Total	58.12	1.0	60	0	96.9	75 - 122				
Surr: 1,2-Dichloroethane-d4	*48.81*	*1.0*	*50*	*0*	*97.6*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*51.18*	*1.0*	*50*	*0*	*102*	*82 - 115*				
Surr: Dibromofluoromethane	*46.85*	*1.0*	*50*	*0*	*93.7*	*73 - 126*				
Surr: Toluene-d8	*50.24*	*1.0*	*50*	*0*	*100*	*81 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397814 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21120514-01MS** Units: **ug/L** Analysis Date: **16-Dec-2021 11:51**
Client ID: Run ID: **VOA4_397814** SeqNo: **6426180** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	16.79	1.0	20	0	83.9	70 - 130				
1,1,2,2-Tetrachloroethane	15.58	1.0	20	0	77.9	70 - 123				
1,1,2-Trichlor-1,2,2-trifluoroethane	16.59	1.0	20	0	82.9	70 - 130				
1,1,2-Trichloroethane	15.61	1.0	20	0	78.1	70 - 117				
1,1-Dichloroethane	15.4	1.0	20	0	77.0	70 - 127				
1,1-Dichloroethene	15.95	1.0	20	0	79.8	70 - 130				
1,2,3-Trichlorobenzene	16.2	1.0	20	0	81.0	70 - 130				
1,2,4-Trichlorobenzene	15.52	1.0	20	0	77.6	70 - 125				
1,2-Dibromo-3-chloropropane	17.47	1.0	20	0	87.3	70 - 130				
1,2-Dibromoethane	16.85	1.0	20	0	84.3	70 - 124				
1,2-Dichlorobenzene	16.26	1.0	20	0	81.3	70 - 115				
1,2-Dichloroethane	16.48	1.0	20	0	82.4	70 - 127				
1,2-Dichloropropane	16.14	1.0	20	0	80.7	70 - 122				
1,3-Dichlorobenzene	16.45	1.0	20	0	82.3	70 - 119				
1,4-Dichlorobenzene	16.16	1.0	20	0	80.8	70 - 114				
2-Butanone	29.99	2.0	40	0	75.0	70 - 130				
2-Hexanone	31.09	2.0	40	0	77.7	70 - 130				
4-Methyl-2-pentanone	33.74	2.0	40	0	84.4	70 - 130				
Acetone	31.71	2.0	40	0	79.3	70 - 130				
Benzene	16.42	1.0	20	0	82.1	70 - 127				
Bromochloromethane	15.33	1.0	20	0	76.7	70 - 127				
Bromodichloromethane	17.57	1.0	20	0	87.8	70 - 124				
Bromoform	15.63	1.0	20	0	78.1	70 - 129				
Bromomethane	16.47	1.0	20	0	82.3	70 - 130				
Carbon disulfide	32.18	2.0	40	0	80.4	70 - 130				
Carbon tetrachloride	17.78	1.0	20	0	88.9	70 - 130				
Chlorobenzene	16.24	1.0	20	0	81.2	70 - 114				
Chloroethane	18.4	1.0	20	0	92.0	70 - 130				
Chloroform	16.02	1.0	20	0	80.1	70 - 125				
Chloromethane	15.47	1.0	20	0	77.3	70 - 130				
cis-1,2-Dichloroethene	15.25	1.0	20	0	76.3	70 - 128				
cis-1,3-Dichloropropene	17.96	1.0	20	0	89.8	70 - 125				
Cyclohexane	16.68	1.0	20	0	83.4	70 - 130				
Dibromochloromethane	16.75	1.0	20	0	83.8	70 - 124				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397814 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS21120514-01MS** Units: **ug/L** Analysis Date: **16-Dec-2021 11:51**
Client ID: Run ID: **VOA4_397814** SeqNo: **6426180** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	16.06	1.0	20	0	80.3	70 - 130				
Ethylbenzene	17.34	1.0	20	0	86.7	70 - 124				
Isopropylbenzene	17.74	1.0	20	0	88.7	70 - 130				
m,p-Xylene	34.5	2.0	40	0	86.2	70 - 130				
Methyl acetate	14.89	1.0	20	0	74.5	76 - 122				S
Methyl tert-butyl ether	15.89	1.0	20	0	79.4	70 - 130				
Methylcyclohexane	17.95	1.0	20	0	89.8	61 - 158				
Methylene chloride	15.51	2.0	20	0	77.6	70 - 128				
o-Xylene	16.88	1.0	20	0	84.4	70 - 124				
Styrene	17.77	1.0	20	0	88.8	70 - 130				
Tetrachloroethene	17.62	1.0	20	0	88.1	70 - 130				
Toluene	17.24	1.0	20	0	86.2	70 - 123				
trans-1,2-Dichloroethene	15.5	1.0	20	0	77.5	70 - 130				
trans-1,3-Dichloropropene	16	1.0	20	0	80.0	70 - 121				
Trichloroethene	17.47	1.0	20	0	87.4	70 - 129				
Trichlorofluoromethane	17.35	1.0	20	0	86.8	70 - 130				
Vinyl chloride	15.78	1.0	20	0	78.9	70 - 130				
Xylenes, Total	51.38	1.0	60	0	85.6	70 - 130				
Surr: 1,2-Dichloroethane-d4	*48.01*	*1.0*	*50*	*0*	*96.0*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*51.81*	*1.0*	*50*	*0*	*104*	*81 - 113*				
Surr: Dibromofluoromethane	*46.16*	*1.0*	*50*	*0*	*92.3*	*77 - 123*				
Surr: Toluene-d8	*49.82*	*1.0*	*50*	*0*	*99.6*	*82 - 127*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397814 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21120514-01MSD** Units: **ug/L** Analysis Date: **16-Dec-2021 12:13**
Client ID: Run ID: **VOA4_397814** SeqNo: **6426181** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	16.58	1.0	20	0	82.9	70 - 130	16.79	1.26	20	
1,1,2,2-Tetrachloroethane	16.16	1.0	20	0	80.8	70 - 123	15.58	3.66	20	
1,1,2-Trichlor-1,2,2-trifluoroethane	16.7	1.0	20	0	83.5	70 - 130	16.59	0.675	20	
1,1,2-Trichloroethane	16	1.0	20	0	80.0	70 - 117	15.61	2.48	20	
1,1-Dichloroethane	14.96	1.0	20	0	74.8	70 - 127	15.4	2.93	20	
1,1-Dichloroethene	16.27	1.0	20	0	81.3	70 - 130	15.95	1.98	20	
1,2,3-Trichlorobenzene	17.27	1.0	20	0	86.4	70 - 130	16.2	6.44	20	
1,2,4-Trichlorobenzene	16.4	1.0	20	0	82.0	70 - 125	15.52	5.55	20	
1,2-Dibromo-3-chloropropane	16.57	1.0	20	0	82.8	70 - 130	17.47	5.31	20	
1,2-Dibromoethane	16.71	1.0	20	0	83.5	70 - 124	16.85	0.874	20	
1,2-Dichlorobenzene	16.1	1.0	20	0	80.5	70 - 115	16.26	1	20	
1,2-Dichloroethane	16.56	1.0	20	0	82.8	70 - 127	16.48	0.507	20	
1,2-Dichloropropane	16.24	1.0	20	0	81.2	70 - 122	16.14	0.61	20	
1,3-Dichlorobenzene	16.83	1.0	20	0	84.2	70 - 119	16.45	2.27	20	
1,4-Dichlorobenzene	15.94	1.0	20	0	79.7	70 - 114	16.16	1.34	20	
2-Butanone	31.11	2.0	40	0	77.8	70 - 130	29.99	3.66	20	
2-Hexanone	31.7	2.0	40	0	79.3	70 - 130	31.09	1.93	20	
4-Methyl-2-pentanone	34.04	2.0	40	0	85.1	70 - 130	33.74	0.872	20	
Acetone	32.21	2.0	40	0	80.5	70 - 130	31.71	1.58	20	
Benzene	16.29	1.0	20	0	81.4	70 - 127	16.42	0.814	20	
Bromochloromethane	14.31	1.0	20	0	71.6	70 - 127	15.33	6.89	20	
Bromodichloromethane	17.28	1.0	20	0	86.4	70 - 124	17.57	1.62	20	
Bromoform	15.58	1.0	20	0	77.9	70 - 129	15.63	0.34	20	
Bromomethane	16.05	1.0	20	0	80.2	70 - 130	16.47	2.58	20	
Carbon disulfide	32.54	2.0	40	0	81.4	70 - 130	32.18	1.13	20	
Carbon tetrachloride	17.52	1.0	20	0	87.6	70 - 130	17.78	1.46	20	
Chlorobenzene	16.24	1.0	20	0	81.2	70 - 114	16.24	0.00398	20	
Chloroethane	18.64	1.0	20	0	93.2	70 - 130	18.4	1.26	20	
Chloroform	15.94	1.0	20	0	79.7	70 - 125	16.02	0.494	20	
Chloromethane	15.98	1.0	20	0	79.9	70 - 130	15.47	3.29	20	
cis-1,2-Dichloroethene	14.75	1.0	20	0	73.7	70 - 128	15.25	3.36	20	
cis-1,3-Dichloropropene	17.34	1.0	20	0	86.7	70 - 125	17.96	3.54	20	
Cyclohexane	16.14	1.0	20	0	80.7	70 - 130	16.68	3.28	20	
Dibromochloromethane	17.14	1.0	20	0	85.7	70 - 124	16.75	2.32	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397814 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS21120514-01MSD** Units: **ug/L** Analysis Date: **16-Dec-2021 12:13**
Client ID: Run ID: **VOA4_397814** SeqNo: **6426181** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Dichlorodifluoromethane	16.15	1.0	20	0	80.8	70 - 130	16.06	0.593	20	
Ethylbenzene	17.36	1.0	20	0	86.8	70 - 124	17.34	0.0658	20	
Isopropylbenzene	17.66	1.0	20	0	88.3	70 - 130	17.74	0.47	20	
m,p-Xylene	34.29	2.0	40	0	85.7	70 - 130	34.5	0.611	20	
Methyl acetate	14.95	1.0	20	0	74.7	76 - 122	14.89	0.352	20	S
Methyl tert-butyl ether	16.11	1.0	20	0	80.6	70 - 130	15.89	1.41	20	
Methylcyclohexane	17.53	1.0	20	0	87.7	61 - 158	17.95	2.36	20	
Methylene chloride	15.41	2.0	20	0	77.0	70 - 128	15.51	0.667	20	
o-Xylene	17.03	1.0	20	0	85.1	70 - 124	16.88	0.903	20	
Styrene	18.26	1.0	20	0	91.3	70 - 130	17.77	2.76	20	
Tetrachloroethene	17.52	1.0	20	0	87.6	70 - 130	17.62	0.561	20	
Toluene	17.02	1.0	20	0	85.1	70 - 123	17.24	1.31	20	
trans-1,2-Dichloroethene	14.9	1.0	20	0	74.5	70 - 130	15.5	3.9	20	
trans-1,3-Dichloropropene	15.93	1.0	20	0	79.6	70 - 121	16	0.469	20	
Trichloroethene	16.67	1.0	20	0	83.3	70 - 129	17.47	4.72	20	
Trichlorofluoromethane	16.97	1.0	20	0	84.9	70 - 130	17.35	2.22	20	
Vinyl chloride	15.64	1.0	20	0	78.2	70 - 130	15.78	0.909	20	
Xylenes, Total	51.32	1.0	60	0	85.5	70 - 130	51.38	0.111	20	
Surr: 1,2-Dichloroethane-d4	*47.4*	*1.0*	*50*	*0*	*94.8*	*70 - 126*	*48.01*	*1.27*	*20*	
Surr: 4-Bromofluorobenzene	*51.22*	*1.0*	*50*	*0*	*102*	*81 - 113*	*51.81*	*1.16*	*20*	
Surr: Dibromofluoromethane	*46.42*	*1.0*	*50*	*0*	*92.8*	*77 - 123*	*46.16*	*0.563*	*20*	
Surr: Toluene-d8	*49.91*	*1.0*	*50*	*0*	*99.8*	*82 - 127*	*49.82*	*0.195*	*20*	

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: 173837 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173837** Units: **mg/L** Analysis Date: **21-Dec-2021 15:00**
Client ID: Run ID: **UV-2450_398122** SeqNo: **6433403** PrepDate: **21-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-173837** Units: **mg/L** Analysis Date: **21-Dec-2021 15:00**
Client ID: Run ID: **UV-2450_398122** SeqNo: **6433402** PrepDate: **21-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.271	0.0500	0.25	0	108	80 - 120				

MS Sample ID: **HS21120336-01MS** Units: **mg/L** Analysis Date: **21-Dec-2021 15:00**
Client ID: Run ID: **UV-2450_398122** SeqNo: **6433400** PrepDate: **21-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.268	0.0500	0.25	-0.003	108	80 - 120				

MSD Sample ID: **HS21120336-01MSD** Units: **mg/L** Analysis Date: **21-Dec-2021 15:00**
Client ID: Run ID: **UV-2450_398122** SeqNo: **6433401** PrepDate: **21-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.27	0.0500	0.25	-0.003	109	80 - 120	0.268	0.743	20	

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397472 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **10-Dec-2021 21:15**
Client ID: Run ID: **ICS-Integrion_397472** SeqNo: **6417781** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	U	0.100								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **10-Dec-2021 21:23**
Client ID: Run ID: **ICS-Integrion_397472** SeqNo: **6417782** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	3.946	0.100	4	0	98.6	80 - 120				

MS Sample ID: **HS21120590-01MS** Units: **mg/L** Analysis Date: **10-Dec-2021 18:37**
Client ID: Run ID: **ICS-Integrion_397472** SeqNo: **6417769** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	3.004	0.100	2	1.163	92.1	80 - 120				

MSD Sample ID: **HS21120590-01MSD** Units: **mg/L** Analysis Date: **10-Dec-2021 18:44**
Client ID: Run ID: **ICS-Integrion_397472** SeqNo: **6417770** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	2.936	0.100	2	1.163	88.6	80 - 120	3.004	2.3	20	

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397515 (0) **Instrument:** WetChem_HS **Method:** PH BY SM4500H+ B-2011

DUP Sample ID: **HS21120665-01DUP** Units: **pH Units** Analysis Date: **13-Dec-2021 16:19**
Client ID: Run ID: **WetChem_HS_397515** SeqNo: **6418851** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	6.52	0.100					6.48	0.615	10	
Temp Deg C @pH	24.4	0					24.5	0.409	10	

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397633 (0) **Instrument: TOC_04** **Method: TOTAL ORGANIC CARBON BY SW9060A**

MBLK Sample ID: **MBLK-12142021** Units: **mg/L** Analysis Date: **15-Dec-2021 01:13**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421526** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	U	1.00								

LCS Sample ID: **LCS-12142021** Units: **mg/L** Analysis Date: **15-Dec-2021 01:29**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421527** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.8	1.00	10	0	108	85 - 115				

LCSD Sample ID: **LCSD-12142021** Units: **mg/L** Analysis Date: **15-Dec-2021 01:45**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421528** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.82	1.00	10	0	108	85 - 115	10.8	0.185	20	

MS Sample ID: **HS21120083-01MS** Units: **mg/L** Analysis Date: **15-Dec-2021 02:54**
Client ID: Run ID: **TOC_04_397633** SeqNo: **6421532** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	30.9	1.00	10	21.11	97.9	80 - 120				

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R397643 (0) **Instrument:** WetChem_HS **Method:** SPECIFIC CONDUCTANCE BY E120.1, 1982

MBLK Sample ID: **MBLK-R397643** Units: **umhos/cm** Analysis Date: **15-Dec-2021 10:43**
Client ID: Run ID: **WetChem_HS_397643** SeqNo: **6421690** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	U	5.00								

LCS Sample ID: **LCS-R397643** Units: **umhos/cm** Analysis Date: **15-Dec-2021 10:43**
Client ID: Run ID: **WetChem_HS_397643** SeqNo: **6421689** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	1416	5.00	1413	0	100	80 - 120				

DUP Sample ID: **HS21120441-01DUP** Units: **umhos/cm** Analysis Date: **15-Dec-2021 10:43**
Client ID: Run ID: **WetChem_HS_397643** SeqNo: **6421692** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Specific Conductance	2448	5.00					2465	0.692	20	

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: HS21120616

QC BATCH REPORT

Batch ID: R398121 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY IC BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **19-Dec-2021 09:18**
Client ID: Run ID: **ICS-Integrion_398121** SeqNo: **6433374** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **19-Dec-2021 09:25**
Client ID: Run ID: **ICS-Integrion_398121** SeqNo: **6433375** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	8.39	0.200	8	0	105	90 - 110				

MS Sample ID: **HS21120616-01MS** Units: **mg/L** Analysis Date: **19-Dec-2021 11:31**
Client ID: **G-P1** Run ID: **ICS-Integrion_398121** SeqNo: **6433379** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	27.59	2.00	40	0.836	66.9	80 - 120				S

MSD Sample ID: **HS21120616-01MSD** Units: **mg/L** Analysis Date: **19-Dec-2021 11:39**
Client ID: **G-P1** Run ID: **ICS-Integrion_398121** SeqNo: **6433380** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	26.26	2.00	40	0.836	63.6	80 - 120	27.59	4.95	20	S

The following samples were analyzed in this batch: HS21120616-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact
WorkOrder: **HS21120616**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
Date	
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

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Sample Receipt Checklist

Work Order ID: HS21120616 **Date/Time Received:** **10-Dec-2021 12:30**

Client Name: ERM Annapolis **Received by:** **Jared R. Makan**

Completed By:	/S/ Jared R. Makan	10-Dec-2021 18:41	**Reviewed by:**	/S/ Corey Grandits	27-Dec-2021 17:38
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **Water** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐	
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑	
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑	
Chain of custody present?	Yes ☑	No ☐	1 Page(s)	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Samplers name present on COC?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☐	No ☑		
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑		
Temperature(s)/Thermometer(s):	18.7°C UC/C		IR31	
Cooler(s)/Kit(s):	47777			
Date/Time sample(s) sent to storage:	12/10/2021 16:20			
Water - VOA vials have zero headspace?	Yes ☐	No ☑	No VOA vials submitted ☐	
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐	
pH adjusted?	Yes ☐	No ☑	N/A ☐	
pH adjusted by:				

Login Notes: All vials for VOC analysis contain head-space greater than 6mm in diameter.
Sample received past the hold time for Pesticides, Herbicides, PCBs, SVOCs, pH & Nitrates.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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☑ ALS Laboratory Group
10450 Stanclift Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

☐ ALS Laboratory Group
3352 128th Avenue
Holland, Michigan 49424
(Tel) 616.399.6070
(Fax) 616.399.6185

ALS Project Manager:		Work Order #:	

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	Gas to Energy Environmental Impact Assessment Study	A	8081_Water_Low (8081 Pesticides)
Work Order		Project Number	0590231	B	8151_Water (8151 Herbicides)
Company Name	ERM	Bill To Company	ERM	C	8260_LL_ Water (8260 TCL VOCs)
Send Report To	Herbert Pirela	Invoice Attn.	AP	D	8270_LOW_Water (8270 PAHs)
Address	190 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr	E	9056_Water-NO2-NO3 Combined & NO3 *NEAT*
				F	COND_Water (Conductivity) & pH
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401	G	ICP_TWater (6020/7470 Metals 16)
Phone	(410) 972-4124	Phone	(410) 972-4124	H	P-TWater (Phosphorous)
Fax		Fax		I	PCB_Water_Low (8082 PCBs)
e-Mail Address	herbert.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	J	TOC_Water 9060 (Total Organic Carbon)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	G-P1	02/12/2021	10:56 AM	GW	1,2,3,8	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

HS21120616

ERM

Gas to Energy Environmental Impact

Sampler(s): Please Print & Sign	Shipment Method:	Required Turnaround Time:	Results Due Date:
Lalita Gopaul Delshah Hamid		☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other	

Relinquished by:	Date:	Time:	Received by:	Notes:
Lalita Gopaul	03/12/2021	9:42am	C. Rodney	
Relinquished by:	Date:	Time:	Received by (Laboratory):	Cooler Temp.
Guyana Logistics Support Services	3/12/2021	9:42am	J. Ramsay 12/10/21 12:30	18.7°C
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

QC Package: (Check Box Below)			
x	Level II: Standard QC		TRRP-Checklist
	Level III: Std QC + Raw Data		TRRP Level IV
	Level IV: SW846 CLP-Like		
	Other:		

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

Cooler 47777
1123. CFO

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LB1026 (6/11) OMN

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 24, 2022

Herbert Pirela
ERM
180 Admiral Cochrance Dr
Suite 400
Annapolis, MD 21401

Work Order: **HS22020380**

Laboratory Results for: **Gas to Energy Environmental Impact Assessment Study**

Dear Herbert Pirela,

ALS Environmental received 1 sample(s) on Feb 08, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS22020380

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22020380-02	NGL-Piez-105	Groundwater		26-Jan-2022 10:21	08-Feb-2022 13:20	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS22020380

GCMS Semivolatiles by Method SW8270

Batch ID: 175442

Sample ID: NGL-Piez-105 (HS22020380-02)

• Sample holding time expired prior analysis, samples were centrifuged to only analyze the water portion.

GCMS Volatiles by Method SW8260

Batch ID: R402459

Sample ID: HS22020379-02MS

• MS and MSD are for an unrelated sample.

Sample ID: NGL-Piez-105 (HS22020380-02)

• Sample holding time expired prior analysis, samples were centrifuged to only analyze the water portion.

Batch ID: R402347

Sample ID: CCV

• Dichlorodifluoromethane is exceeded %D limits on CCV. Associated samples are non-detect for this analyte.

Sample ID: NGL-Piez-105 (HS22020380-02)

• Sample holding time expired prior analysis, samples were centrifuged to only analyze the water portion.

Sample ID: VLCSW-220216

• Dichlorodifluoromethane is exceeded %recovery limits on LCS. Associated samples are non-detect for this analyte.

Sample ID: HS22020394-02MS

• MS and MSD are for an unrelated sample.

Metals by Method SW6020A

Batch ID: 175519

Sample ID: HS22020394-02MS

• MS and MSD are for an unrelated sample.

Sample ID: HS22020394-02MSD

• MSD is for an unrelated sample.

Sample ID: NGL-Piez-105 (HS22020380-02)

• Sample ran at 2x due to sample matrix.

Metals by Method SW7470A

Batch ID: 175385

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS22020380

WetChemistry by Method SW9056

Batch ID: R402744

Sample ID: NGL-Piez-105 (HS22020380-02)

- The reporting limit is elevated due to dilution for high concentrations of non-target analytes. (Nitrogen, Nitrate (As N),Nitrogen, Nitrate-Nitrite,Nitrogen, Nitrite (As N))

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22020380
Sample ID: NGL-Piez-105 Lab ID:HS22020380-02
Collection Date: 26-Jan-2022 10:21 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: AKP
1,1,1-Trichloroethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
1,1,2,2-Tetrachloroethane	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:35
1,1,2-Trichlor-1,2,2-trifluoroethane	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:35
1,1,2-Trichloroethane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
1,1-Dichloroethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
1,1-Dichloroethene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
1,2,3-Trichlorobenzene	U	H	0.40	1.0	ug/L	1	16-Feb-2022 17:35
1,2,4-Trichlorobenzene	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:35
1,2-Dibromo-3-chloropropane	U	H	1.0	1.0	ug/L	1	16-Feb-2022 17:35
1,2-Dibromoethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
1,2-Dichlorobenzene	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:35
1,2-Dichloroethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
1,2-Dichloropropane	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:35
1,3-Dichlorobenzene	U	H	0.40	1.0	ug/L	1	16-Feb-2022 17:35
1,4-Dichlorobenzene	U	H	0.40	1.0	ug/L	1	16-Feb-2022 17:35
2-Butanone	U	H	0.50	2.0	ug/L	1	16-Feb-2022 17:35
2-Hexanone	U	H	1.0	2.0	ug/L	1	16-Feb-2022 17:35
4-Methyl-2-pentanone	U	H	0.70	2.0	ug/L	1	16-Feb-2022 17:35
Acetone	U	H	2.0	2.0	ug/L	1	16-Feb-2022 17:35
Benzene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
Bromochloromethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
Bromodichloromethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
Bromoform	U	H	0.40	1.0	ug/L	1	16-Feb-2022 17:35
Bromomethane	U	H	0.40	1.0	ug/L	1	16-Feb-2022 17:35
Carbon disulfide	U	H	0.60	2.0	ug/L	1	16-Feb-2022 17:35
Carbon tetrachloride	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:35
Chlorobenzene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Chloroethane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Chloroform	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
Chloromethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
cis-1,2-Dichloroethene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
cis-1,3-Dichloropropene	U	H	0.10	1.0	ug/L	1	16-Feb-2022 17:35
Cyclohexane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Dibromochloromethane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Dichlorodifluoromethane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Ethylbenzene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Isopropylbenzene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
m,p-Xylene	U	H	0.50	2.0	ug/L	1	16-Feb-2022 17:35
Methyl acetate	U	H	1.0	1.0	ug/L	1	16-Feb-2022 17:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22020380
Sample ID: NGL-Piez-105 Lab ID:HS22020380-02
Collection Date: 26-Jan-2022 10:21 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: AKP
Methyl tert-butyl ether	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
Methylcyclohexane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Methylene chloride	**55**	H	**1.0**	**2.0**	**ug/L**	1	17-Feb-2022 11:49
o-Xylene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Styrene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Tetrachloroethene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Toluene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
trans-1,2-Dichloroethene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
trans-1,3-Dichloropropene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
Trichloroethene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
Trichlorofluoromethane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Vinyl chloride	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:35
Xylenes, Total	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:35
Surr: 1,2-Dichloroethane-d4	*104*			*70-126*	*%REC*	*1*	*16-Feb-2022 17:35*
Surr: 1,2-Dichloroethane-d4	*103*			*70-126*	*%REC*	*1*	*17-Feb-2022 11:49*
Surr: 4-Bromofluorobenzene	*99.9*			*77-113*	*%REC*	*1*	*16-Feb-2022 17:35*
Surr: 4-Bromofluorobenzene	*97.8*			*77-113*	*%REC*	*1*	*17-Feb-2022 11:49*
Surr: Dibromofluoromethane	*101*			*77-123*	*%REC*	*1*	*16-Feb-2022 17:35*
Surr: Dibromofluoromethane	*102*			*77-123*	*%REC*	*1*	*17-Feb-2022 11:49*
Surr: Toluene-d8	*101*			*82-127*	*%REC*	*1*	*16-Feb-2022 17:35*
Surr: Toluene-d8	*100*			*82-127*	*%REC*	*1*	*17-Feb-2022 11:49*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22020380
Sample ID: NGL-Piez-105 Lab ID:HS22020380-02
Collection Date: 26-Jan-2022 10:21 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL PAHS - 8270D		**Method:SW8270**			Prep:SW3511 / 17-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
2-Methylnaphthalene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Acenaphthene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Acenaphthylene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Anthracene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Benz(a)anthracene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Benzo(a)pyrene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Benzo(b)fluoranthene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Benzo(g,h,i)perylene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Benzo(k)fluoranthene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Chrysene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Dibenz(a,h)anthracene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Dibenzofuran	U	H	0.0319	0.106	ug/L	1	21-Feb-2022 18:29
Fluoranthene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Fluorene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Indeno(1,2,3-cd)pyrene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Naphthalene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Phenanthrene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Pyrene	U	H	0.0213	0.106	ug/L	1	21-Feb-2022 18:29
Surr: 2-Fluorobiphenyl	*52.1*			*32-130*	*%REC*	*1*	*21-Feb-2022 18:29*
Surr: 4-Terphenyl-d14	*55.8*			*40-135*	*%REC*	*1*	*21-Feb-2022 18:29*
Surr: Nitrobenzene-d5	*60.0*			*45-142*	*%REC*	*1*	*21-Feb-2022 18:29*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 18-Feb-2022		Analyst: JHD
Antimony	U		0.000800	0.00400	mg/L	2	22-Feb-2022 12:30
Arsenic	**0.0159**		**0.000800**	**0.00400**	**mg/L**	2	22-Feb-2022 12:30
Beryllium	**0.00718**		**0.000400**	**0.00400**	**mg/L**	2	22-Feb-2022 12:30
Cadmium	U		0.000400	0.00400	mg/L	2	22-Feb-2022 12:30
Chromium	**0.0849**		**0.000800**	**0.00800**	**mg/L**	2	22-Feb-2022 12:30
Copper	**0.0198**		**0.00200**	**0.00400**	**mg/L**	2	22-Feb-2022 12:30
Iron	**39.1**		**0.0240**	**0.400**	**mg/L**	2	22-Feb-2022 12:30
Lead	**0.0563**		**0.00120**	**0.00400**	**mg/L**	2	22-Feb-2022 12:30
Manganese	**0.747**		**0.00140**	**0.0100**	**mg/L**	2	22-Feb-2022 12:30
Nickel	**0.0271**		**0.00120**	**0.00400**	**mg/L**	2	22-Feb-2022 12:30
Potassium	**8.03**		**0.0360**	**0.400**	**mg/L**	2	22-Feb-2022 12:30
Selenium	**0.00349**	J	**0.00220**	**0.00400**	**mg/L**	2	22-Feb-2022 12:30
Silver	U		0.000400	0.00400	mg/L	2	22-Feb-2022 12:30
Thallium	U		0.000400	0.00400	mg/L	2	22-Feb-2022 12:30
Zinc	**0.275**		**0.00400**	**0.00800**	**mg/L**	2	22-Feb-2022 12:30

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22020380
Sample ID: NGL-Piez-105 Lab ID:HS22020380-02
Collection Date: 26-Jan-2022 10:21 Matrix:Groundwater

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 16-Feb-2022		Analyst: MSC
Mercury	**0.000520**	J	**0.000300**	**0.00200**	**mg/L**	1	16-Feb-2022 12:21
NITRATE/NITRITE BY IC BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate-Nitrite	**0.397**	J	**0.300**	**2.00**	**mg/L**	10	21-Feb-2022 14:22

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

Batch ID: 175385 **Start Date:** 16 Feb 2022 07:30 **End Date:** 16 Feb 2022 10:30
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020380-02		1 (mL)	10 (mL)	10	120 plastic HNO3

Batch ID: 175442 **Start Date:** 17 Feb 2022 08:52 **End Date:** 17 Feb 2022 16:00
Method: SW3511 **Prep Code:** 3511_PAH

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020380-02	1	31 (mL)	2 (mL)	0.06452	40 mL VOA vial, Neat

Batch ID: 175519 **Start Date:** 18 Feb 2022 11:00 **End Date:** 18 Feb 2022 15:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020380-02		10 (mL)	10 (mL)	1	120 plastic HNO3

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 175385 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Groundwater	
HS22020380-02	NGL-Piez-105	26 Jan 2022 10:21		16 Feb 2022 07:30	16 Feb 2022 12:21	1
Batch ID: 175442 (0)	**Test Name :** LOW-LEVEL PAHS - 8270D				**Matrix:** Groundwater	
HS22020380-02	NGL-Piez-105	26 Jan 2022 10:21		17 Feb 2022 08:52	21 Feb 2022 18:29	1
Batch ID: 175519 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Groundwater	
HS22020380-02	NGL-Piez-105	26 Jan 2022 10:21		18 Feb 2022 15:00	22 Feb 2022 12:30	2
Batch ID: R402347 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Groundwater	
HS22020380-02	NGL-Piez-105	26 Jan 2022 10:21			16 Feb 2022 17:35	1
Batch ID: R402459 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Groundwater	
HS22020380-02	NGL-Piez-105	26 Jan 2022 10:21			17 Feb 2022 11:49	1
Batch ID: R402744 (0)	**Test Name :** NITRATE/NITRITE BY IC BY SW9056A				**Matrix:** Groundwater	
HS22020380-02	NGL-Piez-105	26 Jan 2022 10:21			21 Feb 2022 14:22	10

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: 175385 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-175385** Units: **mg/L** Analysis Date: **16-Feb-2022 11:56**
Client ID: Run ID: **HG03_402355** SeqNo: **6505701** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U		0.000200								

LCS Sample ID: **LCS-175385** Units: **mg/L** Analysis Date: **16-Feb-2022 11:58**
Client ID: Run ID: **HG03_402355** SeqNo: **6505702** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00497		0.000200	0.005	0	99.4	80 - 120				

MS Sample ID: **HS22020655-01MS** Units: **mg/L** Analysis Date: **16-Feb-2022 12:12**
Client ID: Run ID: **HG03_402355** SeqNo: **6505706** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00459		0.000200	0.005	-0.000027	92.3	75 - 125				

MSD Sample ID: **HS22020655-01MSD** Units: **mg/L** Analysis Date: **16-Feb-2022 12:14**
Client ID: Run ID: **HG03_402355** SeqNo: **6505707** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00446		0.000200	0.005	-0.000027	89.7	75 - 125	0.00459	2.87	20	

The following samples were analyzed in this batch: HS22020380-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-175519** Units: **mg/L** Analysis Date: **21-Feb-2022 22:50**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6513140** PrepDate: **18-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	0.00092	0.00400								J
Copper	U	0.00200								
Iron	U	0.200								
Lead	U	0.00200								
Manganese	U	0.00500								
Nickel	U	0.00200								
Potassium	U	0.200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-175519** Units: **mg/L** Analysis Date: **21-Feb-2022 21:17**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6512695** PrepDate: **18-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04697	0.00200	0.05	0	93.9	80 - 120				
Arsenic	0.04711	0.00200	0.05	0	94.2	80 - 120				
Beryllium	0.04713	0.00200	0.05	0	94.3	80 - 120				
Cadmium	0.04819	0.00200	0.05	0	96.4	80 - 120				
Chromium	0.04666	0.00400	0.05	0	93.3	80 - 120				
Copper	0.04866	0.00200	0.05	0	97.3	80 - 120				
Iron	4.664	0.200	5	0	93.3	80 - 120				
Lead	0.04586	0.00200	0.05	0	91.7	80 - 120				
Manganese	0.04798	0.00500	0.05	0	96.0	80 - 120				
Nickel	0.048	0.00200	0.05	0	96.0	80 - 120				
Potassium	4.647	0.200	5	0	92.9	80 - 120				
Selenium	0.0492	0.00200	0.05	0	98.4	80 - 120				
Silver	0.05032	0.00200	0.05	0	101	80 - 120				
Thallium	0.04748	0.00200	0.05	0	95.0	80 - 120				
Zinc	0.04966	0.00400	0.05	0	99.3	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22020394-02MS** Units: **mg/L** Analysis Date: **21-Feb-2022 21:23**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6512698** PrepDate: **18-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05119	0.00200	0.05	0.00012	102	80 - 120				
Arsenic	0.05634	0.00200	0.05	0.00427	104	80 - 120				
Beryllium	0.05247	0.00200	0.05	0.00009	105	80 - 120				
Cadmium	0.05058	0.00200	0.05	-0.000006	101	80 - 120				
Chromium	0.05066	0.00400	0.05	0.000388	101	80 - 120				
Copper	0.05111	0.00200	0.05	0.000392	101	80 - 120				
Iron	6.194	0.200	5	1.173	100	80 - 120				
Lead	0.05048	0.00200	0.05	0.00029	100	80 - 120				
Manganese	0.7922	0.00500	0.05	0.7138	157	80 - 120				SO
Nickel	0.05246	0.00200	0.05	0.002191	101	80 - 120				
Potassium	7.031	0.200	5	2.036	99.9	80 - 120				
Selenium	0.05284	0.00200	0.05	0.000213	105	80 - 120				
Silver	0.05233	0.00200	0.05	-0.00001	105	80 - 120				
Thallium	0.05142	0.00200	0.05	0.00004	103	80 - 120				
Zinc	0.09058	0.00400	0.05	0.03602	109	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22020394-02MSD** Units: **mg/L** Analysis Date: **21-Feb-2022 21:25**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6512699** PrepDate: **18-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05013	0.00200	0.05	0.00012	100	80 - 120	0.05119	2.09	20	
Arsenic	0.05502	0.00200	0.05	0.00427	102	80 - 120	0.05634	2.37	20	
Beryllium	0.04999	0.00200	0.05	0.00009	99.8	80 - 120	0.05247	4.84	20	
Cadmium	0.04947	0.00200	0.05	-0.000006	99.0	80 - 120	0.05058	2.22	20	
Chromium	0.04924	0.00400	0.05	0.000388	97.7	80 - 120	0.05066	2.84	20	
Copper	0.05003	0.00200	0.05	0.000392	99.3	80 - 120	0.05111	2.13	20	
Iron	6.061	0.200	5	1.173	97.8	80 - 120	6.194	2.16	20	
Lead	0.04886	0.00200	0.05	0.00029	97.1	80 - 120	0.05048	3.27	20	
Manganese	0.769	0.00500	0.05	0.7138	110	80 - 120	0.7922	2.96	20	O
Nickel	0.05141	0.00200	0.05	0.002191	98.4	80 - 120	0.05246	2.02	20	
Potassium	6.807	0.200	5	2.036	95.4	80 - 120	7.031	3.24	20	
Selenium	0.05278	0.00200	0.05	0.000213	105	80 - 120	0.05284	0.114	20	
Silver	0.05073	0.00200	0.05	-0.00001	101	80 - 120	0.05233	3.1	20	
Thallium	0.05077	0.00200	0.05	0.00004	101	80 - 120	0.05142	1.28	20	
Zinc	0.08811	0.00400	0.05	0.03602	104	80 - 120	0.09058	2.76	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

PDS Sample ID: **HS22020394-02PDS** Units: **mg/L** Analysis Date: **21-Feb-2022 21:27**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6512700** PrepDate: **18-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1059	0.00200	0.1	0.00012	106	75 - 125				
Arsenic	0.1177	0.00200	0.1	0.00427	113	75 - 125				
Beryllium	0.1086	0.00200	0.1	0.00009	109	75 - 125				
Cadmium	0.1081	0.00200	0.1	-0.000006	108	75 - 125				
Chromium	0.1104	0.00400	0.1	0.000388	110	75 - 125				
Copper	0.1106	0.00200	0.1	0.000392	110	75 - 125				
Iron	12.01	0.200	10	1.173	108	75 - 125				
Lead	0.1075	0.00200	0.1	0.00029	107	75 - 125				
Manganese	0.8156	0.00500	0.1	0.7138	102	75 - 125				O
Nickel	0.1112	0.00200	0.1	0.002191	109	75 - 125				
Potassium	12.76	0.200	10	2.036	107	75 - 125				
Selenium	0.115	0.00200	0.1	0.000213	115	75 - 125				
Silver	0.1062	0.00200	0.1	-0.00001	106	75 - 125				
Thallium	0.1094	0.00200	0.1	0.00004	109	75 - 125				
Zinc	0.1486	0.00400	0.1	0.03602	113	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22020394-02SD** Units: **mg/L** Analysis Date: **21-Feb-2022 21:21**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6512697** PrepDate: **18-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.00012	0	10	
Arsenic	0.005019	0.0100					0.00427	0	10	J
Beryllium	U	0.0100					0.00009	0	10	
Cadmium	U	0.0100					-0.000006	0	10	
Chromium	U	0.0200					0.000388	0	10	
Copper	U	0.0100					0.000392	0	10	
Iron	1.181	1.00					1.173	0.667	10	
Lead	U	0.0100					0.00029	0	10	
Manganese	0.7049	0.0250					0.7138	1.25	10	
Nickel	U	0.0100					0.002191	0	10	
Potassium	2.048	1.00					2.036	0.617	10	
Selenium	U	0.0100					0.000213	0	10	
Silver	U	0.0100					-0.00001	0	10	
Thallium	U	0.0100					0.00004	0	10	
Zinc	0.03451	0.0200					0.03602	4.19	10	

The following samples were analyzed in this batch: HS22020380-02

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: 175442 (0) **Instrument: SV-6** **Method: LOW-LEVEL PAHS - 8270D**

MBLK Sample ID: **MBLK-175442** Units: **ug/L** Analysis Date: **21-Feb-2022 13:46**
Client ID: Run ID: **SV-6_402655** SeqNo: **6516814** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.100								
2-Methylnaphthalene	U	0.100								
Acenaphthene	U	0.100								
Acenaphthylene	U	0.100								
Anthracene	U	0.100								
Benz(a)anthracene	U	0.100								
Benzo(a)pyrene	U	0.100								
Benzo(b)fluoranthene	U	0.100								
Benzo(g,h,i)perylene	U	0.100								
Benzo(k)fluoranthene	U	0.100								
Chrysene	U	0.100								
Dibenz(a,h)anthracene	U	0.100								
Dibenzofuran	U	0.100								
Fluoranthene	U	0.100								
Fluorene	U	0.100								
Indeno(1,2,3-cd)pyrene	U	0.100								
Naphthalene	U	0.100								
Phenanthrene	U	0.100								
Pyrene	U	0.100								
Surr: 2-Fluorobiphenyl	*1.564*	*0.100*	*3.03*	*0*	*51.6*	*32 - 130*				
Surr: 4-Terphenyl-d14	*1.408*	*0.100*	*3.03*	*0*	*46.5*	*40 - 135*				
Surr: Nitrobenzene-d5	*2.192*	*0.100*	*3.03*	*0*	*72.3*	*45 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: 175442 (0) **Instrument: SV-6** **Method: LOW-LEVEL PAHS - 8270D**

LCS Sample ID: **LCS-175442** Units: **ug/L** Analysis Date: **21-Feb-2022 14:06**
Client ID: Run ID: **SV-6_402655** SeqNo: **6516815** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	2.888	0.100	3.03	0	95.3	40 - 140				
2-Methylnaphthalene	2.832	0.100	3.03	0	93.5	40 - 140				
Acenaphthene	1.98	0.100	3.03	0	65.3	40 - 140				
Acenaphthylene	2.416	0.100	3.03	0	79.7	40 - 140				
Anthracene	2.922	0.100	3.03	0	96.4	40 - 140				
Benz(a)anthracene	1.43	0.100	3.03	0	47.2	40 - 140				
Benzo(a)pyrene	2.935	0.100	3.03	0	96.9	40 - 140				
Benzo(b)fluoranthene	1.905	0.100	3.03	0	62.9	40 - 140				
Benzo(g,h,i)perylene	1.982	0.100	3.03	0	65.4	40 - 140				
Benzo(k)fluoranthene	1.966	0.100	3.03	0	64.9	40 - 140				
Chrysene	1.978	0.100	3.03	0	65.3	40 - 140				
Dibenz(a,h)anthracene	1.951	0.100	3.03	0	64.4	40 - 140				
Dibenzofuran	2.5	0.100	3.03	0	82.5	40 - 140				
Fluoranthene	2.39	0.100	3.03	0	78.9	40 - 140				
Fluorene	2.601	0.100	3.03	0	85.9	40 - 140				
Indeno(1,2,3-cd)pyrene	2.186	0.100	3.03	0	72.2	40 - 140				
Naphthalene	2.805	0.100	3.03	0	92.6	40 - 140				
Phenanthrene	2.731	0.100	3.03	0	90.1	40 - 140				
Pyrene	3.187	0.100	3.03	0	105	40 - 140				
Surr: 2-Fluorobiphenyl	*2.275*	*0.100*	*3.03*	*0*	*75.1*	*32 - 130*				
Surr: 4-Terphenyl-d14	*1.455*	*0.100*	*3.03*	*0*	*48.0*	*40 - 135*				
Surr: Nitrobenzene-d5	*3.02*	*0.100*	*3.03*	*0*	*99.7*	*45 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: 175442 (0) **Instrument: SV-6** **Method: LOW-LEVEL PAHS - 8270D**

LCSD Sample ID: **LCSD-175442** Units: **ug/L** Analysis Date: **21-Feb-2022 14:26**
Client ID: Run ID: **SV-6_402655** SeqNo: **6516816** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	2.561	0.100	3.03	0	84.5	40 - 140	2.888	12	25	
2-Methylnaphthalene	2.49	0.100	3.03	0	82.2	40 - 140	2.832	12.8	25	
Acenaphthene	2.008	0.100	3.03	0	66.3	40 - 140	1.98	1.4	25	
Acenaphthylene	2.308	0.100	3.03	0	76.2	40 - 140	2.416	4.58	25	
Anthracene	2.975	0.100	3.03	0	98.2	40 - 140	2.922	1.79	25	
Benz(a)anthracene	1.575	0.100	3.03	0	52.0	40 - 140	1.43	9.63	25	
Benzo(a)pyrene	2.449	0.100	3.03	0	80.8	40 - 140	2.935	18.1	25	
Benzo(b)fluoranthene	1.693	0.100	3.03	0	55.9	40 - 140	1.905	11.8	25	
Benzo(g,h,i)perylene	2.242	0.100	3.03	0	74.0	40 - 140	1.982	12.3	25	
Benzo(k)fluoranthene	2.337	0.100	3.03	0	77.1	40 - 140	1.966	17.3	25	
Chrysene	1.929	0.100	3.03	0	63.7	40 - 140	1.978	2.5	25	
Dibenz(a,h)anthracene	1.799	0.100	3.03	0	59.4	40 - 140	1.951	8.11	25	
Dibenzofuran	2.786	0.100	3.03	0	91.9	40 - 140	2.5	10.8	25	
Fluoranthene	2.568	0.100	3.03	0	84.8	40 - 140	2.39	7.18	25	
Fluorene	2.494	0.100	3.03	0	82.3	40 - 140	2.601	4.22	25	
Indeno(1,2,3-cd)pyrene	2.071	0.100	3.03	0	68.3	40 - 140	2.186	5.42	25	
Naphthalene	2.825	0.100	3.03	0	93.2	40 - 140	2.805	0.721	25	
Phenanthrene	2.876	0.100	3.03	0	94.9	40 - 140	2.731	5.15	25	
Pyrene	2.798	0.100	3.03	0	92.3	40 - 140	3.187	13	25	
Surr: 2-Fluorobiphenyl	*2.151*	*0.100*	*3.03*	*0*	*71.0*	*32 - 130*	*2.275*	*5.61*	*25*	
Surr: 4-Terphenyl-d14	*1.588*	*0.100*	*3.03*	*0*	*52.4*	*40 - 135*	*1.455*	*8.74*	*25*	
Surr: Nitrobenzene-d5	*2.852*	*0.100*	*3.03*	*0*	*94.1*	*45 - 142*	*3.02*	*5.71*	*25*	

The following samples were analyzed in this batch: HS22020380-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-220216** Units: **ug/L** Analysis Date: **16-Feb-2022 10:18**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505553** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	1.0								
1,1,2,2-Tetrachloroethane	U	1.0								
1,1,2-Trichlor-1,2,2-trifluoroethane	U	1.0								
1,1,2-Trichloroethane	U	1.0								
1,1-Dichloroethane	U	1.0								
1,1-Dichloroethene	U	1.0								
1,2,3-Trichlorobenzene	U	1.0								
1,2,4-Trichlorobenzene	U	1.0								
1,2-Dibromo-3-chloropropane	U	1.0								
1,2-Dibromoethane	U	1.0								
1,2-Dichlorobenzene	U	1.0								
1,2-Dichloroethane	U	1.0								
1,2-Dichloropropane	U	1.0								
1,3-Dichlorobenzene	U	1.0								
1,4-Dichlorobenzene	U	1.0								
2-Butanone	U	2.0								
2-Hexanone	U	2.0								
4-Methyl-2-pentanone	U	2.0								
Acetone	U	2.0								
Benzene	U	1.0								
Bromochloromethane	U	1.0								
Bromodichloromethane	U	1.0								
Bromoform	U	1.0								
Bromomethane	U	1.0								
Carbon disulfide	U	2.0								
Carbon tetrachloride	U	1.0								
Chlorobenzene	U	1.0								
Chloroethane	U	1.0								
Chloroform	U	1.0								
Chloromethane	U	1.0								
cis-1,2-Dichloroethene	U	1.0								
cis-1,3-Dichloropropene	U	1.0								
Cyclohexane	U	1.0								
Dibromochloromethane	U	1.0								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-220216** Units: **ug/L** Analysis Date: **16-Feb-2022 10:18**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505553** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	U	1.0								
Ethylbenzene	U	1.0								
Isopropylbenzene	U	1.0								
m,p-Xylene	U	2.0								
Methyl acetate	U	1.0								
Methyl tert-butyl ether	U	1.0								
Methylcyclohexane	U	1.0								
o-Xylene	U	1.0								
Styrene	U	1.0								
Tetrachloroethene	U	1.0								
Toluene	U	1.0								
trans-1,2-Dichloroethene	U	1.0								
trans-1,3-Dichloropropene	U	1.0								
Trichloroethene	U	1.0								
Trichlorofluoromethane	U	1.0								
Vinyl chloride	U	1.0								
Xylenes, Total	U	1.0								
Surr: 1,2-Dichloroethane-d4	*51.05*	*1.0*	*50*	*0*	*102*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*49.11*	*1.0*	*50*	*0*	*98.2*	*77 - 113*				
Surr: Dibromofluoromethane	*51.63*	*1.0*	*50*	*0*	*103*	*73 - 126*				
Surr: Toluene-d8	*49.62*	*1.0*	*50*	*0*	*99.2*	*81 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-220216** Units: **ug/L** Analysis Date: **16-Feb-2022 09:34**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505552** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	21.08	1.0	20	0	105	70 - 130				
1,1,2,2-Tetrachloroethane	20.33	1.0	20	0	102	70 - 120				
1,1,2-Trichlor-1,2,2-trifluoroethane	22.15	1.0	20	0	111	70 - 130				
1,1,2-Trichloroethane	20.82	1.0	20	0	104	77 - 113				
1,1-Dichloroethane	20.41	1.0	20	0	102	71 - 122				
1,1-Dichloroethene	21.5	1.0	20	0	108	70 - 130				
1,2,3-Trichlorobenzene	19.36	1.0	20	0	96.8	70 - 130				
1,2,4-Trichlorobenzene	19.87	1.0	20	0	99.3	77 - 126				
1,2-Dibromo-3-chloropropane	20.34	1.0	20	0	102	70 - 130				
1,2-Dibromoethane	20.98	1.0	20	0	105	76 - 123				
1,2-Dichlorobenzene	19.16	1.0	20	0	95.8	77 - 113				
1,2-Dichloroethane	20.71	1.0	20	0	104	70 - 124				
1,2-Dichloropropane	19.12	1.0	20	0	95.6	72 - 119				
1,3-Dichlorobenzene	19.13	1.0	20	0	95.6	78 - 118				
1,4-Dichlorobenzene	20.3	1.0	20	0	101	79 - 113				
2-Butanone	32.62	2.0	40	0	81.5	70 - 130				
2-Hexanone	40.97	2.0	40	0	102	70 - 130				
4-Methyl-2-pentanone	43.28	2.0	40	0	108	70 - 130				
Acetone	42.35	2.0	40	0	106	70 - 130				
Benzene	19.4	1.0	20	0	97.0	74 - 120				
Bromochloromethane	20.09	1.0	20	0	100	76 - 124				
Bromodichloromethane	20.56	1.0	20	0	103	74 - 122				
Bromoform	20.7	1.0	20	0	103	73 - 128				
Bromomethane	24.47	1.0	20	0	122	70 - 130				
Carbon disulfide	39.59	2.0	40	0	99.0	70 - 130				
Carbon tetrachloride	20.16	1.0	20	0	101	71 - 125				
Chlorobenzene	19.01	1.0	20	0	95.1	76 - 113				
Chloroethane	20.67	1.0	20	0	103	70 - 130				
Chloroform	20.34	1.0	20	0	102	71 - 121				
Chloromethane	23.43	1.0	20	0	117	70 - 129				
cis-1,2-Dichloroethene	20.04	1.0	20	0	100	75 - 122				
cis-1,3-Dichloropropene	20.74	1.0	20	0	104	73 - 127				
Cyclohexane	18.96	1.0	20	0	94.8	70 - 130				
Dibromochloromethane	21.52	1.0	20	0	108	77 - 122				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-220216** Units: **ug/L** Analysis Date: **16-Feb-2022 09:34**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505552** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	31.69	1.0	20	0	158	70 - 130				S
Ethylbenzene	19.55	1.0	20	0	97.7	77 - 117				
Isopropylbenzene	20.2	1.0	20	0	101	73 - 127				
m,p-Xylene	39.36	2.0	40	0	98.4	77 - 122				
Methyl acetate	18.09	1.0	20	0	90.4	76 - 122				
Methyl tert-butyl ether	18.33	1.0	20	0	91.6	70 - 130				
Methylcyclohexane	18.25	1.0	20	0	91.3	61 - 157				
o-Xylene	18.82	1.0	20	0	94.1	75 - 119				
Styrene	20.3	1.0	20	0	101	72 - 126				
Tetrachloroethene	19.92	1.0	20	0	99.6	76 - 119				
Toluene	19.46	1.0	20	0	97.3	77 - 118				
trans-1,2-Dichloroethene	19.44	1.0	20	0	97.2	72 - 127				
trans-1,3-Dichloropropene	19.13	1.0	20	0	95.7	77 - 119				
Trichloroethene	18.99	1.0	20	0	95.0	77 - 121				
Trichlorofluoromethane	21.82	1.0	20	0	109	70 - 130				
Vinyl chloride	21.39	1.0	20	0	107	70 - 130				
Xylenes, Total	58.17	1.0	60	0	97.0	75 - 122				
Surr: 1,2-Dichloroethane-d4	*51*	*1.0*	*50*	*0*	*102*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*50.22*	*1.0*	*50*	*0*	*100*	*77 - 113*				
Surr: Dibromofluoromethane	*51.79*	*1.0*	*50*	*0*	*104*	*73 - 126*				
Surr: Toluene-d8	*50.85*	*1.0*	*50*	*0*	*102*	*81 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS22020394-02MS** Units: **ug/L** Analysis Date: **16-Feb-2022 11:40**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505748** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	19.57	1.0	20	0	97.8	70 - 130				
1,1,2,2-Tetrachloroethane	16.87	1.0	20	0	84.4	70 - 123				
1,1,2-Trichlor-1,2,2-trifluoroethane	20.62	1.0	20	0	103	70 - 130				
1,1,2-Trichloroethane	16.38	1.0	20	0.3246	80.3	70 - 117				
1,1-Dichloroethane	17.6	1.0	20	0	88.0	70 - 127				
1,1-Dichloroethene	18.77	1.0	20	0	93.8	70 - 130				
1,2,3-Trichlorobenzene	15.93	1.0	20	0	79.7	70 - 130				
1,2,4-Trichlorobenzene	16.4	1.0	20	0	82.0	70 - 125				
1,2-Dibromo-3-chloropropane	17.63	1.0	20	0	88.1	70 - 130				
1,2-Dibromoethane	18.26	1.0	20	0	91.3	70 - 124				
1,2-Dichlorobenzene	16.16	1.0	20	0	80.8	70 - 115				
1,2-Dichloroethane	17.72	1.0	20	4.804	64.6	70 - 127				S
1,2-Dichloropropane	15.89	1.0	20	38.47	-113	70 - 122				S
1,3-Dichlorobenzene	16.04	1.0	20	0	80.2	70 - 119				
1,4-Dichlorobenzene	17.15	1.0	20	0	85.7	70 - 114				
2-Butanone	32.65	2.0	40	6.865	64.5	70 - 130				S
2-Hexanone	32.5	2.0	40	1.49	77.5	70 - 130				
4-Methyl-2-pentanone	36.64	2.0	40	1.405	88.1	70 - 130				
Acetone	40.09	2.0	40	3.589	91.3	70 - 130				
Benzene	21.19	1.0	20	4.096	85.4	70 - 127				
Bromochloromethane	17.22	1.0	20	0	86.1	70 - 127				
Bromodichloromethane	17.43	1.0	20	0	87.2	70 - 124				
Bromoform	17.17	1.0	20	0	85.9	70 - 129				
Bromomethane	20.15	1.0	20	0	101	70 - 130				
Carbon disulfide	35.53	2.0	40	0	88.8	70 - 130				
Carbon tetrachloride	18.64	1.0	20	0.5009	90.7	70 - 130				
Chlorobenzene	16.34	1.0	20	0	81.7	70 - 114				
Chloroethane	18.07	1.0	20	0	90.3	70 - 130				
Chloroform	17.4	1.0	20	0	87.0	70 - 125				
Chloromethane	19.32	1.0	20	5.388	69.7	70 - 130				S
cis-1,2-Dichloroethene	17.07	1.0	20	0	85.3	70 - 128				
cis-1,3-Dichloropropene	17.5	1.0	20	0	87.5	70 - 125				
Cyclohexane	21.37	1.0	20	1.64	98.7	70 - 130				
Dibromochloromethane	17.38	1.0	20	0	86.9	70 - 124				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS22020394-02MS** Units: **ug/L** Analysis Date: **16-Feb-2022 11:40**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505748** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	22.51	1.0	20	0	113	70 - 130				
Ethylbenzene	18.28	1.0	20	0.637	88.2	70 - 124				
Isopropylbenzene	19.08	1.0	20	0.7721	91.5	70 - 130				
m,p-Xylene	36.21	2.0	40	1.585	86.6	70 - 130				
Methyl acetate	64.42	1.0	20	0	322	76 - 122				S
Methyl tert-butyl ether	27.11	1.0	20	8.375	93.7	70 - 130				
Methylcyclohexane	23.29	1.0	20	4.687	93.0	61 - 158				
o-Xylene	17.06	1.0	20	0.3288	83.6	70 - 124				
Styrene	17.18	1.0	20	0	85.9	70 - 130				
Tetrachloroethene	17.61	1.0	20	0	88.0	70 - 130				
Toluene	17.41	1.0	20	0.4352	84.9	70 - 123				
trans-1,2-Dichloroethene	17.51	1.0	20	0	87.6	70 - 130				
trans-1,3-Dichloropropene	16.4	1.0	20	1.437	74.8	70 - 121				
Trichloroethene	16.69	1.0	20	0	83.4	70 - 129				
Trichlorofluoromethane	19.54	1.0	20	0	97.7	70 - 130				
Vinyl chloride	19.47	1.0	20	0	97.4	70 - 130				
Xylenes, Total	53.27	1.0	60	1.914	85.6	70 - 130				
Surr: 1,2-Dichloroethane-d4	*51.41*	*1.0*	*50*	*0*	*103*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*50.81*	*1.0*	*50*	*0*	*102*	*77 - 113*				
Surr: Dibromofluoromethane	*52.05*	*1.0*	*50*	*0*	*104*	*77 - 123*				
Surr: Toluene-d8	*49.95*	*1.0*	*50*	*0*	*99.9*	*82 - 127*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS22020394-02MSD** Units: **ug/L** Analysis Date: **16-Feb-2022 12:02**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505749** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	19.39	1.0	20	0	97.0	70 - 130	19.57	0.909	20	
1,1,2,2-Tetrachloroethane	16.95	1.0	20	0	84.7	70 - 123	16.87	0.444	20	
1,1,2-Trichlor-1,2,2-trifluoroethane	20.49	1.0	20	0	102	70 - 130	20.62	0.641	20	
1,1,2-Trichloroethane	17.01	1.0	20	0.3246	83.5	70 - 117	16.38	3.81	20	
1,1-Dichloroethane	17.7	1.0	20	0	88.5	70 - 127	17.6	0.517	20	
1,1-Dichloroethene	19.06	1.0	20	0	95.3	70 - 130	18.77	1.56	20	
1,2,3-Trichlorobenzene	16.6	1.0	20	0	83.0	70 - 130	15.93	4.1	20	
1,2,4-Trichlorobenzene	17.81	1.0	20	0	89.0	70 - 125	16.4	8.21	20	
1,2-Dibromo-3-chloropropane	17.57	1.0	20	0	87.8	70 - 130	17.63	0.336	20	
1,2-Dibromoethane	18.25	1.0	20	0	91.2	70 - 124	18.26	0.072	20	
1,2-Dichlorobenzene	16.27	1.0	20	0	81.3	70 - 115	16.16	0.651	20	
1,2-Dichloroethane	17.31	1.0	20	4.804	62.5	70 - 127	17.72	2.37	20	S
1,2-Dichloropropane	16.3	1.0	20	38.47	-111	70 - 122	15.89	2.57	20	S
1,3-Dichlorobenzene	16.42	1.0	20	0	82.1	70 - 119	16.04	2.33	20	
1,4-Dichlorobenzene	17.36	1.0	20	0	86.8	70 - 114	17.15	1.25	20	
2-Butanone	31.12	2.0	40	6.865	60.6	70 - 130	32.65	4.8	20	S
2-Hexanone	33.71	2.0	40	1.49	80.6	70 - 130	32.5	3.67	20	
4-Methyl-2-pentanone	40.43	2.0	40	1.405	97.6	70 - 130	36.64	9.84	20	
Acetone	41.91	2.0	40	3.589	95.8	70 - 130	40.09	4.44	20	
Benzene	21.14	1.0	20	4.096	85.2	70 - 127	21.19	0.231	20	
Bromochloromethane	16.64	1.0	20	0	83.2	70 - 127	17.22	3.47	20	
Bromodichloromethane	17.51	1.0	20	0	87.6	70 - 124	17.43	0.468	20	
Bromoform	16.69	1.0	20	0	83.4	70 - 129	17.17	2.87	20	
Bromomethane	18.8	1.0	20	0	94.0	70 - 130	20.15	6.91	20	
Carbon disulfide	35.85	2.0	40	0	89.6	70 - 130	35.53	0.913	20	
Carbon tetrachloride	18.48	1.0	20	0.5009	89.9	70 - 130	18.64	0.875	20	
Chlorobenzene	16.19	1.0	20	0	80.9	70 - 114	16.34	0.927	20	
Chloroethane	17.44	1.0	20	0	87.2	70 - 130	18.07	3.53	20	
Chloroform	17.17	1.0	20	0	85.8	70 - 125	17.4	1.35	20	
Chloromethane	18.48	1.0	20	5.388	65.5	70 - 130	19.32	4.42	20	S
cis-1,2-Dichloroethene	17.21	1.0	20	0	86.0	70 - 128	17.07	0.813	20	
cis-1,3-Dichloropropene	17.73	1.0	20	0	88.7	70 - 125	17.5	1.29	20	
Cyclohexane	22.59	1.0	20	1.64	105	70 - 130	21.37	5.56	20	
Dibromochloromethane	17.73	1.0	20	0	88.6	70 - 124	17.38	1.97	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS22020394-02MSD** Units: **ug/L** Analysis Date: **16-Feb-2022 12:02**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505749** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Dichlorodifluoromethane	21.38	1.0	20	0	107	70 - 130	22.51	5.15	20	
Ethylbenzene	18.37	1.0	20	0.637	88.7	70 - 124	18.28	0.47	20	
Isopropylbenzene	19.59	1.0	20	0.7721	94.1	70 - 130	19.08	2.62	20	
m,p-Xylene	36.4	2.0	40	1.585	87.0	70 - 130	36.21	0.502	20	
Methyl acetate	67.86	1.0	20	0	339	76 - 122	64.42	5.2	20	S
Methyl tert-butyl ether	26.53	1.0	20	8.375	90.8	70 - 130	27.11	2.15	20	
Methylcyclohexane	23.44	1.0	20	4.687	93.8	61 - 158	23.29	0.637	20	
o-Xylene	17.17	1.0	20	0.3288	84.2	70 - 124	17.06	0.673	20	
Styrene	17.49	1.0	20	0	87.4	70 - 130	17.18	1.79	20	
Tetrachloroethene	18.09	1.0	20	0	90.5	70 - 130	17.61	2.72	20	
Toluene	17.52	1.0	20	0.4352	85.4	70 - 123	17.41	0.664	20	
trans-1,2-Dichloroethene	17.34	1.0	20	0	86.7	70 - 130	17.51	0.988	20	
trans-1,3-Dichloropropene	16.48	1.0	20	1.437	75.2	70 - 121	16.4	0.469	20	
Trichloroethene	16.5	1.0	20	0	82.5	70 - 129	16.69	1.11	20	
Trichlorofluoromethane	20.44	1.0	20	0	102	70 - 130	19.54	4.5	20	
Vinyl chloride	19.23	1.0	20	0	96.2	70 - 130	19.47	1.25	20	
Xylenes, Total	53.57	1.0	60	1.914	86.1	70 - 130	53.27	0.557	20	
Surr: 1,2-Dichloroethane-d4	*50.6*	*1.0*	*50*	*0*	*101*	*70 - 126*	*51.41*	*1.6*	*20*	
Surr: 4-Bromofluorobenzene	*50.72*	*1.0*	*50*	*0*	*101*	*77 - 113*	*50.81*	*0.184*	*20*	
Surr: Dibromofluoromethane	*51.96*	*1.0*	*50*	*0*	*104*	*77 - 123*	*52.05*	*0.183*	*20*	
Surr: Toluene-d8	*50.27*	*1.0*	*50*	*0*	*101*	*82 - 127*	*49.95*	*0.649*	*20*	

The following samples were analyzed in this batch: HS22020380-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402459 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-220217** Units: **ug/L** Analysis Date: **17-Feb-2022 11:27**
Client ID: Run ID: **VOA4_402459** SeqNo: **6507682** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Methylene chloride	U	2.0								
Surr: 1,2-Dichloroethane-d4	*51.13*	*1.0*	*50*	*0*	*102*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*49.72*	*1.0*	*50*	*0*	*99.4*	*77 - 113*				
Surr: Dibromofluoromethane	*51.01*	*1.0*	*50*	*0*	*102*	*73 - 126*				
Surr: Toluene-d8	*50.07*	*1.0*	*50*	*0*	*100*	*81 - 120*				

LCS Sample ID: **VLCSW-220217** Units: **ug/L** Analysis Date: **17-Feb-2022 10:43**
Client ID: Run ID: **VOA4_402459** SeqNo: **6507681** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Methylene chloride	22.09	2.0	20	0	110	70 - 127				
Surr: 1,2-Dichloroethane-d4	*49.92*	*1.0*	*50*	*0*	*99.8*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*50.81*	*1.0*	*50*	*0*	*102*	*77 - 113*				
Surr: Dibromofluoromethane	*51.01*	*1.0*	*50*	*0*	*102*	*73 - 126*				
Surr: Toluene-d8	*49.87*	*1.0*	*50*	*0*	*99.7*	*81 - 120*				

MS Sample ID: **HS22020379-02MS** Units: **ug/L** Analysis Date: **17-Feb-2022 12:33**
Client ID: Run ID: **VOA4_402459** SeqNo: **6507685** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Methylene chloride	3714	100	1000	3023	69.1	70 - 128				S
Surr: 1,2-Dichloroethane-d4	*2489*	*50*	*2500*	*0*	*99.6*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*2501*	*50*	*2500*	*0*	*100*	*77 - 113*				
Surr: Dibromofluoromethane	*2585*	*50*	*2500*	*0*	*103*	*77 - 123*				
Surr: Toluene-d8	*2517*	*50*	*2500*	*0*	*101*	*82 - 127*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402459 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS22020379-02MSD** Units: **ug/L** Analysis Date: **17-Feb-2022 12:55**
Client ID: Run ID: **VOA4_402459** SeqNo: **6507686** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Methylene chloride	3642	100	1000	3023	61.9	70 - 128	3714	1.95	20	S
Surr: 1,2-Dichloroethane-d4	*2542*	*50*	*2500*	*0*	*102*	*70 - 126*	*2489*	*2.12*	*20*	
Surr: 4-Bromofluorobenzene	*2522*	*50*	*2500*	*0*	*101*	*77 - 113*	*2501*	*0.834*	*20*	
Surr: Dibromofluoromethane	*2538*	*50*	*2500*	*0*	*102*	*77 - 123*	*2585*	*1.82*	*20*	
Surr: Toluene-d8	*2507*	*50*	*2500*	*0*	*100*	*82 - 127*	*2517*	*0.424*	*20*	

The following samples were analyzed in this batch: HS22020380-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020380

QC BATCH REPORT

Batch ID: R402744 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY IC BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **21-Feb-2022 11:48**
Client ID: Run ID: **ICS-Integrion_402744** SeqNo: **6513828** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **21-Feb-2022 11:54**
Client ID: Run ID: **ICS-Integrion_402744** SeqNo: **6513829** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	8.011	0.200	8	0	100	90 - 110				

MS Sample ID: **HS22020380-02MS** Units: **mg/L** Analysis Date: **21-Feb-2022 14:27**
Client ID: **NGL-Piez-105** Run ID: **ICS-Integrion_402744** SeqNo: **6513836** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	35.13	2.00	40	0.397	86.8	80 - 120				

MSD Sample ID: **HS22020380-02MSD** Units: **mg/L** Analysis Date: **21-Feb-2022 14:33**
Client ID: **NGL-Piez-105** Run ID: **ICS-Integrion_402744** SeqNo: **6513837** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	35.83	2.00	40	0.397	88.6	80 - 120	35.13	1.98	20	

The following samples were analyzed in this batch: HS22020380-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: **HS22020380**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-34	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS22020380 **Date/Time Received:** **08-Feb-2022 13:20**

Client Name: ERM Annapolis **Received by:** **Nilesh D. Ranchod**

Completed By:	/S/ Nilesh D. Ranchod	08-Feb-2022 16:58	**Reviewed by:**	/S/ Corey Grandits	09-Feb-2022 09:16
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **Sludge** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☑	No ☐	Not Present ☐
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s):	9.5C/1.0C UC/C	IR31
Cooler(s)/Kit(s):	45892	
Date/Time sample(s) sent to storage:	02/08/2022 17:30	

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes: Sample matrix COC=GW Receieved = Heavy Sludge.
Lab centrifuged samples to obtain rough 100ml of water volume to perform VOCs, PAHs, anions, and metals.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

HS22020380

ERM

Gas to Energy Environmental Impact Assessment S

Customer Information		Project Information		ALS Project Manager:	
Purchase Order		Project Name	Gas to Energy Environmental Impact Assessment Study	A	8081_Water_Low (8081 Pesticides)
Work Order		Project Number	0590231	B	8151_Water (8151 Herbicides)
Company Name	ERM	Bill To Company	ERM	C	8260_LL_ Water (8260 TCL VOCs)
Send Report To	Herbert Pirela	Invoice Attn.	AP	D	8270_LOW_Water (8270 PAHs)
Address	190 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr	E	9056_Water-NO2-NO3 Combined & NO3 "NEAT"
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401	F	COND_Water (Conductivity) & pH
Phone	(410) 972-4124	Phone	(410) 972-4124	G	ICP_TWater (6020/7470 Metals 16)
Fax		Fax		H	P-TWater (~~Phosphorous~~) 15
e-Mail Address	herbert.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	I	PCB_Water_Low (8082 PCBs)
				J	TOC_Water 9060 (Total Organic Carbon)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	NGL-Piez-105	26/01/2022	10:21 AM	GW	1,2,3,8	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Lalila Gopaul
Delshah Hamid

Shipment Method:

Required Turnaround Time: ☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other _____

Results Due Date:

	Date:	Time:		
Relinquished by: Delshah Hamid	27/01/2021	9:37am	Received by:	
Relinquished by: DHL	Date: 2/3/22	Time: 13:20	Received by (Laboratory):	
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

Notes:

Cooler Temp. 4°C / 4.5

QC Package: (Check Box Below)

X	Level II: Standard QC	TRRP-Checklist
	Level III: Std QC + Raw Data	TRRP Level IV
	Level IV: SW846 CLP-Like	
	Other: _____	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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1 2 N 3: CR + 0.5

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February 24, 2022

Herbert Pirela
ERM
180 Admiral Cochrance Dr
Suite 400
Annapolis, MD 21401

Work Order: **HS22020379**

Laboratory Results for: **Gas to Energy Environmental Impact Assessment Study**

Dear Herbert Pirela,

ALS Environmental received 1 sample(s) on Feb 08, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS22020379

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22020379-02	NGL-Piez-106	Water		26-Jan-2022 08:25	08-Feb-2022 13:20	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS22020379

GCMS Semivolatiles by Method SW8270

Batch ID: 175442

Sample ID: NGL-Piez-106 (HS22020379-02)

- Sample holding time expired prior analysis, samples were centrifuged to only analyze the water portion.

GCMS Volatiles by Method SW8260

Batch ID: R402347

Sample ID: CCV

- Dichlorodifluoromethane is exceeded %D limits on CCV. Associated samples are non-detect for this analyte.

Sample ID: NGL-Piez-106 (HS22020379-02)

- Sample holding time expired prior analysis, samples were centrifuged to only analyze the water portion.

Sample ID: VLCSW-220216

- Dichlorodifluoromethane is exceeded %recovery limits on LCS. Associated samples are non-detect for this analyte.

Sample ID: HS22020394-02MS

- MS and MSD were performed on unrelated sample.

Batch ID: R402459

Sample ID: NGL-Piez-106 (HS22020379-02MS

- The recovery of the Matrix Spike (MS) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The recovery of the MS may be due to sample matrix interference.

Sample ID: NGL-Piez-106 (HS22020379-02)

- Sample received out of hold times. Sample vials have head space with sample volume of less than 20 mL..

Sample ID: NGL-Piez-106 (HS22020379-02MSD)

- The recovery of the Matrix Spike Duplicate (MSD) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The failed recovery of the MSD may be due to sample matrix interference.

Metals by Method SW6020A

Batch ID: 175519

Sample ID: HS22020394-02MS

- MS and MSD are for an unrelated sample.

Metals by Method SW7470A

Batch ID: 175385

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS22020379

WetChemistry by Method SW9056

Batch ID: R402744

Sample ID: NGL-Piez-106 (HS22020379-02)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22020379
Sample ID: NGL-Piez-106 Lab ID:HS22020379-02
Collection Date: 26-Jan-2022 08:25 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C	**Method:SW8260**						Analyst: AKP
1,1,1-Trichloroethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
1,1,2,2-Tetrachloroethane	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:13
1,1,2-Trichlor-1,2,2-trifluoroethane	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:13
1,1,2-Trichloroethane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
1,1-Dichloroethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
1,1-Dichloroethene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
1,2,3-Trichlorobenzene	U	H	0.40	1.0	ug/L	1	16-Feb-2022 17:13
1,2,4-Trichlorobenzene	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:13
1,2-Dibromo-3-chloropropane	U	H	1.0	1.0	ug/L	1	16-Feb-2022 17:13
1,2-Dibromoethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
1,2-Dichlorobenzene	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:13
1,2-Dichloroethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
1,2-Dichloropropane	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:13
1,3-Dichlorobenzene	U	H	0.40	1.0	ug/L	1	16-Feb-2022 17:13
1,4-Dichlorobenzene	U	H	0.40	1.0	ug/L	1	16-Feb-2022 17:13
2-Butanone	U	H	0.50	2.0	ug/L	1	16-Feb-2022 17:13
2-Hexanone	U	H	1.0	2.0	ug/L	1	16-Feb-2022 17:13
4-Methyl-2-pentanone	U	H	0.70	2.0	ug/L	1	16-Feb-2022 17:13
Acetone	**11**	H	**2.0**	**2.0**	**ug/L**	1	16-Feb-2022 17:13
Benzene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
Bromochloromethane	**5.4**	H	**0.20**	**1.0**	**ug/L**	1	16-Feb-2022 17:13
Bromodichloromethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
Bromoform	U	H	0.40	1.0	ug/L	1	16-Feb-2022 17:13
Bromomethane	U	H	0.40	1.0	ug/L	1	16-Feb-2022 17:13
Carbon disulfide	U	H	0.60	2.0	ug/L	1	16-Feb-2022 17:13
Carbon tetrachloride	U	H	0.50	1.0	ug/L	1	16-Feb-2022 17:13
Chlorobenzene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Chloroethane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Chloroform	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
Chloromethane	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
cis-1,2-Dichloroethene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
cis-1,3-Dichloropropene	U	H	0.10	1.0	ug/L	1	16-Feb-2022 17:13
Cyclohexane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Dibromochloromethane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Dichlorodifluoromethane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Ethylbenzene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Isopropylbenzene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
m,p-Xylene	U	H	0.50	2.0	ug/L	1	16-Feb-2022 17:13
Methyl acetate	U	H	1.0	1.0	ug/L	1	16-Feb-2022 17:13

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22020379
Sample ID: NGL-Piez-106 Lab ID:HS22020379-02
Collection Date: 26-Jan-2022 08:25 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		**Method:SW8260**					Analyst: AKP
Methyl tert-butyl ether	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
Methylcyclohexane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Methylene chloride	**3,000**	H	**50**	**100**	**ug/L**	50	17-Feb-2022 12:11
o-Xylene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Styrene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Tetrachloroethene	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Toluene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
trans-1,2-Dichloroethene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
trans-1,3-Dichloropropene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
Trichloroethene	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
Trichlorofluoromethane	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Vinyl chloride	U	H	0.20	1.0	ug/L	1	16-Feb-2022 17:13
Xylenes, Total	U	H	0.30	1.0	ug/L	1	16-Feb-2022 17:13
Surr: 1,2-Dichloroethane-d4	*103*			*70-126*	*%REC*	*1*	*16-Feb-2022 17:13*
Surr: 1,2-Dichloroethane-d4	*103*			*70-126*	*%REC*	*50*	*17-Feb-2022 12:11*
Surr: 4-Bromofluorobenzene	*97.8*			*77-113*	*%REC*	*1*	*16-Feb-2022 17:13*
Surr: 4-Bromofluorobenzene	*99.1*			*77-113*	*%REC*	*50*	*17-Feb-2022 12:11*
Surr: Dibromofluoromethane	*102*			*77-123*	*%REC*	*1*	*16-Feb-2022 17:13*
Surr: Dibromofluoromethane	*103*			*77-123*	*%REC*	*50*	*17-Feb-2022 12:11*
Surr: Toluene-d8	*99.6*			*82-127*	*%REC*	*1*	*16-Feb-2022 17:13*
Surr: Toluene-d8	*100*			*82-127*	*%REC*	*50*	*17-Feb-2022 12:11*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22020379
Sample ID: NGL-Piez-106 Lab ID:HS22020379-02
Collection Date: 26-Jan-2022 08:25 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL PAHS - 8270D	**Method:SW8270**				Prep:SW3511 / 17-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
2-Methylnaphthalene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Acenaphthene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Acenaphthylene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Anthracene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Benz(a)anthracene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Benzo(a)pyrene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Benzo(b)fluoranthene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Benzo(g,h,i)perylene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Benzo(k)fluoranthene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Chrysene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Dibenz(a,h)anthracene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Dibenzofuran	U	H	0.0293	0.0977	ug/L	1	21-Feb-2022 18:09
Fluoranthene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Fluorene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Indeno(1,2,3-cd)pyrene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Naphthalene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Phenanthrene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Pyrene	U	H	0.0195	0.0977	ug/L	1	21-Feb-2022 18:09
Surr: 2-Fluorobiphenyl	*48.2*			*32-130*	*%REC*	*1*	*21-Feb-2022 18:09*
Surr: 4-Terphenyl-d14	*48.4*			*40-135*	*%REC*	*1*	*21-Feb-2022 18:09*
Surr: Nitrobenzene-d5	*76.2*			*45-142*	*%REC*	*1*	*21-Feb-2022 18:09*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 18-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	22-Feb-2022 12:28
Arsenic	**0.0185**		**0.000400**	**0.00200**	**mg/L**	1	22-Feb-2022 12:28
Beryllium	**0.00191**	J	**0.000200**	**0.00200**	**mg/L**	1	22-Feb-2022 12:28
Cadmium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 12:28
Chromium	**0.0305**		**0.000400**	**0.00400**	**mg/L**	1	22-Feb-2022 12:28
Copper	**0.00828**		**0.00100**	**0.00200**	**mg/L**	1	22-Feb-2022 12:28
Iron	**17.1**		**0.0120**	**0.200**	**mg/L**	1	22-Feb-2022 12:28
Lead	**0.0165**		**0.000600**	**0.00200**	**mg/L**	1	22-Feb-2022 12:28
Manganese	**0.373**		**0.000700**	**0.00500**	**mg/L**	1	22-Feb-2022 12:28
Nickel	**0.0156**		**0.000600**	**0.00200**	**mg/L**	1	22-Feb-2022 12:28
Potassium	**9.07**		**0.0180**	**0.200**	**mg/L**	1	22-Feb-2022 12:28
Selenium	**0.00152**	J	**0.00110**	**0.00200**	**mg/L**	1	22-Feb-2022 12:28
Silver	U		0.000200	0.00200	mg/L	1	22-Feb-2022 12:28
Thallium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 12:28
Zinc	**0.0558**		**0.00200**	**0.00400**	**mg/L**	1	22-Feb-2022 12:28

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22020379
Sample ID: NGL-Piez-106 Lab ID:HS22020379-02
Collection Date: 26-Jan-2022 08:25 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 16-Feb-2022		Analyst: MSC
Mercury	U		0.000300	0.00200	mg/L	1	16-Feb-2022 12:19
NITRATE/NITRITE BY IC BY SW9056A		**Method:SW9056**					Analyst: YP
Nitrogen, Nitrate-Nitrite	**0.382**	J	**0.300**	**2.00**	**mg/L**	10	21-Feb-2022 14:17

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

Batch ID: 175385 **Start Date:** 16 Feb 2022 07:30 **End Date:** 16 Feb 2022 10:30
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020379-02		1 (mL)	10 (mL)	10	120 plastic HNO3

Batch ID: 175442 **Start Date:** 17 Feb 2022 08:52 **End Date:** 17 Feb 2022 16:00
Method: SW3511 **Prep Code:** 3511_PAH

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020379-02	1	33.78 (mL)	2 (mL)	0.05921	40 mL VOA vial, Neat

Batch ID: 175519 **Start Date:** 18 Feb 2022 11:00 **End Date:** 18 Feb 2022 15:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020379-02		10 (mL)	10 (mL)	1	120 plastic HNO3

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 175385 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22020379-02	NGL-Piez-106	26 Jan 2022 08:25		16 Feb 2022 07:30	16 Feb 2022 12:19	1
Batch ID: 175442 (0)	**Test Name :** LOW-LEVEL PAHS - 8270D				**Matrix:** Water	
HS22020379-02	NGL-Piez-106	26 Jan 2022 08:25		17 Feb 2022 08:52	21 Feb 2022 18:09	1
Batch ID: 175519 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22020379-02	NGL-Piez-106	26 Jan 2022 08:25		18 Feb 2022 15:00	22 Feb 2022 12:28	1
Batch ID: R402347 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Water	
HS22020379-02	NGL-Piez-106	26 Jan 2022 08:25			16 Feb 2022 17:13	1
Batch ID: R402459 (0)	**Test Name :** LOW LEVEL VOLATILES BY SW8260C				**Matrix:** Water	
HS22020379-02	NGL-Piez-106	26 Jan 2022 08:25			17 Feb 2022 12:11	50
Batch ID: R402744 (0)	**Test Name :** NITRATE/NITRITE BY IC BY SW9056A				**Matrix:** Water	
HS22020379-02	NGL-Piez-106	26 Jan 2022 08:25			21 Feb 2022 14:17	10

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: 175385 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-175385** Units: **mg/L** Analysis Date: **16-Feb-2022 11:56**
Client ID: Run ID: **HG03_402355** SeqNo: **6505701** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury		U	0.000200								

LCS Sample ID: **LCS-175385** Units: **mg/L** Analysis Date: **16-Feb-2022 11:58**
Client ID: Run ID: **HG03_402355** SeqNo: **6505702** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00497	0.000200	0.005	0	99.4	80 - 120				

MS Sample ID: **HS22020655-01MS** Units: **mg/L** Analysis Date: **16-Feb-2022 12:12**
Client ID: Run ID: **HG03_402355** SeqNo: **6505706** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00459	0.000200	0.005	-0.000027	92.3	75 - 125				

MSD Sample ID: **HS22020655-01MSD** Units: **mg/L** Analysis Date: **16-Feb-2022 12:14**
Client ID: Run ID: **HG03_402355** SeqNo: **6505707** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00446	0.000200	0.005	-0.000027	89.7	75 - 125	0.00459	2.87	20	

The following samples were analyzed in this batch: HS22020379-02

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-175519** Units: **mg/L** Analysis Date: **21-Feb-2022 22:50**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6513140** PrepDate: **18-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	0.00092	0.00400								J
Copper	U	0.00200								
Iron	U	0.200								
Lead	U	0.00200								
Manganese	U	0.00500								
Nickel	U	0.00200								
Potassium	U	0.200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Zinc	U	0.00400								

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-175519** Units: **mg/L** Analysis Date: **21-Feb-2022 21:17**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6512695** PrepDate: **18-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04697	0.00200	0.05	0	93.9	80 - 120				
Arsenic	0.04711	0.00200	0.05	0	94.2	80 - 120				
Beryllium	0.04713	0.00200	0.05	0	94.3	80 - 120				
Cadmium	0.04819	0.00200	0.05	0	96.4	80 - 120				
Chromium	0.04666	0.00400	0.05	0	93.3	80 - 120				
Copper	0.04866	0.00200	0.05	0	97.3	80 - 120				
Iron	4.664	0.200	5	0	93.3	80 - 120				
Lead	0.04586	0.00200	0.05	0	91.7	80 - 120				
Manganese	0.04798	0.00500	0.05	0	96.0	80 - 120				
Nickel	0.048	0.00200	0.05	0	96.0	80 - 120				
Potassium	4.647	0.200	5	0	92.9	80 - 120				
Selenium	0.0492	0.00200	0.05	0	98.4	80 - 120				
Silver	0.05032	0.00200	0.05	0	101	80 - 120				
Thallium	0.04748	0.00200	0.05	0	95.0	80 - 120				
Zinc	0.04966	0.00400	0.05	0	99.3	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22020394-02MS** Units: **mg/L** Analysis Date: **21-Feb-2022 21:23**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6512698** PrepDate: **18-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05119	0.00200	0.05	0.00012	102	80 - 120				
Arsenic	0.05634	0.00200	0.05	0.00427	104	80 - 120				
Beryllium	0.05247	0.00200	0.05	0.00009	105	80 - 120				
Cadmium	0.05058	0.00200	0.05	-0.000006	101	80 - 120				
Chromium	0.05066	0.00400	0.05	0.000388	101	80 - 120				
Copper	0.05111	0.00200	0.05	0.000392	101	80 - 120				
Iron	6.194	0.200	5	1.173	100	80 - 120				
Lead	0.05048	0.00200	0.05	0.00029	100	80 - 120				
Manganese	0.7922	0.00500	0.05	0.7138	157	80 - 120				SO
Nickel	0.05246	0.00200	0.05	0.002191	101	80 - 120				
Potassium	7.031	0.200	5	2.036	99.9	80 - 120				
Selenium	0.05284	0.00200	0.05	0.000213	105	80 - 120				
Silver	0.05233	0.00200	0.05	-0.00001	105	80 - 120				
Thallium	0.05142	0.00200	0.05	0.00004	103	80 - 120				
Zinc	0.09058	0.00400	0.05	0.03602	109	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22020394-02MSD** Units: **mg/L** Analysis Date: **21-Feb-2022 21:25**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6512699** PrepDate: **18-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05013	0.00200	0.05	0.00012	100	80 - 120	0.05119	2.09	20	
Arsenic	0.05502	0.00200	0.05	0.00427	102	80 - 120	0.05634	2.37	20	
Beryllium	0.04999	0.00200	0.05	0.00009	99.8	80 - 120	0.05247	4.84	20	
Cadmium	0.04947	0.00200	0.05	-0.000006	99.0	80 - 120	0.05058	2.22	20	
Chromium	0.04924	0.00400	0.05	0.000388	97.7	80 - 120	0.05066	2.84	20	
Copper	0.05003	0.00200	0.05	0.000392	99.3	80 - 120	0.05111	2.13	20	
Iron	6.061	0.200	5	1.173	97.8	80 - 120	6.194	2.16	20	
Lead	0.04886	0.00200	0.05	0.00029	97.1	80 - 120	0.05048	3.27	20	
Manganese	0.769	0.00500	0.05	0.7138	110	80 - 120	0.7922	2.96	20	O
Nickel	0.05141	0.00200	0.05	0.002191	98.4	80 - 120	0.05246	2.02	20	
Potassium	6.807	0.200	5	2.036	95.4	80 - 120	7.031	3.24	20	
Selenium	0.05278	0.00200	0.05	0.000213	105	80 - 120	0.05284	0.114	20	
Silver	0.05073	0.00200	0.05	-0.00001	101	80 - 120	0.05233	3.1	20	
Thallium	0.05077	0.00200	0.05	0.00004	101	80 - 120	0.05142	1.28	20	
Zinc	0.08811	0.00400	0.05	0.03602	104	80 - 120	0.09058	2.76	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

PDS Sample ID: **HS22020394-02PDS** Units: **mg/L** Analysis Date: **21-Feb-2022 21:27**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6512700** PrepDate: **18-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1059	0.00200	0.1	0.00012	106	75 - 125				
Arsenic	0.1177	0.00200	0.1	0.00427	113	75 - 125				
Beryllium	0.1086	0.00200	0.1	0.00009	109	75 - 125				
Cadmium	0.1081	0.00200	0.1	-0.000006	108	75 - 125				
Chromium	0.1104	0.00400	0.1	0.000388	110	75 - 125				
Copper	0.1106	0.00200	0.1	0.000392	110	75 - 125				
Iron	12.01	0.200	10	1.173	108	75 - 125				
Lead	0.1075	0.00200	0.1	0.00029	107	75 - 125				
Manganese	0.8156	0.00500	0.1	0.7138	102	75 - 125				O
Nickel	0.1112	0.00200	0.1	0.002191	109	75 - 125				
Potassium	12.76	0.200	10	2.036	107	75 - 125				
Selenium	0.115	0.00200	0.1	0.000213	115	75 - 125				
Silver	0.1062	0.00200	0.1	-0.00001	106	75 - 125				
Thallium	0.1094	0.00200	0.1	0.00004	109	75 - 125				
Zinc	0.1486	0.00400	0.1	0.03602	113	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: 175519 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22020394-02SD** Units: **mg/L** Analysis Date: **21-Feb-2022 21:21**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6512697** PrepDate: **18-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.00012	0	10	
Arsenic	0.005019	0.0100					0.00427	0	10	J
Beryllium	U	0.0100					0.00009	0	10	
Cadmium	U	0.0100					-0.000006	0	10	
Chromium	U	0.0200					0.000388	0	10	
Copper	U	0.0100					0.000392	0	10	
Iron	1.181	1.00					1.173	0.667	10	
Lead	U	0.0100					0.00029	0	10	
Manganese	0.7049	0.0250					0.7138	1.25	10	
Nickel	U	0.0100					0.002191	0	10	
Potassium	2.048	1.00					2.036	0.617	10	
Selenium	U	0.0100					0.000213	0	10	
Silver	U	0.0100					-0.00001	0	10	
Thallium	U	0.0100					0.00004	0	10	
Zinc	0.03451	0.0200					0.03602	4.19	10	

The following samples were analyzed in this batch: HS22020379-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: 175442 (0) **Instrument: SV-6** **Method: LOW-LEVEL PAHS - 8270D**

MBLK Sample ID: **MBLK-175442** Units: **ug/L** Analysis Date: **21-Feb-2022 13:46**
Client ID: Run ID: **SV-6_402655** SeqNo: **6516814** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.100								
2-Methylnaphthalene	U	0.100								
Acenaphthene	U	0.100								
Acenaphthylene	U	0.100								
Anthracene	U	0.100								
Benz(a)anthracene	U	0.100								
Benzo(a)pyrene	U	0.100								
Benzo(b)fluoranthene	U	0.100								
Benzo(g,h,i)perylene	U	0.100								
Benzo(k)fluoranthene	U	0.100								
Chrysene	U	0.100								
Dibenz(a,h)anthracene	U	0.100								
Dibenzofuran	U	0.100								
Fluoranthene	U	0.100								
Fluorene	U	0.100								
Indeno(1,2,3-cd)pyrene	U	0.100								
Naphthalene	U	0.100								
Phenanthrene	U	0.100								
Pyrene	U	0.100								
Surr: 2-Fluorobiphenyl	*1.564*	*0.100*	*3.03*	*0*	*51.6*	*32 - 130*				
Surr: 4-Terphenyl-d14	*1.408*	*0.100*	*3.03*	*0*	*46.5*	*40 - 135*				
Surr: Nitrobenzene-d5	*2.192*	*0.100*	*3.03*	*0*	*72.3*	*45 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: 175442 (0) **Instrument: SV-6** **Method: LOW-LEVEL PAHS - 8270D**

LCS Sample ID: **LCS-175442** Units: **ug/L** Analysis Date: **21-Feb-2022 14:06**
Client ID: Run ID: **SV-6_402655** SeqNo: **6516815** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	2.888	0.100	3.03	0	95.3	40 - 140				
2-Methylnaphthalene	2.832	0.100	3.03	0	93.5	40 - 140				
Acenaphthene	1.98	0.100	3.03	0	65.3	40 - 140				
Acenaphthylene	2.416	0.100	3.03	0	79.7	40 - 140				
Anthracene	2.922	0.100	3.03	0	96.4	40 - 140				
Benz(a)anthracene	1.43	0.100	3.03	0	47.2	40 - 140				
Benzo(a)pyrene	2.935	0.100	3.03	0	96.9	40 - 140				
Benzo(b)fluoranthene	1.905	0.100	3.03	0	62.9	40 - 140				
Benzo(g,h,i)perylene	1.982	0.100	3.03	0	65.4	40 - 140				
Benzo(k)fluoranthene	1.966	0.100	3.03	0	64.9	40 - 140				
Chrysene	1.978	0.100	3.03	0	65.3	40 - 140				
Dibenz(a,h)anthracene	1.951	0.100	3.03	0	64.4	40 - 140				
Dibenzofuran	2.5	0.100	3.03	0	82.5	40 - 140				
Fluoranthene	2.39	0.100	3.03	0	78.9	40 - 140				
Fluorene	2.601	0.100	3.03	0	85.9	40 - 140				
Indeno(1,2,3-cd)pyrene	2.186	0.100	3.03	0	72.2	40 - 140				
Naphthalene	2.805	0.100	3.03	0	92.6	40 - 140				
Phenanthrene	2.731	0.100	3.03	0	90.1	40 - 140				
Pyrene	3.187	0.100	3.03	0	105	40 - 140				
Surr: 2-Fluorobiphenyl	*2.275*	*0.100*	*3.03*	*0*	*75.1*	*32 - 130*				
Surr: 4-Terphenyl-d14	*1.455*	*0.100*	*3.03*	*0*	*48.0*	*40 - 135*				
Surr: Nitrobenzene-d5	*3.02*	*0.100*	*3.03*	*0*	*99.7*	*45 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: 175442 (0) **Instrument: SV-6** **Method: LOW-LEVEL PAHS - 8270D**

LCSD Sample ID: **LCSD-175442** Units: **ug/L** Analysis Date: **21-Feb-2022 14:26**
Client ID: Run ID: **SV-6_402655** SeqNo: **6516816** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	2.561	0.100	3.03	0	84.5	40 - 140	2.888	12	25	
2-Methylnaphthalene	2.49	0.100	3.03	0	82.2	40 - 140	2.832	12.8	25	
Acenaphthene	2.008	0.100	3.03	0	66.3	40 - 140	1.98	1.4	25	
Acenaphthylene	2.308	0.100	3.03	0	76.2	40 - 140	2.416	4.58	25	
Anthracene	2.975	0.100	3.03	0	98.2	40 - 140	2.922	1.79	25	
Benz(a)anthracene	1.575	0.100	3.03	0	52.0	40 - 140	1.43	9.63	25	
Benzo(a)pyrene	2.449	0.100	3.03	0	80.8	40 - 140	2.935	18.1	25	
Benzo(b)fluoranthene	1.693	0.100	3.03	0	55.9	40 - 140	1.905	11.8	25	
Benzo(g,h,i)perylene	2.242	0.100	3.03	0	74.0	40 - 140	1.982	12.3	25	
Benzo(k)fluoranthene	2.337	0.100	3.03	0	77.1	40 - 140	1.966	17.3	25	
Chrysene	1.929	0.100	3.03	0	63.7	40 - 140	1.978	2.5	25	
Dibenz(a,h)anthracene	1.799	0.100	3.03	0	59.4	40 - 140	1.951	8.11	25	
Dibenzofuran	2.786	0.100	3.03	0	91.9	40 - 140	2.5	10.8	25	
Fluoranthene	2.568	0.100	3.03	0	84.8	40 - 140	2.39	7.18	25	
Fluorene	2.494	0.100	3.03	0	82.3	40 - 140	2.601	4.22	25	
Indeno(1,2,3-cd)pyrene	2.071	0.100	3.03	0	68.3	40 - 140	2.186	5.42	25	
Naphthalene	2.825	0.100	3.03	0	93.2	40 - 140	2.805	0.721	25	
Phenanthrene	2.876	0.100	3.03	0	94.9	40 - 140	2.731	5.15	25	
Pyrene	2.798	0.100	3.03	0	92.3	40 - 140	3.187	13	25	
Surr: 2-Fluorobiphenyl	*2.151*	*0.100*	*3.03*	*0*	*71.0*	*32 - 130*	*2.275*	*5.61*	*25*	
Surr: 4-Terphenyl-d14	*1.588*	*0.100*	*3.03*	*0*	*52.4*	*40 - 135*	*1.455*	*8.74*	*25*	
Surr: Nitrobenzene-d5	*2.852*	*0.100*	*3.03*	*0*	*94.1*	*45 - 142*	*3.02*	*5.71*	*25*	

The following samples were analyzed in this batch: HS22020379-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-220216** Units: **ug/L** Analysis Date: **16-Feb-2022 10:18**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505553** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	1.0								
1,1,2,2-Tetrachloroethane	U	1.0								
1,1,2-Trichlor-1,2,2-trifluoroethane	U	1.0								
1,1,2-Trichloroethane	U	1.0								
1,1-Dichloroethane	U	1.0								
1,1-Dichloroethene	U	1.0								
1,2,3-Trichlorobenzene	U	1.0								
1,2,4-Trichlorobenzene	U	1.0								
1,2-Dibromo-3-chloropropane	U	1.0								
1,2-Dibromoethane	U	1.0								
1,2-Dichlorobenzene	U	1.0								
1,2-Dichloroethane	U	1.0								
1,2-Dichloropropane	U	1.0								
1,3-Dichlorobenzene	U	1.0								
1,4-Dichlorobenzene	U	1.0								
2-Butanone	U	2.0								
2-Hexanone	U	2.0								
4-Methyl-2-pentanone	U	2.0								
Acetone	U	2.0								
Benzene	U	1.0								
Bromochloromethane	U	1.0								
Bromodichloromethane	U	1.0								
Bromoform	U	1.0								
Bromomethane	U	1.0								
Carbon disulfide	U	2.0								
Carbon tetrachloride	U	1.0								
Chlorobenzene	U	1.0								
Chloroethane	U	1.0								
Chloroform	U	1.0								
Chloromethane	U	1.0								
cis-1,2-Dichloroethene	U	1.0								
cis-1,3-Dichloropropene	U	1.0								
Cyclohexane	U	1.0								
Dibromochloromethane	U	1.0								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-220216** Units: **ug/L** Analysis Date: **16-Feb-2022 10:18**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505553** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	U	1.0								
Ethylbenzene	U	1.0								
Isopropylbenzene	U	1.0								
m,p-Xylene	U	2.0								
Methyl acetate	U	1.0								
Methyl tert-butyl ether	U	1.0								
Methylcyclohexane	U	1.0								
o-Xylene	U	1.0								
Styrene	U	1.0								
Tetrachloroethene	U	1.0								
Toluene	U	1.0								
trans-1,2-Dichloroethene	U	1.0								
trans-1,3-Dichloropropene	U	1.0								
Trichloroethene	U	1.0								
Trichlorofluoromethane	U	1.0								
Vinyl chloride	U	1.0								
Xylenes, Total	U	1.0								
Surr: 1,2-Dichloroethane-d4	*51.05*	*1.0*	*50*	*0*	*102*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*49.11*	*1.0*	*50*	*0*	*98.2*	*77 - 113*				
Surr: Dibromofluoromethane	*51.63*	*1.0*	*50*	*0*	*103*	*73 - 126*				
Surr: Toluene-d8	*49.62*	*1.0*	*50*	*0*	*99.2*	*81 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-220216** Units: **ug/L** Analysis Date: **16-Feb-2022 09:34**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505552** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	21.08	1.0	20	0	105	70 - 130				
1,1,2,2-Tetrachloroethane	20.33	1.0	20	0	102	70 - 120				
1,1,2-Trichlor-1,2,2-trifluoroethane	22.15	1.0	20	0	111	70 - 130				
1,1,2-Trichloroethane	20.82	1.0	20	0	104	77 - 113				
1,1-Dichloroethane	20.41	1.0	20	0	102	71 - 122				
1,1-Dichloroethene	21.5	1.0	20	0	108	70 - 130				
1,2,3-Trichlorobenzene	19.36	1.0	20	0	96.8	70 - 130				
1,2,4-Trichlorobenzene	19.87	1.0	20	0	99.3	77 - 126				
1,2-Dibromo-3-chloropropane	20.34	1.0	20	0	102	70 - 130				
1,2-Dibromoethane	20.98	1.0	20	0	105	76 - 123				
1,2-Dichlorobenzene	19.16	1.0	20	0	95.8	77 - 113				
1,2-Dichloroethane	20.71	1.0	20	0	104	70 - 124				
1,2-Dichloropropane	19.12	1.0	20	0	95.6	72 - 119				
1,3-Dichlorobenzene	19.13	1.0	20	0	95.6	78 - 118				
1,4-Dichlorobenzene	20.3	1.0	20	0	101	79 - 113				
2-Butanone	32.62	2.0	40	0	81.5	70 - 130				
2-Hexanone	40.97	2.0	40	0	102	70 - 130				
4-Methyl-2-pentanone	43.28	2.0	40	0	108	70 - 130				
Acetone	42.35	2.0	40	0	106	70 - 130				
Benzene	19.4	1.0	20	0	97.0	74 - 120				
Bromochloromethane	20.09	1.0	20	0	100	76 - 124				
Bromodichloromethane	20.56	1.0	20	0	103	74 - 122				
Bromoform	20.7	1.0	20	0	103	73 - 128				
Bromomethane	24.47	1.0	20	0	122	70 - 130				
Carbon disulfide	39.59	2.0	40	0	99.0	70 - 130				
Carbon tetrachloride	20.16	1.0	20	0	101	71 - 125				
Chlorobenzene	19.01	1.0	20	0	95.1	76 - 113				
Chloroethane	20.67	1.0	20	0	103	70 - 130				
Chloroform	20.34	1.0	20	0	102	71 - 121				
Chloromethane	23.43	1.0	20	0	117	70 - 129				
cis-1,2-Dichloroethene	20.04	1.0	20	0	100	75 - 122				
cis-1,3-Dichloropropene	20.74	1.0	20	0	104	73 - 127				
Cyclohexane	18.96	1.0	20	0	94.8	70 - 130				
Dibromochloromethane	21.52	1.0	20	0	108	77 - 122				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

LCS Sample ID: **VLCSW-220216** Units: **ug/L** Analysis Date: **16-Feb-2022 09:34**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505552** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	31.69	1.0	20	0	158	70 - 130				S
Ethylbenzene	19.55	1.0	20	0	97.7	77 - 117				
Isopropylbenzene	20.2	1.0	20	0	101	73 - 127				
m,p-Xylene	39.36	2.0	40	0	98.4	77 - 122				
Methyl acetate	18.09	1.0	20	0	90.4	76 - 122				
Methyl tert-butyl ether	18.33	1.0	20	0	91.6	70 - 130				
Methylcyclohexane	18.25	1.0	20	0	91.3	61 - 157				
o-Xylene	18.82	1.0	20	0	94.1	75 - 119				
Styrene	20.3	1.0	20	0	101	72 - 126				
Tetrachloroethene	19.92	1.0	20	0	99.6	76 - 119				
Toluene	19.46	1.0	20	0	97.3	77 - 118				
trans-1,2-Dichloroethene	19.44	1.0	20	0	97.2	72 - 127				
trans-1,3-Dichloropropene	19.13	1.0	20	0	95.7	77 - 119				
Trichloroethene	18.99	1.0	20	0	95.0	77 - 121				
Trichlorofluoromethane	21.82	1.0	20	0	109	70 - 130				
Vinyl chloride	21.39	1.0	20	0	107	70 - 130				
Xylenes, Total	58.17	1.0	60	0	97.0	75 - 122				
Surr: 1,2-Dichloroethane-d4	*51*	*1.0*	*50*	*0*	*102*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*50.22*	*1.0*	*50*	*0*	*100*	*77 - 113*				
Surr: Dibromofluoromethane	*51.79*	*1.0*	*50*	*0*	*104*	*73 - 126*				
Surr: Toluene-d8	*50.85*	*1.0*	*50*	*0*	*102*	*81 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS22020394-02MS** Units: **ug/L** Analysis Date: **16-Feb-2022 11:40**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505748** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	19.57	1.0	20	0	97.8	70 - 130				
1,1,2,2-Tetrachloroethane	16.87	1.0	20	0	84.4	70 - 123				
1,1,2-Trichlor-1,2,2-trifluoroethane	20.62	1.0	20	0	103	70 - 130				
1,1,2-Trichloroethane	16.38	1.0	20	0.3246	80.3	70 - 117				
1,1-Dichloroethane	17.6	1.0	20	0	88.0	70 - 127				
1,1-Dichloroethene	18.77	1.0	20	0	93.8	70 - 130				
1,2,3-Trichlorobenzene	15.93	1.0	20	0	79.7	70 - 130				
1,2,4-Trichlorobenzene	16.4	1.0	20	0	82.0	70 - 125				
1,2-Dibromo-3-chloropropane	17.63	1.0	20	0	88.1	70 - 130				
1,2-Dibromoethane	18.26	1.0	20	0	91.3	70 - 124				
1,2-Dichlorobenzene	16.16	1.0	20	0	80.8	70 - 115				
1,2-Dichloroethane	17.72	1.0	20	4.804	64.6	70 - 127				S
1,2-Dichloropropane	15.89	1.0	20	38.47	-113	70 - 122				S
1,3-Dichlorobenzene	16.04	1.0	20	0	80.2	70 - 119				
1,4-Dichlorobenzene	17.15	1.0	20	0	85.7	70 - 114				
2-Butanone	32.65	2.0	40	6.865	64.5	70 - 130				S
2-Hexanone	32.5	2.0	40	1.49	77.5	70 - 130				
4-Methyl-2-pentanone	36.64	2.0	40	1.405	88.1	70 - 130				
Acetone	40.09	2.0	40	3.589	91.3	70 - 130				
Benzene	21.19	1.0	20	4.096	85.4	70 - 127				
Bromochloromethane	17.22	1.0	20	0	86.1	70 - 127				
Bromodichloromethane	17.43	1.0	20	0	87.2	70 - 124				
Bromoform	17.17	1.0	20	0	85.9	70 - 129				
Bromomethane	20.15	1.0	20	0	101	70 - 130				
Carbon disulfide	35.53	2.0	40	0	88.8	70 - 130				
Carbon tetrachloride	18.64	1.0	20	0.5009	90.7	70 - 130				
Chlorobenzene	16.34	1.0	20	0	81.7	70 - 114				
Chloroethane	18.07	1.0	20	0	90.3	70 - 130				
Chloroform	17.4	1.0	20	0	87.0	70 - 125				
Chloromethane	19.32	1.0	20	5.388	69.7	70 - 130				S
cis-1,2-Dichloroethene	17.07	1.0	20	0	85.3	70 - 128				
cis-1,3-Dichloropropene	17.5	1.0	20	0	87.5	70 - 125				
Cyclohexane	21.37	1.0	20	1.64	98.7	70 - 130				
Dibromochloromethane	17.38	1.0	20	0	86.9	70 - 124				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MS Sample ID: **HS22020394-02MS** Units: **ug/L** Analysis Date: **16-Feb-2022 11:40**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505748** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	22.51	1.0	20	0	113	70 - 130				
Ethylbenzene	18.28	1.0	20	0.637	88.2	70 - 124				
Isopropylbenzene	19.08	1.0	20	0.7721	91.5	70 - 130				
m,p-Xylene	36.21	2.0	40	1.585	86.6	70 - 130				
Methyl acetate	64.42	1.0	20	0	322	76 - 122				S
Methyl tert-butyl ether	27.11	1.0	20	8.375	93.7	70 - 130				
Methylcyclohexane	23.29	1.0	20	4.687	93.0	61 - 158				
o-Xylene	17.06	1.0	20	0.3288	83.6	70 - 124				
Styrene	17.18	1.0	20	0	85.9	70 - 130				
Tetrachloroethene	17.61	1.0	20	0	88.0	70 - 130				
Toluene	17.41	1.0	20	0.4352	84.9	70 - 123				
trans-1,2-Dichloroethene	17.51	1.0	20	0	87.6	70 - 130				
trans-1,3-Dichloropropene	16.4	1.0	20	1.437	74.8	70 - 121				
Trichloroethene	16.69	1.0	20	0	83.4	70 - 129				
Trichlorofluoromethane	19.54	1.0	20	0	97.7	70 - 130				
Vinyl chloride	19.47	1.0	20	0	97.4	70 - 130				
Xylenes, Total	53.27	1.0	60	1.914	85.6	70 - 130				
Surr: 1,2-Dichloroethane-d4	*51.41*	*1.0*	*50*	*0*	*103*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*50.81*	*1.0*	*50*	*0*	*102*	*77 - 113*				
Surr: Dibromofluoromethane	*52.05*	*1.0*	*50*	*0*	*104*	*77 - 123*				
Surr: Toluene-d8	*49.95*	*1.0*	*50*	*0*	*99.9*	*82 - 127*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS22020394-02MSD** Units: **ug/L** Analysis Date: **16-Feb-2022 12:02**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505749** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	19.39	1.0	20	0	97.0	70 - 130	19.57	0.909	20	
1,1,2,2-Tetrachloroethane	16.95	1.0	20	0	84.7	70 - 123	16.87	0.444	20	
1,1,2-Trichlor-1,2,2-trifluoroethane	20.49	1.0	20	0	102	70 - 130	20.62	0.641	20	
1,1,2-Trichloroethane	17.01	1.0	20	0.3246	83.5	70 - 117	16.38	3.81	20	
1,1-Dichloroethane	17.7	1.0	20	0	88.5	70 - 127	17.6	0.517	20	
1,1-Dichloroethene	19.06	1.0	20	0	95.3	70 - 130	18.77	1.56	20	
1,2,3-Trichlorobenzene	16.6	1.0	20	0	83.0	70 - 130	15.93	4.1	20	
1,2,4-Trichlorobenzene	17.81	1.0	20	0	89.0	70 - 125	16.4	8.21	20	
1,2-Dibromo-3-chloropropane	17.57	1.0	20	0	87.8	70 - 130	17.63	0.336	20	
1,2-Dibromoethane	18.25	1.0	20	0	91.2	70 - 124	18.26	0.072	20	
1,2-Dichlorobenzene	16.27	1.0	20	0	81.3	70 - 115	16.16	0.651	20	
1,2-Dichloroethane	17.31	1.0	20	4.804	62.5	70 - 127	17.72	2.37	20	S
1,2-Dichloropropane	16.3	1.0	20	38.47	-111	70 - 122	15.89	2.57	20	S
1,3-Dichlorobenzene	16.42	1.0	20	0	82.1	70 - 119	16.04	2.33	20	
1,4-Dichlorobenzene	17.36	1.0	20	0	86.8	70 - 114	17.15	1.25	20	
2-Butanone	31.12	2.0	40	6.865	60.6	70 - 130	32.65	4.8	20	S
2-Hexanone	33.71	2.0	40	1.49	80.6	70 - 130	32.5	3.67	20	
4-Methyl-2-pentanone	40.43	2.0	40	1.405	97.6	70 - 130	36.64	9.84	20	
Acetone	41.91	2.0	40	3.589	95.8	70 - 130	40.09	4.44	20	
Benzene	21.14	1.0	20	4.096	85.2	70 - 127	21.19	0.231	20	
Bromochloromethane	16.64	1.0	20	0	83.2	70 - 127	17.22	3.47	20	
Bromodichloromethane	17.51	1.0	20	0	87.6	70 - 124	17.43	0.468	20	
Bromoform	16.69	1.0	20	0	83.4	70 - 129	17.17	2.87	20	
Bromomethane	18.8	1.0	20	0	94.0	70 - 130	20.15	6.91	20	
Carbon disulfide	35.85	2.0	40	0	89.6	70 - 130	35.53	0.913	20	
Carbon tetrachloride	18.48	1.0	20	0.5009	89.9	70 - 130	18.64	0.875	20	
Chlorobenzene	16.19	1.0	20	0	80.9	70 - 114	16.34	0.927	20	
Chloroethane	17.44	1.0	20	0	87.2	70 - 130	18.07	3.53	20	
Chloroform	17.17	1.0	20	0	85.8	70 - 125	17.4	1.35	20	
Chloromethane	18.48	1.0	20	5.388	65.5	70 - 130	19.32	4.42	20	S
cis-1,2-Dichloroethene	17.21	1.0	20	0	86.0	70 - 128	17.07	0.813	20	
cis-1,3-Dichloropropene	17.73	1.0	20	0	88.7	70 - 125	17.5	1.29	20	
Cyclohexane	22.59	1.0	20	1.64	105	70 - 130	21.37	5.56	20	
Dibromochloromethane	17.73	1.0	20	0	88.6	70 - 124	17.38	1.97	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: R402347 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS22020394-02MSD** Units: **ug/L** Analysis Date: **16-Feb-2022 12:02**
Client ID: Run ID: **VOA4_402347** SeqNo: **6505749** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Dichlorodifluoromethane	21.38	1.0	20	0	107	70 - 130	22.51	5.15	20	
Ethylbenzene	18.37	1.0	20	0.637	88.7	70 - 124	18.28	0.47	20	
Isopropylbenzene	19.59	1.0	20	0.7721	94.1	70 - 130	19.08	2.62	20	
m,p-Xylene	36.4	2.0	40	1.585	87.0	70 - 130	36.21	0.502	20	
Methyl acetate	67.86	1.0	20	0	339	76 - 122	64.42	5.2	20	S
Methyl tert-butyl ether	26.53	1.0	20	8.375	90.8	70 - 130	27.11	2.15	20	
Methylcyclohexane	23.44	1.0	20	4.687	93.8	61 - 158	23.29	0.637	20	
o-Xylene	17.17	1.0	20	0.3288	84.2	70 - 124	17.06	0.673	20	
Styrene	17.49	1.0	20	0	87.4	70 - 130	17.18	1.79	20	
Tetrachloroethene	18.09	1.0	20	0	90.5	70 - 130	17.61	2.72	20	
Toluene	17.52	1.0	20	0.4352	85.4	70 - 123	17.41	0.664	20	
trans-1,2-Dichloroethene	17.34	1.0	20	0	86.7	70 - 130	17.51	0.988	20	
trans-1,3-Dichloropropene	16.48	1.0	20	1.437	75.2	70 - 121	16.4	0.469	20	
Trichloroethene	16.5	1.0	20	0	82.5	70 - 129	16.69	1.11	20	
Trichlorofluoromethane	20.44	1.0	20	0	102	70 - 130	19.54	4.5	20	
Vinyl chloride	19.23	1.0	20	0	96.2	70 - 130	19.47	1.25	20	
Xylenes, Total	53.57	1.0	60	1.914	86.1	70 - 130	53.27	0.557	20	
Surr: 1,2-Dichloroethane-d4	*50.6*	*1.0*	*50*	*0*	*101*	*70 - 126*	*51.41*	*1.6*	*20*	
Surr: 4-Bromofluorobenzene	*50.72*	*1.0*	*50*	*0*	*101*	*77 - 113*	*50.81*	*0.184*	*20*	
Surr: Dibromofluoromethane	*51.96*	*1.0*	*50*	*0*	*104*	*77 - 123*	*52.05*	*0.183*	*20*	
Surr: Toluene-d8	*50.27*	*1.0*	*50*	*0*	*101*	*82 - 127*	*49.95*	*0.649*	*20*	

The following samples were analyzed in this batch: HS22020379-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: R402459 (0) **Instrument: VOA4** **Method: LOW LEVEL VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKW-220217** Units: **ug/L** Analysis Date: **17-Feb-2022 11:27**
Client ID: Run ID: **VOA4_402459** SeqNo: **6507682** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Methylene chloride	U	2.0								
Surr: 1,2-Dichloroethane-d4	*51.13*	*1.0*	*50*	*0*	*102*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*49.72*	*1.0*	*50*	*0*	*99.4*	*77 - 113*				
Surr: Dibromofluoromethane	*51.01*	*1.0*	*50*	*0*	*102*	*73 - 126*				
Surr: Toluene-d8	*50.07*	*1.0*	*50*	*0*	*100*	*81 - 120*				

LCS Sample ID: **VLCSW-220217** Units: **ug/L** Analysis Date: **17-Feb-2022 10:43**
Client ID: Run ID: **VOA4_402459** SeqNo: **6507681** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Methylene chloride	22.09	2.0	20	0	110	70 - 127				
Surr: 1,2-Dichloroethane-d4	*49.92*	*1.0*	*50*	*0*	*99.8*	*70 - 123*				
Surr: 4-Bromofluorobenzene	*50.81*	*1.0*	*50*	*0*	*102*	*77 - 113*				
Surr: Dibromofluoromethane	*51.01*	*1.0*	*50*	*0*	*102*	*73 - 126*				
Surr: Toluene-d8	*49.87*	*1.0*	*50*	*0*	*99.7*	*81 - 120*				

MS Sample ID: **HS22020379-02MS** Units: **ug/L** Analysis Date: **17-Feb-2022 12:33**
Client ID: **NGL-Piez-106** Run ID: **VOA4_402459** SeqNo: **6507685** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Methylene chloride	3714	100	1000	3023	69.1	70 - 128				S
Surr: 1,2-Dichloroethane-d4	*2489*	*50*	*2500*	*0*	*99.6*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*2501*	*50*	*2500*	*0*	*100*	*77 - 113*				
Surr: Dibromofluoromethane	*2585*	*50*	*2500*	*0*	*103*	*77 - 123*				
Surr: Toluene-d8	*2517*	*50*	*2500*	*0*	*101*	*82 - 127*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: **R402459 (0)** **Instrument:** **VOA4** **Method:** **LOW LEVEL VOLATILES BY SW8260C**

MSD Sample ID: **HS22020379-02MSD** Units: **ug/L** Analysis Date: **17-Feb-2022 12:55**
Client ID: **NGL-Piez-106** Run ID: **VOA4_402459** SeqNo: **6507686** PrepDate: DF: **50**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Methylene chloride	3642	100	1000	3023	61.9	70 - 128	3714	1.95	20	S
Surr: 1,2-Dichloroethane-d4	*2542*	*50*	*2500*	*0*	*102*	*70 - 126*	*2489*	*2.12*	*20*	
Surr: 4-Bromofluorobenzene	*2522*	*50*	*2500*	*0*	*101*	*77 - 113*	*2501*	*0.834*	*20*	
Surr: Dibromofluoromethane	*2538*	*50*	*2500*	*0*	*102*	*77 - 123*	*2585*	*1.82*	*20*	
Surr: Toluene-d8	*2507*	*50*	*2500*	*0*	*100*	*82 - 127*	*2517*	*0.424*	*20*	

The following samples were analyzed in this batch: HS22020379-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22020379

QC BATCH REPORT

Batch ID: R402744 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY IC BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **21-Feb-2022 11:48**
Client ID: Run ID: **ICS-Integrion_402744** SeqNo: **6513828** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **21-Feb-2022 11:54**
Client ID: Run ID: **ICS-Integrion_402744** SeqNo: **6513829** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	8.011	0.200	8	0	100	90 - 110				

MS Sample ID: **HS22020380-02MS** Units: **mg/L** Analysis Date: **21-Feb-2022 14:27**
Client ID: Run ID: **ICS-Integrion_402744** SeqNo: **6513836** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	35.13	2.00	40	0.397	86.8	80 - 120				

MSD Sample ID: **HS22020380-02MSD** Units: **mg/L** Analysis Date: **21-Feb-2022 14:33**
Client ID: Run ID: **ICS-Integrion_402744** SeqNo: **6513837** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate-Nitrite	35.83	2.00	40	0.397	88.6	80 - 120	35.13	1.98	20	

The following samples were analyzed in this batch: HS22020379-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: **HS22020379**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-34	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

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Sample Receipt Checklist

Work Order ID: HS22020379 **Date/Time Received:** **08-Feb-2022 13:20**

Client Name: ERM Annapolis **Received by:** **Nilesh D. Ranchod**

Completed By:	/S/ Nilesh D. Ranchod	08-Feb-2022 16:58	**Reviewed by:**	/S/ Corey Grandits	09-Feb-2022 09:14
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **Sludge** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☑	No ☐	Not Present ☐
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s):	8.3C/8.8c U/C	IR31
Cooler(s)/Kit(s):	48011	
Date/Time sample(s) sent to storage:	02/08/2022 17:30	

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes: Sample matrix COC=GW Receieved = Heavy Sludge.
Lab centrifuged samples to obtain rough 100ml of water volume to perform VOCs, PAHs, anions, and metals.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

HS22020379

ERM

Gas to Energy Environmental Impact Assessment S

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name	Gas to Energy Environmental Impact Assessment Study	
Work Order		Project Number	0590231	
Company Name	ERM	Bill To Company	ERM	
Send Report To	Herbert Pirela	Invoice Attn.	AP	
Address	180 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr	
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401	
Phone	(410) 972-4124	Phone	(410) 972-4124	
Fax		Fax		
e-Mail Address	herbert.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	

A	8081_Water_Low (8081 Pesticides)
B	8151_Water (8151 Herbicides)
C	8260_LL_ Water (8260 TCL VOCs)
D	8270_LOW_Water (8270 PAHs)
E	9056_Water-NO2-NO3 Combined & NO3 *NEAT*
F	COND_Water (Conductivity) & pH
G	ICP_TWater (6020/7470 Metals 16)
H	P-TWater (~~Phosphorous~~)
I	PCB_Water_Low (8082 PCBs)
J	TOC_Water 9060 (Total Organic Carbon)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	NGL-Piez-106	26/01/2022	8:25 AM	GW	1,2,3,8	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Lalita Gopaul
Delshah Hamid

Shipment Method:

Required Turnaround Time: ☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other _____

Results Due Date:

Relinquished by: Lalita Gopaul	Date: 27/01/2021	Time: 9:27am	Received by: C. Pabre	Notes:
Relinquished by: DHL	Date: 2/8/22	Time: 13.20	Received by (Laboratory): NA	
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	Cooler Temp. 8.3

QC Package: (Check Box Below)

x	Level II: Standard QC	TRRP-Checklist
	Level III: Std QC + Raw Data	TRRP Level IV
	Level IV: SW846 CLP-Like	
	Other: _____	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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43011 IR #31 C/C +0.5

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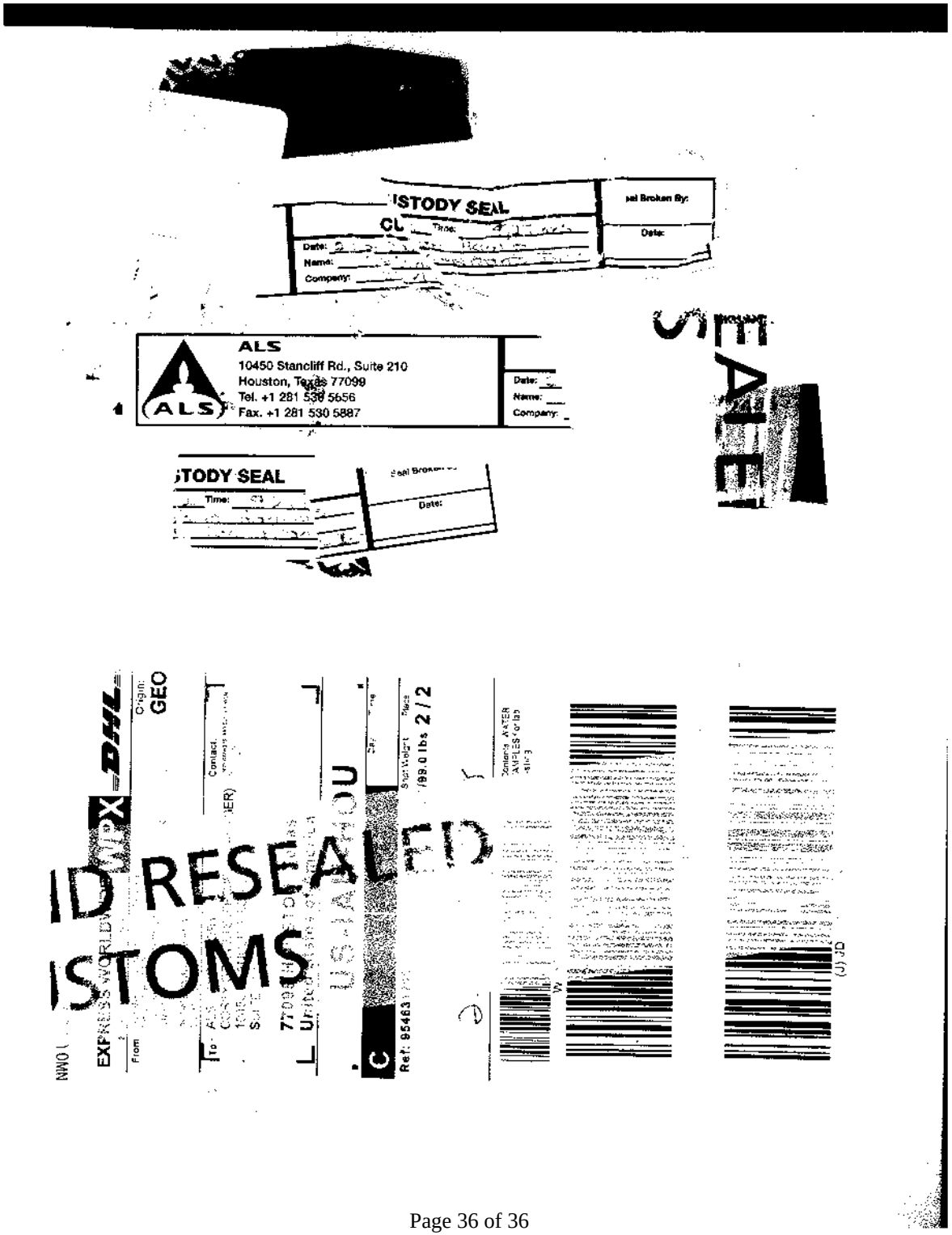

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Deep Piezometer Boring Logs

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Soil Boring Log

Project	Exxon Guyana Gas to
Project No	0400186135
Client	Exxon
Contractor	GSEC
Day & Date	Tuesday 2021-12-14

metric

Logged By	Brian Stewart
Reviewed By	Samar Bou Semaan
Driller	Cornel Pitt
Driller 2	Keyon Hooper, Delon
Rig Type	CWD200

Borehole No	BH-124
Drilling Method	Rotary Wash
BH Diameter [cm]	12.00
BH Completion	complete
Completion Depth [m]	30.00

Hammer Type	Automatic Trip Hammer
Weight [kg]	63.50
Drop [cm]	75.00
Efficiency (%)	1

LOG

#	Time (hh:mm)	From [m]	Drive [cm]	To [m]	Recov [cm]	Sampler Type	Blows/Pressure/Time 1	2	3
1	09:10	0.00	60	0.60	23.00	Direct Push Shelby (ST)	2000		
2	09:12	0.60	60	1.20	42.00	Direct Push Shelby (ST)	1100		
3	09:14	1.20	60	1.80	27.00	Direct Push Shelby (ST)	0		
4	09:16	1.80	60	2.40	47.00	Direct Push Shelby (ST)	0		
5	09:19	2.40	60	3.00	60.00	Direct Push Shelby (ST)	0		
6	09:22	4.50	60	5.10	60.00	Direct Push Shelby (ST)	0		
7	09:27	6.00	60	6.60	60.00	Direct Push Shelby (ST)	0		
8	11:25	7.50	60	8.10	60.00	Direct Push Shelby (ST)	0		
9	11:39	9.00	60	9.60	60.00	Direct Push Shelby (ST)	0		
10	11:49	10.50	60	11.10	37.00	Direct Push Shelby (ST)	0		
11	13:20	12.00	60	12.60	60.00	Direct Push Shelby (ST)	0		
12	13:39	13.50	60	14.10	60.00	Direct Push Shelby (ST)	0		
13	13:54	15.00	60	15.60	60.00	Direct Push Shelby (ST)	0		
14	14:09	16.50	60	17.10	60.00	Direct Push Shelby (ST)	1100		
15	14:29	18.00	60	18.60	60.00	Direct Push Shelby (ST)	1000		
16	14:53	19.50	60	20.10	60.00	Direct Push Shelby (ST)	1400		
17	15:17	21.00	60	21.60	60.00	Direct Push Shelby (ST)	800		
18	08:59	22.50	45	22.95	21.00	SPT	5	9	14
19	09:15	22.95	45	23.40	35.00	SPT	14	20	16
20	10:15	24.00	45	24.45	45.00	SPT	14	18	18
21	10:52	25.50	45	25.95	45.00	SPT	11	9	12
22	13:01	27.00	45	27.45	45.00	SPT	3	3	4
23	13:52	28.50	45	28.95	10.00	SPT	4	3	3
24	14:15	29.40	45	29.85	45.00	SPT	7	7	11

SAMPLING

Sample Type	From [m]	To [m]	No
Liner/Tube	0.00	0.55	LT1A
Baggie	0.55	0.60	B1B
Liner/Tube	0.60	1.15	LT2A
Baggie	1.15	1.20	B2B
Liner/Tube	1.20	1.75	LT3A
Baggie	1.75	1.80	B3B
Liner/Tube	1.80	2.35	LT4A
Baggie	2.35	2.40	B4B
Liner/Tube	2.40	2.95	LT5A
Baggie	2.95	3.00	B5B
Liner/Tube	4.50	5.05	LT6A
Baggie	5.05	5.10	B6B
Liner/Tube	6.00	6.55	LT7A
Baggie	6.55	6.60	B7B
Liner/Tube	7.50	8.05	LT8A
Baggie	8.05	8.10	B8B
Liner/Tube	9.00	9.55	LT9A
Baggie	9.55	9.60	B9B
Liner/Tube	10.50	11.05	LT10A
Baggie	11.05	11.10	B10B
Liner/Tube	12.00	12.55	LT11A
Baggie	12.55	12.60	B11B
Liner/Tube	13.50	14.05	LT12A
Baggie	14.05	14.10	B12B
Liner/Tube	15.00	15.55	LT13A
Baggie	15.55	15.60	B13B
Liner/Tube	16.50	17.05	LT14A
Baggie	17.05	17.10	B14B
Liner/Tube	18.00	18.55	LT15A

IN SITU TEST RESULTS

Test Type	Depth [m]	Ref	Result 1	Result 2
Pocket Pen	0.60	1	1.00	
Torvane S	0.60	1	0.23	
Pocket Pen	1.20	2	1.00	
Torvane S	1.20	2	0.18	
Torvane M	1.80	3	0.24	
Torvane M	2.40	4	0.15	
Torvane M	3.00	5	0.18	
Torvane M	4.50	6	0.05	
Torvane M	6.60	7	0.03	
Torvane M	8.10	8	0.20	
Torvane M	9.60	9	0.24	
Torvane M	11.10	10	0.16	
Torvane M	12.60	11	0.20	
Torvane M	14.10	12	0.16	
Torvane M	15.60	13	0.25	
Pocket Pen	17.10	14	1.00	
Torvane S	17.10	14	0.29	
Pocket Pen	18.60	15	0.75	
Torvane S	18.60	15	0.26	
Pocket Pen	20.10	16	2.25	
Torvane S	20.10	16	0.61	
Pocket Pen	21.60	17	1.00	
Torvane S	21.60	17	0.32	

OTHER

Caved Depth [m]	0.00

GROUNDWATER

Time	00:00	00:00	00:00
Depth of Hole [m]			
Depth of Casing [m]			
Initial Water Depth [m]			
Static Water at min			
Static Water at min			
Static Water at min			

LOCATION

Horiz. Coord. System	WGS84
Easting / Longitude	58.23339
Northing / Latitude	6.63883
Vertical Datum	WGS84
Elevation [m]	4.00
Offset [m]	3.00
Shore	Onshore

BACKFILL/INSTRUMENTATION

Backfill	???
Instrument Type	???
Instrument Diam. [cm]	

GEOPHYSICAL LOGGING

P-S Logging	
Electric Logging	
Acoustic Televiewer	

DRILLING METHODS

Method	To Depth [m]
Hollow Stem Auger	3.00
Rotary Wash	30.00

Gaia.Forms (3.4.3477.b74f38) - UsSoilBoringLog - PDF generated on 2021-12-15 17:52:31 by fugrogaiasub

Soil Boring Log

Project	Exxon Guyana Gas to
Project No	0400186135
Client	Exxon
Contractor	GSEC
Day & Date	Tuesday 2021-12-14

metric

Logged By	Brian Stewart
Reviewed By	Samar Bou Semaan
Driller	Cornel Pitt
Driller 2	Keyon Hooper, Delon
Rig Type	CWD200

Borehole No	BH-124
Drilling Method	Rotary Wash
BH Diameter [cm]	12.00
BH Completion	complete
Completion Depth [m]	30.00

Hammer Type	Automatic Trip Hammer
Weight [kg]	63.50
Drop [cm]	75.00
Efficiency (%)	1

LOG

#	Time (hh:mm)	From [m]	Drive [cm]	To [m]	Recov [cm]	Sampler Type	Blows/Pressure/Time 1	2	3

SAMPLING

Sample Type	From [m]	To [m]	No
Baggie	18.55	18.60	B15B
Liner/Tube	19.50	20.05	LT16A
Baggie	20.05	21.00	B16B
Liner/Tube	21.00	21.55	LT17A
Baggie	21.55	21.60	B17B
Baggie	22.50	22.95	B18A
Baggie	22.95	23.40	B19A
Baggie	24.00	24.45	B20A
Baggie	25.50	25.95	B21A
Baggie	27.00	27.45	B22A
Baggie	28.50	28.95	B23A
Baggie	29.40	29.85	B24A

IN SITU TEST RESULTS

Test Type	Depth [m]	Ref	Result 1	Result 2

OTHER

Caved Depth [m]	0.00

GROUNDWATER

Time	00:00	00:00	00:00
Depth of Hole [m]			
Depth of Casing [m]			
Initial Water Depth [m]			
Static Water at min			
Static Water at min			
Static Water at min			

LOCATION

Horiz. Coord. System	WGS84
Easting / Longitude	58.23339
Northing / Latitude	6.63883
Vertical Datum	WGS84
Elevation [m]	4.00
Offset [m]	3.00
Shore	Onshore

BACKFILL/INSTRUMENTATION

Backfill	???
Instrument Type	???
Instrument Diam. [cm]	

GEOPHYSICAL LOGGING

P-S Logging	
Electric Logging	
Acoustic Televiewer	

DRILLING METHODS

Method	To Depth [m]
Hollow Stem Auger	3.00
Rotary Wash	30.00

Gaia.Forms (3.4.3477.b74f38) - UsSoilBoringLog - PDF generated on 2021-12-15 17:52:31 by fugrogaiasub

FUGRO

Soil Boring Log

Project	Exxon Guyana Gas to	Logged By	Brian Stewart	Borehole No	BH-124	Hammer Type	Automatic Trip Hammer
Project No	0400186135	Reviewed By	Samar Bou Semaan	Drilling Method	Rotary Wash	Weight [kg]	63.50 Drop [cm] 75.00
Client	Exxon	Driller	Cornel Pitt	BH Diameter [cm]	12.00	Efficiency (%)	1
Contractor	GSEC	Driller 2	Keyon Hooper, Delon	BH Completion	complete		
metric	Day & Date Tuesday 2021-12-14	Rig Type	CWD200	Completion Depth [m]	30.00		

STRATA

From [m]	To [m]	Geologic Unit	Group Name	Density / Consistency	Color	Moist.	HCl	Description | Other	Dry strength	Dilat.	Tough.	Plast.
0.00	0.60		Lean CLAY (CL)	stiff	gray, reddish brown	moist		Mottled., Oxidize.		none		
0.60	1.20		Lean CLAY (CL)	firm	light gray, light reddish brown	moist		Mottled., Oxidize.		none		
1.20	1.80		Lean CLAY (CL)	soft	light gray, brown	moist		Mottled., Oxidize.		none		
1.80	2.40		Lean CLAY (CL)	soft	bluish gray, light brown	moist		Mottled.		slow		
2.40	3.00		Lean CLAY (CL)	soft	bluish gray, light brown	moist		Mottled.		slow		
3.00	5.10		Lean CLAY (CL)	very soft	bluish gray, yellow	moist		Mottled.		rapid		
5.10	6.60		Lean CLAY (CL)	very soft	bluish gray, brown	moist				rapid		
6.60	8.10		Lean CLAY (CL)	soft	greenish gray, black	moist		Mottled.		none		
8.10	9.60		Lean CLAY (CL)	soft	very dark bluish gray, brown	moist		Trace of organic., Elastic.		slow		medium
9.60	11.10		Lean CLAY (CL)	soft	bluish gray, brown	moist		With peat.		slow		low
11.10	12.60		Lean CLAY (CL)	soft	dark gray, dark brown	moist		Trace of organic matterial, mottled		slow		low
12.60	14.10		Lean CLAY (CL)	soft	dark gray, very dark grayish brown	moist		Black, Trace of organic material.		slow		low
14.10	15.60		Lean CLAY (CL)	soft	dark gray, very dark gray	moist		Trace of organic.		none		low
15.60	17.10		Lean CLAY (CL)	stiff	light greenish gray, yellow	moist		Mottled.		none		medium
17.10	18.60		Lean CLAY (CL)	stiff	light greenish gray, brownish yellow	moist		Mottled., Oxidize.		none		medium
18.60	20.10		Lean CLAY (CL)	very stiff	light gray, yellowish brown	moist		Mottled, slick., Oxidize.		none		medium
20.10	21.60		Lean CLAY (CL)	stiff	light gray, yellowish brown	moist		Mottled, streak., Oxidize.		none		medium
21.60	22.95		Well-graded SAND (SW)	medium dense	white, yellow	moist		Fine to medium grained., Trace of clay.		rapid		
22.95	23.40		Well-graded SAND (SW)	dense	yellowish brown, very pale brown	moist		Fine to medium.		rapid		
23.40	24.60		Well-graded SAND (SW)	dense	white, light brown	moist		Trace of clay		rapid		
24.60	26.10		Well-graded SAND (SW)	medium dense	pinkish white, light greenish gray	moist		Trace of clay.		rapid		
26.10	27.60		Well-graded SAND (SW)	loose	yellow, light gray	moist		Some clay.		rapid		
27.60	29.10		Well-graded SAND (SW)	loose	pinkish white, pale brown	moist				rapid		

FUGRO

Soil Boring Log

Project	Exxon Guyana Gas to	Logged By	Brian Stewart	Borehole No	BH-124	Hammer Type	Automatic Trip Hammer
Project No	0400186135	Reviewed By	Samar Bou Semaan	Drilling Method	Rotary Wash	Weight [kg]	63.50 Drop [cm] 75.00
Client	Exxon	Driller	Cornel Pitt	BH Diameter [cm]	12.00	Efficiency (%)	1
Contractor	GSEC	Driller 2	Keyon Hooper, Delon	BH Completion	complete		
metric	Day & Date Tuesday 2021-12-14	Rig Type	CWD200	Completion Depth [m]	30.00		

STRATA

From [m]	To [m]	Geologic Unit	Group Name	Density / Consistency	Color	Moist.	HCl	Description | Other	Dry strength	Dilat.	Tough.	Plast.
29.10	30.00		Well-graded SAND with CLAY (SW-SC)	medium dense	pinkish white, light greenish gray	moist		Mottled., Oxidize.		rapid		

FUGRO

Soil Boring Log

Project	Exxon Guyana Gas to	Logged By	Brian Stewart	Borehole No	BH-124	Hammer Type	Automatic Trip Hammer
Project No	0400186135	Reviewed By	Samar Bou Semaan	Drilling Method	Rotary Wash	Weight [kg]	63.50 Drop [cm] 75.00
Client	Exxon	Driller	Cornel Pitt	BH Diameter [cm]	12.00	Efficiency (%)	1
Contractor	GSEC	Driller 2	Keyon Hooper, Delon	BH Completion	complete		
metric	Day & Date Tuesday 2021-12-14	Rig Type	CWD200	Completion Depth [m]	30.00		

DEPTH RELATED REMARKS

Depth [m]	Remark
0.00	No water reading before rotary wash.
22.95	A confirmation SPT was done to make sure that the previous sample was actually sand and not clay.

FUGRO

Soil Boring Log

Project	Exxon Guyana Gas to
Project No	0400186135
Client	Exxon
Contractor	GSEC
Day & Date	Tuesday 2021-12-14

metric

Logged By	Brian Stewart
Reviewed By	Samar Bou Semaan
Driller	Cornel Pitt
Driller 2	Keyon Hooper, Delon
Rig Type	CWD200

Borehole No	BH-124
Drilling Method	Rotary Wash
BH Diameter [cm]	12.00
BH Completion	complete
Completion Depth [m]	30.00

Hammer Type	Automatic Trip Hammer
Weight [kg]	63.50
Drop [cm]	75.00
Efficiency (%)	1

INSTRUMENT	
Type	
Serial Number	

MONITORING POINT	
Monitoring Point Reference	
Monitoring Point Distance [m]	
Atmospheric Pressure [bar]	
Differential Pressure [bar]	
Depth to valve [m]	
Depth to water [m]	
Depth to base [m]	

FLOW RATE	
Gas Flow Rate [m3/h]	

GAS SAMPLE	
ID	
Number	
Depth [m]	

STEADY STATE FINAL RESULTS	
	H2S (ppm)
Peak Value	
Steady State Value	
Calculated time to steady state	
	CH4 (ppm)
Peak Value	
Steady State Value	
Calculated time to steady state	
	VOC (ppm)
Peak Value	
Steady State Value	
Calculated time to steady state	
	O2 (%v/v)
Peak Value	
Steady State Value	
Calculated time to steady state	
	CO (ppm)
Peak Value	
Steady State Value	
Calculated time to steady state	

STEADY STATE CONCENTRATIONS

Time (sec)	Depth [m]	H2S (ppm)	CH4 (ppm)	VOC (ppm)	O2 (%v/v)	CO (ppm)

Project Name	Exxon Guyana Gas to Energy
Project Reference	0400186135
Location ID	**BH-124**
Date	Tuesday 2021-12-14

Additional Information

REMARKS

ATTACHED FILES

SKETCH

PHOTOS

Project	Exxon Guyana Gas to Energy		
Project No	0400186135		
Client	Exxon		
Date	Tuesday	Time	09:11

Sample Picture Log

SAMPLES

Soil Boring Log

Project	Exxon Guyana Gas to
Project No	0400186135
Client	Exxon
Contractor	Fugro
Day & Date	Wednesday 2021-12-01

Logged By	Eddie Deshpande
Reviewed By	Eddie Deshpande
Driller	Jonathan Sandlin
Driller 2	Hunter Isaacks
Rig Type	CME_850X

Borehole No	BH-127
Drilling Method	Rotary Wash
BH Diameter [cm]	10.00
BH Completion	complete
Completion Depth [m]	60.00

Hammer Type	Automatic Trip Hammer
Weight [kg]	63.50
Drop [cm]	76.00
Efficiency (%)	1

metric

LOG

#	Time (hh:mm)	From [m]	Drive [cm]	To [m]	Recov [cm]	Sampler Type	Blows/Pressure/Time 1	2	3
1	09:20	0.00	61	0.61	61.00	Direct Push Shelby (ST)	0		
2	09:23	0.61	61	1.22	48.00	Direct Push Shelby (ST)	0		
3	09:25	1.22	61	1.83	50.00	Direct Push Shelby (ST)	0		
4	09:45	1.83	61	2.44	61.00	Direct Push Shelby (ST)	0		
5	10:17	2.44	61	3.05	61.00	Direct Push Shelby (ST)	0		
6	10:19	3.96	61	4.57	61.00	Direct Push Shelby (ST)	0		
7	10:30	5.49	61	6.10	61.00	Direct Push Shelby (ST)	0		
8	10:33	7.01	61	7.62	61.00	Direct Push Shelby (ST)	0		
9	10:47	8.53	61	9.14	61.00	Direct Push Shelby (ST)	0		
10	10:53	10.06	61	10.67	61.00	Direct Push Shelby (ST)	0		
11	10:56	11.58	61	12.19	61.00	Direct Push Shelby (ST)	0		
12	11:08	13.11	61	13.72	61.00	Direct Push Shelby (ST)	0		
13	11:22	14.63	61	15.24	61.00	Direct Push Shelby (ST)	0		
14	11:28	16.15	46	16.61	38.00	SPT	3	6	6
15	11:46	17.68	46	18.14	46.00	SPT	5	6	14
16	12:16	19.20	46	19.66	46.00	SPT	3	12	18
17	13:00	20.73	46	21.19	46.00	SPT	3	9	21
18	13:28	22.25	61	22.86	61.00	Direct Push Shelby (ST)	0		
19	13:53	23.77	46	24.23	27.00	SPT	9	19	28
20	14:26	25.30	46	25.76	46.00	2.5" California Sampler (MC2)	12	24	27
21	14:53	26.82	61	27.43	61.00	Direct Push Shelby (ST)	0		
22	15:04	28.35	61	28.96	45.00	Direct Push Shelby (ST)	0		
23	15:25	29.87	61	30.48	61.00	Direct Push Shelby (ST)	0		
24	15:59	33.52	61	34.13	61.00	Direct Push Shelby (ST)	0		
25	16:36	36.57	46	37.03	46.00	2.5" California Sampler (MC2)	10	19	23
26	09:40	39.01	61	39.62	61.00	Direct Push Shelby (ST)			
27	10:16	42.06	61	42.67	45.72	Direct Push Shelby (ST)			
28	10:28	45.11	61	45.72	61.00	Direct Push Shelby (ST)			
29	10:37	48.16	61	48.77	61.00	Direct Push Shelby (ST)			

SAMPLING

Sample Type	From [m]	To [m]	No
Liner/Tube	0.00	0.56	LT1A
Baggie	0.56	0.61	B1B
Baggie	0.61	0.82	B2A
Liner/Tube	0.82	1.02	LT2B
Liner/Tube	1.02	1.22	LT2C
Baggie	1.22	1.43	B3A
Liner/Tube	1.43	1.63	LT3B
Liner/Tube	1.63	1.83	LT3C
Liner/Tube	1.83	2.39	LT4A
Liner/Tube	2.39	2.44	LT4B
Baggie	2.44	2.65	B5A
Liner/Tube	2.65	2.85	LT5B
Liner/Tube	2.85	3.05	LT5C
Baggie	3.96	4.17	B6A
Liner/Tube	4.17	4.37	LT6B
Liner/Tube	4.37	4.57	LT6C
Liner/Tube	5.49	6.05	LT7A
Baggie	6.05	6.10	B7B
Baggie	7.01	7.22	B8A
Liner/Tube	7.22	7.42	LT8B
Liner/Tube	7.42	7.62	LT8C
Baggie	8.53	8.74	B9A
Liner/Tube	8.74	8.94	LT9B
Liner/Tube	8.94	9.14	LT9C
Liner/Tube	10.06	10.62	LT10A
Baggie	10.62	10.67	B10B
Baggie	11.58	11.79	B11A
Liner/Tube	11.79	11.99	LT11B
Liner/Tube	11.99	12.19	LT11C

IN SITU TEST RESULTS

Test Type	Depth [m]	Ref	Result 1	Result 2
Torvane M	0.61	1	1.00	
Torvane M	1.22	2	3.00	
Torvane M	1.83	3	3.00	
Torvane M	2.44	4	2.00	
Torvane M	3.05	5	4.00	
Torvane M	4.57	6	3.00	
Torvane M	6.10	7	3.50	
Torvane M	7.62	8	3.50	
Torvane M	9.14	9	4.00	
Torvane M	10.67	10	2.50	
Pocket Pen	12.19	11	3.00	
Pocket Pen	13.72	12	3.50	
Pocket Pen	22.86	13	3.50	
Pocket Pen	25.76	14	4.50	
Pocket Pen	27.43	15	2.50	
Pocket Pen	28.96	16	4.50	
Pocket Pen	30.48	17	4.50	
Pocket Pen	34.13	18	2.50	
Pocket Pen	39.62	26	2.75	
Pocket Pen	42.67	27	1.00	
Pocket Pen	45.72	28	2.25	
Pocket Pen	48.77	29	2.75	
Pocket Pen	51.91	32	2.25	

OTHER

Caved Depth [m]	0.00

GROUNDWATER

Time	09:30	00:00	00:00
Depth of Hole [m]	2.44		
Depth of Casing [m]	0.00		
Initial Water Depth [m]	1.28		
Static Water at 30 min	1.28		
Static Water at min			
Static Water at min			

LOCATION

Horiz. Coord. System	WGS84
Easting / Longitude	-58.233632
Northing / Latitude	6.6418264
Vertical Datum	NAVD88
Elevation [m]	8.10
Offset [m]	0.00
Shore	Onshore

BACKFILL/INSTRUMENTATION

Backfill	Other
Instrument Type	Piezometer
Instrument Diam. [cm]	10.00

GEOPHYSICAL LOGGING

P-S Logging	
Electric Logging	
Acoustic Televiewer	

DRILLING METHODS

Method	To Depth [m]
Solid Flight Auger	2.44
Rotary Wash	60.00

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FUGRO

Soil Boring Log

Project	Exxon Guyana Gas to
Project No	0400186135
Client	Exxon
Contractor	Fugro
Day & Date	Wednesday 2021-12-01

Logged By	Eddie Deshpande
Reviewed By	Eddie Deshpande
Driller	Jonathan Sandlin
Driller 2	Hunter Isaacks
Rig Type	CME_850X

Borehole No	BH-127
Drilling Method	Rotary Wash
BH Diameter [cm]	10.00
BH Completion	complete
Completion Depth [m]	60.00

Hammer Type	Automatic Trip Hammer
Weight [kg]	63.50
Drop [cm]	76.00
Efficiency (%)	1

metric

LOG

#	Time (hh:mm)	From [m]	Drive [cm]	To [m]	Recov [cm]	Sampler Type	Blows/Pressure/Time 1	2	3
30	10:51	51.36	46	51.82	46.00	SPT	0	0	0
31	11:10	54.41	46	54.87	46.00	SPT	0	0	0
32	13:19	57.45	46	57.91	46.00	SPT	5	6	10
33	14:05	59.40	46	59.86	46.00	SPT	3	9	12

SAMPLING

Sample Type	From [m]	To [m]	No
Baggie	13.11	13.32	B12A
Liner/Tube	13.32	13.52	LT12B
Liner/Tube	13.52	13.72	LT12C
Baggie	16.35	16.61	B14A
Baggie	17.68	18.14	B15A
Baggie	19.20	19.66	B16A
Baggie	20.73	21.19	B17A
Baggie	22.25	22.46	B18A
Liner/Tube	22.46	22.66	LT18B
Liner/Tube	22.66	22.86	LT18C
Baggie	23.77	24.23	B19A
Liner/Tube	25.30	25.45	LT20A
Liner/Tube	25.45	25.60	LT20B
Liner/Tube	25.60	25.76	LT20C
Baggie	26.82	27.03	B21A
Liner/Tube	27.03	27.23	LT21B
Liner/Tube	27.23	27.43	LT21C
Liner/Tube	28.35	28.91	LT22A
Baggie	28.91	28.96	B22B
Baggie	29.87	30.08	B23A
Liner/Tube	30.08	30.28	LT23B
Liner/Tube	30.28	30.48	LT23C
Baggie	33.52	33.73	B24A
Liner/Tube	33.73	33.93	LT24B
Liner/Tube	33.93	34.13	LT24C
Liner/Tube	36.57	36.72	LT25A
Liner/Tube	36.72	36.87	LT25B
Liner/Tube	36.87	37.03	LT25C
Thin Wall	39.01	39.57	TW26A

IN SITU TEST RESULTS

Test Type	Depth [m]	Ref	Result 1	Result 2
Pocket Pen	60.96	33	3.25	

OTHER

Caved Depth [m]	0.00

GROUNDWATER

Time	09:30	00:00	00:00
Depth of Hole [m]	2.44		
Depth of Casing [m]	0.00		
Initial Water Depth [m]	1.28		
Static Water at 30 min	1.28		
Static Water at min			
Static Water at min			

LOCATION

Horiz. Coord. System	WGS84
Easting / Longitude	-58.233632
Northing / Latitude	6.6418264
Vertical Datum	NAVD88
Elevation [m]	8.10
Offset [m]	0.00
Shore	Onshore

BACKFILL/INSTRUMENTATION

Backfill	Other
Instrument Type	Piezometer
Instrument Diam. [cm]	10.00

GEOPHYSICAL LOGGING

P-S Logging	
Electric Logging	
Acoustic Televiewer	

DRILLING METHODS

Method	To Depth [m]
Solid Flight Auger	2.44
Rotary Wash	60.00

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Soil Boring Log

Project	Exxon Guyana Gas to
Project No	0400186135
Client	Exxon
Contractor	Fugro
Day & Date	Wednesday 2021-12-01

metric

Logged By	Eddie Deshpande
Reviewed By	Eddie Deshpande
Driller	Jonathan Sandlin
Driller 2	Hunter Isaacks
Rig Type	CME_850X

Borehole No	BH-127
Drilling Method	Rotary Wash
BH Diameter [cm]	10.00
BH Completion	complete
Completion Depth [m]	60.00

Hammer Type	Automatic Trip Hammer
Weight [kg]	63.50
Drop [cm]	76.00
Efficiency (%)	1

LOG

#	Time (hh:mm)	From [m]	Drive [cm]	To [m]	Recov [cm]	Sampler Type	Blows/Pressure/Time 1	2	3

SAMPLING

Sample Type	From [m]	To [m]	No
Baggie	39.57	39.62	B26B
Liner/Tube	42.21	42.37	LT27A
Liner/Tube	42.37	42.52	LT27B
Liner/Tube	42.52	42.67	LT27C
Liner/Tube	45.11	45.26	LT28A
Liner/Tube	45.26	45.57	LT28B
Liner/Tube	45.57	45.72	LT28C
Thin Wall	48.16	48.72	TW29A
Baggie	48.72	48.77	B29B
Baggie	51.36	51.82	B30A
Baggie	54.41	54.86	B31A
Baggie	57.45	57.91	B32A
Baggie	60.50	60.96	B

IN SITU TEST RESULTS

Test Type	Depth [m]	Ref	Result 1	Result 2

OTHER

Caved Depth [m]	0.00

GROUNDWATER

Time	09:30	00:00	00:00
Depth of Hole [m]	2.44		
Depth of Casing [m]	0.00		
Initial Water Depth [m]	1.28		
Static Water at 30 min	1.28		
Static Water at min			
Static Water at min			

LOCATION

Horiz. Coord. System	WGS84
Easting / Longitude	-58.233632
Northing / Latitude	6.6418264
Vertical Datum	NAVD88
Elevation [m]	8.10
Offset [m]	0.00
Shore	Onshore

BACKFILL/INSTRUMENTATION

Backfill	Other
Instrument Type	Piezometer
Instrument Diam. [cm]	10.00

GEOPHYSICAL LOGGING

P-S Logging	
Electric Logging	
Acoustic Televiewer	

DRILLING METHODS

Method	To Depth [m]
Solid Flight Auger	2.44
Rotary Wash	60.00

Gaia.Forms (3.5.3542.e6e3c9) - UsSoilBoringLog - PDF generated on 2021-12-19 11:04:17 by calgeotablet03

FUGRO

Soil Boring Log

Project	Exxon Guyana Gas to	Logged By	Eddie Deshpande	Borehole No	BH-127	Hammer Type	Automatic Trip Hammer
Project No	0400186135	Reviewed By	Eddie Deshpande	Drilling Method	Rotary Wash	Weight [kg]	63.50 Drop [cm] 76.00
Client	Exxon	Driller	Jonathan Sandlin	BH Diameter [cm]	10.00	Efficiency (%)	1
Contractor	Fugro	Driller 2	Hunter Isaacks	BH Completion	complete		
metric	Day & Date Wednesday 2021-12-01	Rig Type	CME_850X	Completion Depth [m]	60.00		

STRATA

From [m]	To [m]	Geologic Unit	Group Name	Density / Consistency	Color	Moist.	HCl	Description | Other	Dry strength	Dilat.	Tough.	Plast.
0.00	0.61	CLAY	Lean CLAY (CL)	very soft	dark gray	moist						medium
0.61	1.83	CLAY	Fat CLAY (CH)	soft	pale brown	moist						high
1.83	3.96	CLAY	Fat CLAY (CH)	very soft	greenish gray	moist						high
3.96	7.01	CLAY	Fat CLAY (CH)	soft	greenish gray	moist						high
7.01	10.06	CLAY	Fat CLAY (CH)	very soft	very dark grayish brown	moist						medium
10.06	11.58	CLAY	Fat CLAY (CH)	soft	dark brown	moist						medium
11.58	14.63	CLAY	Fat CLAY (CH)	stiff	greenish gray	moist						high
14.63	16.15	SAND	Well-graded SAND (SW)	medium dense	brownish yellow	moist		fine to medium grained, angular sand, trace clay seams				nonplastic
16.15	19.20	SAND	Poorly-graded SAND (SP)	medium dense	light yellowish brown	moist		medium to coarse sand, angular sand				nonplastic
19.20	22.25	SAND	Well-graded SAND (SW)	dense	yellowish brown	moist		fine to medium grained; angular sand				nonplastic
22.25	23.77	CLAY	Fat CLAY (CH)	very stiff	greenish gray	moist						medium
23.77	25.30	CLAY	Lean CLAY (CL)	very stiff	light gray	moist		silt seams, trace fine sand				low
25.30	26.82	CLAY	Fat CLAY (CH)	hard	light gray	moist		trace fine sand				medium
26.82	28.35	CLAY	Fat CLAY (CH)	medium stiff	light gray	moist						high
28.35	33.52	CLAY	Fat CLAY (CH)	hard	gray	moist						high
33.52	37.03	CLAY	Fat CLAY (CH)	stiff	dark gray	moist						medium
37.03	39.62	Clay	Fat CLAY (CH)	stiff	bluish black	dry		with few silt layers		none		high
39.62	42.67	Clay	Fat CLAY (CH)	stiff	bluish black	dry		some organic stains		none		high
42.67	45.72	Clay	Fat CLAY (CH)	stiff	greenish black, very dark grayish brown	dry				none		medium
45.72	48.77	Clay	Fat CLAY (CH)	stiff	greenish black, very dark grayish brown	moist		with some fine to medium sand pockets		slow		medium
48.77	51.82	Clay	Fat CLAY (CH)	stiff	greenish black	dry		with some fine sand pokcets along the sample		none		medium
51.82	54.87	Clay	Fat CLAY (CH)	stiff	dark greenish gray, greenish black	dry		some layers of silt along extruded sample, organic material and stains		none		medium
54.87	57.91	Clay	Fat CLAY (CH)	stiff	grayish green	dry		with some fine sand pockets		none		high
57.91	60.00	Clay	Fat CLAY (CH)	stiff	dark greenish gray	dry		With some organic stains and few fine sand pockets		none		medium

Gaia.Forms (3.5.3542.e6e3c9) - UsSoilBoringLog - PDF generated on 2021-12-19 11:04:22 by calgeotablet03

FUGRO

Soil Boring Log

Project	Exxon Guyana Gas to	Logged By	Eddie Deshpande	Borehole No	BH-127	Hammer Type	Automatic Trip Hammer
Project No	0400186135	Reviewed By	Eddie Deshpande	Drilling Method	Rotary Wash	Weight [kg]	63.50 Drop [cm] 76.00
Client	Exxon	Driller	Jonathan Sandlin	BH Diameter [cm]	10.00	Efficiency (%)	1
Contractor	Fugro	Driller 2	Hunter Isaacks	BH Completion	complete		
metric	Day & Date Wednesday 2021-12-01	Rig Type	CME_850X	Completion Depth [m]	60.00		

DEPTH RELATED REMARKS

Depth [m]	Remark
51.82	Pushed an SPT for recovery
54.87	Pushed an SPT for recovery

FUGRO

Soil Boring Log

Project	Exxon Guyana Gas to
Project No	0400186135
Client	Exxon
Contractor	Fugro
Day & Date	Wednesday 2021-12-01

metric

Logged By	Eddie Deshpande
Reviewed By	Eddie Deshpande
Driller	Jonathan Sandlin
Driller 2	Hunter Isaacks
Rig Type	CME_850X

Borehole No	BH-127
Drilling Method	Rotary Wash
BH Diameter [cm]	10.00
BH Completion	complete
Completion Depth [m]	60.00

Hammer Type	Automatic Trip Hammer
Weight [kg]	63.50
Drop [cm]	76.00
Efficiency (%)	1

INSTRUMENT	
Type	
Serial Number	

MONITORING POINT	
Monitoring Point Reference	
Monitoring Point Distance [m]	
Atmospheric Pressure [bar]	
Differential Pressure [bar]	
Depth to valve [m]	
Depth to water [m]	
Depth to base [m]	

FLOW RATE	
Gas Flow Rate [m3/h]	

GAS SAMPLE	
ID	
Number	
Depth [m]	

STEADY STATE FINAL RESULTS	
	H2S (ppm)
Peak Value	
Steady State Value	
Calculated time to steady state	
	CH4 (ppm)
Peak Value	
Steady State Value	
Calculated time to steady state	
	VOC (ppm)
Peak Value	
Steady State Value	
Calculated time to steady state	
	O2 (%v/v)
Peak Value	
Steady State Value	
Calculated time to steady state	
	CO (ppm)
Peak Value	
Steady State Value	
Calculated time to steady state	

STEADY STATE CONCENTRATIONS

Time (sec)	Depth [m]	H2S (ppm)	CH4 (ppm)	VOC (ppm)	O2 (%v/v)	CO (ppm)

Project Name	Exxon Guyana Gas to Energy
Project Reference	0400186135
Location ID	**BH-127**
Date	Wednesday 2021-12-01

Additional Information

REMARKS

ATTACHED FILES

SKETCH

PHOTOS

Project	Exxon Guyana Gas to Energy
Project No	0400186135
Client	Exxon
Date	Wednesday Time 09:44

Sample Picture Log

SAMPLES

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Theis Drawdown Analysis

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Table B.1-1. Parameters used for Theoretical Drawdown Calculations for A-Sands Aquifer using the Theis Equation

Well Parameters	**TPW**
Screen Radius (inches)	4
Pumping Rate (gal/min)	69.34
Pumping Rate (m^3/hr)	15.75
Pumping Rate (m^3/day)	378
Aquifer Parameters	**Value**
Thickness (m)[1]	100
Anisotropy Ratio (Kz/Kr)	0.1
Theis Parameters	
Hydraulic Conductivity (m/day)[2]	90
Transmissivity (m^2/day)[1]	1,987
Storativity[1]	0.0002

[1] Arad, A., 1983. A summary of the artesian coastal basin of Guyana. *Journal of Hydrology*, *63*(3-4), pp.299-313.

[2] Hutchinson, C.B. 1990. Analysis of groundwater flow in the A-Sand aquifer at Paramaribo, Suriname, South Africa. U.S. Geological Survey. Water-Resources Investigations Report 90-4036.

Table B.1-2 Theoretical Drawdown Calculations for A-Sands Aquifer Theis Equation for Steady Radial Flow in a Confined Aquifer

Based on the Average T, S	**0.5 days**	**31 days**	**365 days**	**18250 days**
u(0.015 m)	1.E-11	2.E-13	2.E-14	3.E-16
u(3.048 m)	5.E-07	8.E-09	6.E-10	1.E-11
u(7.62 m)	3.E-06	5.E-08	4.E-09	8.E-11
u(15.24 m)	1.E-05	2.E-07	2.E-08	3.E-10
u(30.48 m)	5.E-05	8.E-07	6.E-08	1.E-09
u(99.9744 m)	5.E-04	8.E-06	7.E-07	1.E-08
u(152.4 m)	1.E-03	2.E-05	2.E-06	3.E-08
u(500 m)	1.E-02	2.E-04	2.E-05	3.E-07
W(u(0.015 m))	24.3	28.3	30.7	34.5
W(u(3.048 m))	14.0	18.0	20.4	24.2
W(u(7.62 m))	12.2	16.2	18.6	22.4
W(u(15.24 m))	10.9	14.9	17.3	21.1
W(u(30.48 m))	9.5	13.5	15.9	19.7
W(u(99.9744 m))	7.2	11.2	13.6	17.4
W(u(152.4 m))	6.4	10.4	12.8	16.6
W(u(500 m))	4.1	8.1	10.5	14.3

Drawdown(at distance) (m)	Distance (m)				
ho - h(0.015m)	0.015	0.368	0.429	0.465	0.523
ho - h(3.048 m)	3.048	0.212	0.273	0.309	0.367
ho - h(7.62 m)	7.620	0.185	0.246	0.282	0.340
ho - h(15.24 m)	15.240	0.165	0.226	0.262	0.319
ho - h(30.48 m)	30.480	0.145	0.205	0.241	0.299
ho - h(99.9744 m)	99.974	0.110	0.170	0.207	0.264
ho - h(152.4 m)	152.400	0.097	0.158	0.194	0.252
ho - h(500 m)	500.000	0.062	0.123	0.159	0.217

Modified Theis Equation for Steady Radial Flow in a Confined Aquifer

u(m) = $L^2 \bullet (S) \div (4 \bullet T \bullet t)$

W(u(m)) = $-0.971 \bullet \text{Ln}(u(m)) - 0.1396$

drawdown (m) = $Q \bullet W(u(m)) \div (4 \bullet \pi \bullet T)$

L – Distance (m) **T – Transmissivity (m^2/day)**

Q – Pumping rate (m^3/day) **t – time (day)**

S – Storativity (-)

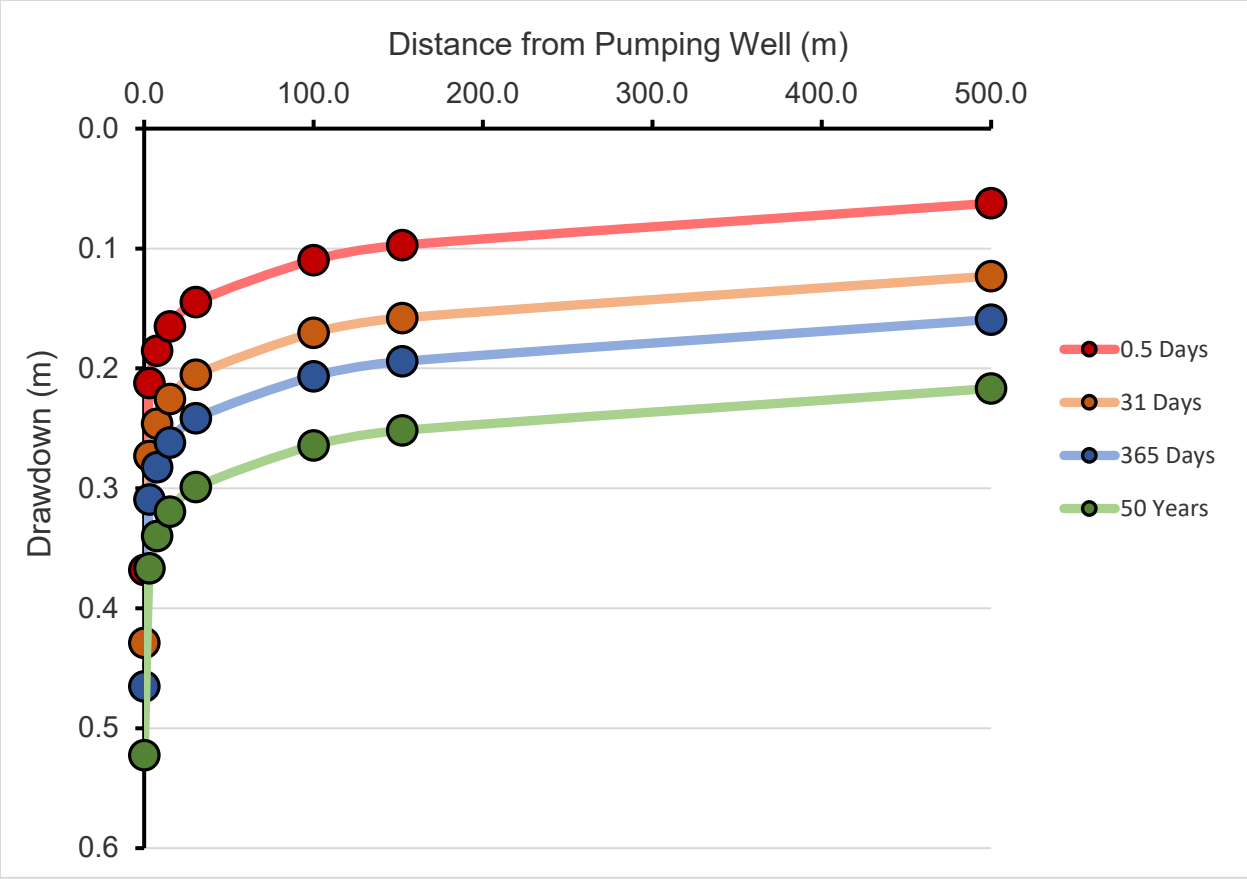

Figure B.1-1 *Theis drawdown analysis graph for a hypothetical well in the A-Sands aquifer.*

APPENDIX E

Soils Quality Reports

Resubmitted without changes

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ExxonMobil

Gas to Energy Environmental Impact Assessment Study

Soils Quality Baseline Study Field Report

January, 2021

SLR CONSULTANTS INC.

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LIST OF ACRONYMS AND ABBREVIATIONS

ATV	All-Terrain Vehicles
COC	Chain-of-Custody
EEPGL	Esso Exploration and Production Guyana Limited
EIA	Environmental Impact Assessment
FPSO	Floating, Production, Storage, and Offloading
FSO	Field Safety Officer
GLSC	Guyana Lands and Surveys Commission
GPS	Global Positioning System
IDW	Investigation-Derived Waste
JHAs	Job Hazard Analyses
LCC	Land Capability Classification

MOF	Materials Offloading Facility
NAREI	National Agricultural Research and Extension Institute
NGL	Natural Gas Liquids
PPE	Personal Protective Equipment
ROW	Right-of-Way

1.0. INTRODUCTION

1.1. PROJECT BACKGROUND

Esso Exploration and Production Guyana Limited (EEPGL) is constructing and installing an offshore pipeline from the Liza Phase 1 and Liza Phase 2 Floating, Production, Storage, and Offloading (FPSO) vessels to the shore landing area where an onshore pipeline will continue to a natural gas liquids (NGL) and natural gas processing plant (NGL plant). The onshore pipeline segment will be approximately 27 kilometres (17 miles) long, depending on route selection, with a temporary work area required during construction of approximately 23 metres (75 feet). As such, the footprint of the temporary onshore pipeline construction will cover approximately 25 to 46 hectares (62 to 114 acres). Following completion of the construction, the permanent right-of-way (ROW) for the onshore pipeline will be approximately 12 metres (39 feet) wide. The footprint of the NGL plant and associated facilities will cover approximately 16 hectares (40 acres), and an additional approximately 40 hectares (100 acres) adjacent to the NGL plant footprint may be used by EEPGL's construction contractor for Project support during construction, all located within the Site.

The scope of work presented in this field report was to complete a Soils Quality Baseline Study ("the study") in support of the Environmental Impact Assessment (EIA) to be conducted for EEPGL's proposed Gas to Energy Project ("the Project"). This field report describes the methodology undertaken and the results identified from the study conducted.

The design of the Project is at an early stage, but for the purpose of designing the study, it was assumed that the Project will potentially include the following activities which may have the potential to impact soil quality:

- Excavation of the trench and associated pipe-laying activities between the Project pipeline shore landing location (Nouvelle Flanders) and the notional location of the Project's NGL plant (Reynstein South);
- Earthworks such as clearing, cutting, filling, soil improvement, and site preparation; and
- Construction/improvement of access roads.

The primary potential environmental impacts to soil quality associated with the Project include the following:

- Potential increase of soil erosion and sedimentation and soil compaction;
- Waste generation/management including the discharge of water generated from dewatering; and
- Non-routine, unplanned events (spills to land).

The study was conducted to evaluate the existing soil quality and productivity and assess potential for impacts of the Project to soil resources. The Project area is located west of the Demerara River, stretching from Nouvelle Flanders to Reynstein South, along open farmlands both privately and publicly owned. The soil sampling locations can be accessed by paved and unpaved roads, passing through several communities including Canal # 1, Canal # 2 and Parfaite Harmonie, and canals and tractor access earthen roads, passing through farmlands in Free and Easy, Hermitage and Reynstein. The area where the NGL Plant will be situated is abandoned sugarcane fields, which have 5 – 7 years of pioneer species overgrowth.

1.2. SOIL AND LAND CAPABILITY CLASSIFICATIONS

1.2.1. Soil Classification in Guyana

The Project area is located on the Coastal Plain of Guyana which provides most of the agricultural production in the country. The plain on the west of the Demerara River consists of recent and old sediments with recent deltaic and fluvio-marine clays and silts occurring on the coast with silty clays and sands inland (Guyana Lands and Surveys Commission, 2013). To protect the plain from flooding, an elaborate system of sea defences, along with irrigation and drainage canals, was established.

Guyana's information on and mapping of the soil resources was derived from FAO mapping in the mid-1960s, which produced a soil map for the whole of Guyana (Guyana Lands and Surveys Commission, 2013). The soil units used in the FAO mapping were recently reclassified by the National Agricultural Research and Extension Institute (NAREI) of Guyana into current USDA classification soil units. The original soil map units and the reclassified soil units for the Coastal Plain are shown in Table 1-1 and the soil map of Guyana with the USDA soil classification map units is shown in Figure 1.

Table 1-1: Soil Mapping Units - FAO and USDA Classifications (Guyana Lands and Surveys Commission, 2013).

FAO Geomorphic Unit (Soil Description)	FAO Mapping Unit	Dominant USDA Soil Class	Associated USDA Soil Class	Land Capability Classification
Coastal Plain (Hydromorphic soils of recent deltaic deposits)				
Low Humic Gleys of High Base Status, Marine Phase "Frontland Clay"	1a	Hydraquents	Sulfaquents, Fluvaquents	I&II
Low Humic Gleys of High and Medium Base Status, Fluvio Marine Phase, Riverain Soils	2a	Fluvaquents	Endoaquents, Medhemists	I&II
Bog Soils, Peat and Muck Phases, Deep Pegasse	3a	Medihemists	Sulfohemists, Medisaprists	III
Low Humic Gleys of Low Base Status, including Groundwater Laterites and Planosols	4a	Endoaquepts	Fluavaquents, Sulfaquepts	III
Groundwater Laterites	5a	Humaquepts	Endoaquepts, Fluvaquents, Psammaquents	I&II

1a - Low Humic Gleys of High Base Status, Marine Phase "Frontland Clay" (Hydraquents with Sulfaquents, Fluvaquents)

This mapping unit occurs mainly on the coastal plain of eastern Guyana from the Essequibo to the Corentyne River stretching some 32 kilometres inland in places. It contains relatively fertile, poorly drained clay soils developed on unconsolidated sediments with associated sandy 'reefs' that are old beach ridges. Some saline soils and organic 'pegasse' soils also occur in patches.

The soils need drainage prior to agricultural production but are relatively fertile. The main limitations for agriculture are the need for drainage and occasional areas of salinity and acid sulphate and aluminium toxicity. In much of the coastal plain, these soils have a land use of rice and sugar with coconuts on the

sandy reefs. Where not developed for agriculture, the vegetation is one of mangrove and swamp forest and marshy grassland.

2a - Low Humic Gleys of High and Medium Base Status, Fluvio Marine Phase, Riverine Soils (Fluvaquents with Endoaquents, Medhemists)

This mapping unit describes poorly drained, deep, silty loam to silty clay over clay textured soils that have developed over alluvial deposits. They occur mainly between the Berbice and Corentyne Rivers, along the Demerara River as far south as Linden and 100 kilometres up the Berbice River and at the Essequibo River mouth.

The soils have moderate to high fertility which decreases away from the coast. The need for drainage is the main limitation. The soils are extensively cultivated with rice and sugar as the main crops but with a natural vegetation similar to 1a where not cultivated.

3a - Bog Soils, Peat and Muck Phases, Deep Pegasse (Medihemists with Sulfohemists, Medisaprists)

These organic bog soils known as 'pegasse' occur as coastal back-swamps and are most extensive in north-western Guyana, west of the Pomeroon River where they can extend 65 kilometres inland, although they also occur in patches behind the rest of the coastal plain.

The soils are organic accumulations of peat and other organic matter occasionally interlayered with clay and can be as deep as 9 metres. They are very acid and have extremely low fertility. Drainage, fertility and acid sulphate toxicity are the main limitations to agriculture. The land cover is mainly natural vegetation of grassland and swamp forest with characteristic ite palms.

4a - Low Humic Gleys of Low Base Status, including Groundwater Laterites and Planosols (Endoaquepts with Fluavaquents, Sulfaquepts)

This unit represents a complex of different soils in which Low Humic Gleys (Endoaquepts) are predominant. The unit occurs primarily in the backlands of the Mahaica-Berbice area, between the Berbice River and Canje Creek and in small patches between the Essequibo and Demerara rivers.

The soils are very poorly drained clays often with a peat topsoil with better drained laterite 'islands' and planosols that show an abrupt silt pan. The soils are very poorly drained, have extremely low fertility and often exhibit acid sulphate and aluminium toxicity. Drainage, fertility and acid sulphate toxicity are the main limitations to agriculture. The land cover is mainly natural vegetation of scrub, waterlogged grassland/marsh and swamp forest.

5a - Groundwater Laterites (Humaquepts with Endoaquepts, Fluvaquents, Psammaquents)

This mapping unit occurs at the boundary of the coastal plain and the White Sand Plateau and is most extensive between the Berbice and Demerara Rivers and south of the Torani Canal in Region 6.

The soils are poor to moderately well drained, deep silty clays to clays of low fertility. Drainage is the main limitation in some areas but the low fertility can be enhanced through appropriate land management. The land cover is largely forest with some areas of savannah.

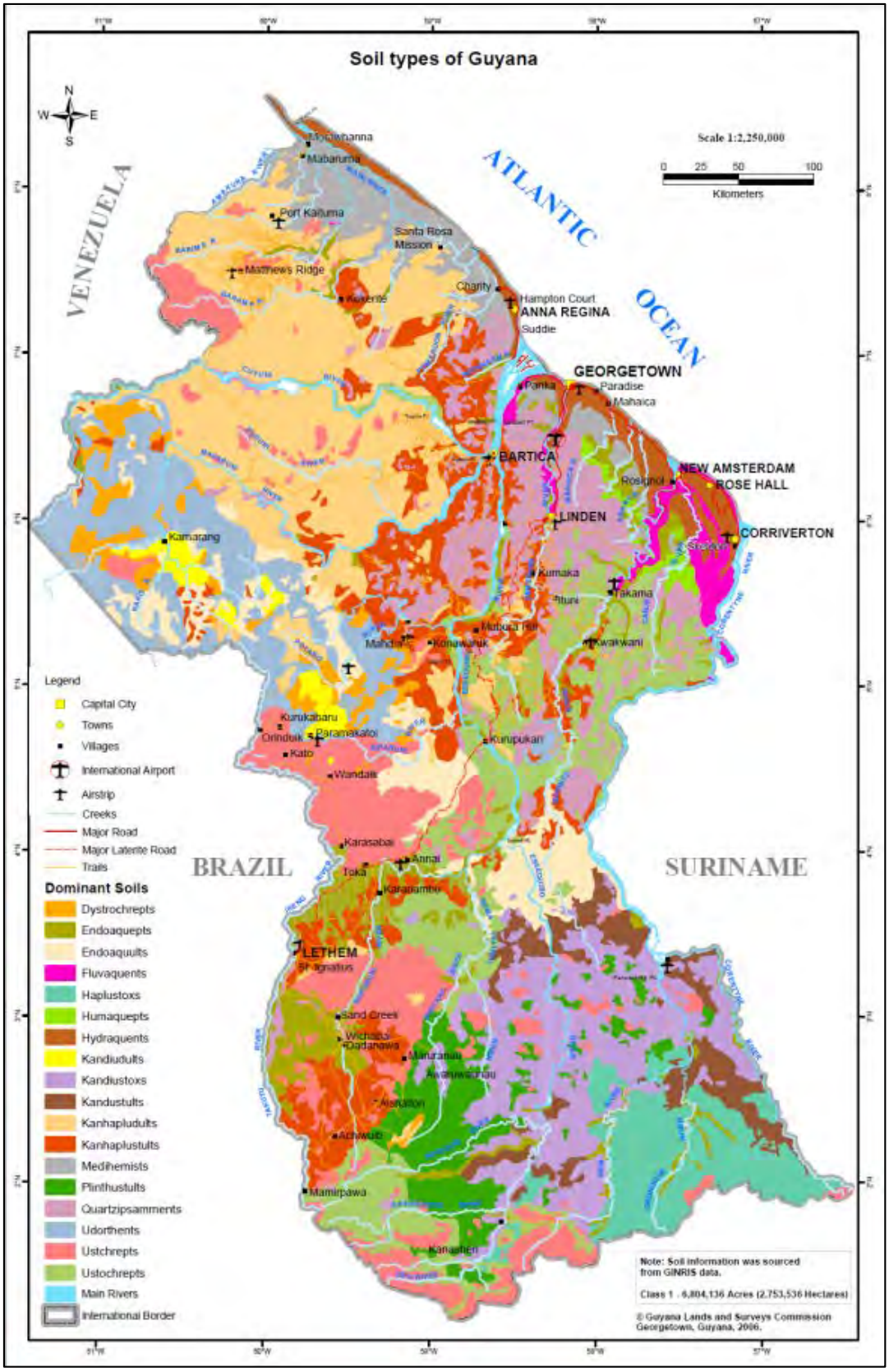

Figure 1: Soils Map of Guyana - USDA Classification (Guyana Lands and Surveys Commission, 2013).

1.2.2. Land Capability Classification (LCC) and Limitation to Agriculture in Guyana

Each USDA classification soil unit was assigned a Land Capability Class by FAO (see Table 1-1), which is a method of grouping soils together to show their relative agricultural suitability and is based on each soil unit's limitations for crop production (Guyana Lands and Surveys Commission, 2013). The classification system used is divided into two levels; the Class and Subclass. Class levels I - IV show the range of limitations to agricultural development, in that, Class I land has the least limitations and the widest range of agricultural use whilst Class IV land is not fit for agricultural use (see Table 1-2).

Table 1-2: Land Capabilities Classification.

LCC	Description
I-II	Good to Moderate Agricultural Land
III	Poor Agricultural Land
IIIf	Poor Agricultural Land with fertilization potential
IV	Non-Agricultural Land

The soils within the Project area along the Coastal Plain is mainly categorised as Class 1 – III. A description of these classification within the plain is given below:

Class I-II - Good to Moderate Agricultural Land

These soils are poorly drained and therefore, require drainage prior to agricultural development. They are clays and silts on a flat plain but with relatively high fertility. Patches of saline soils occur and toxic acid sulphate soils occur close to swamps. Drainage, lime and fertiliser will be needed for sustainable agricultural production.

Class III - Poor Agricultural Land

These are marginal soils for agriculture with severe limitations of fertility, toxicity, water holding capacity, flooding and topography. They can be cultivated with difficulty but generally should be left in their natural condition. These are soils that are very poorly drained and are either organic peats and mucks of swampy areas or are mineral soils with low to extremely low fertility. These include potential acid sulphate soils which can release sulphuric acid if drained. Even if developed, the range of crops that may be grown will be small and will require a high level of management to be sustainable.

The Subclasses are notated by a suffix (Im, IIs, IIIt, etc.) which relate to specific limitations to agricultural development:

- f low fertility;
- t soil toxicity;
- m physical limitations (heavy clay texture, poor structure, poor drainage, etc.);
- s excess soluble salts (salinity);
- w poor drainage;
- l flooding;
- x low water holding capacity;
- d shallow depth; and
- e erosion hazard.

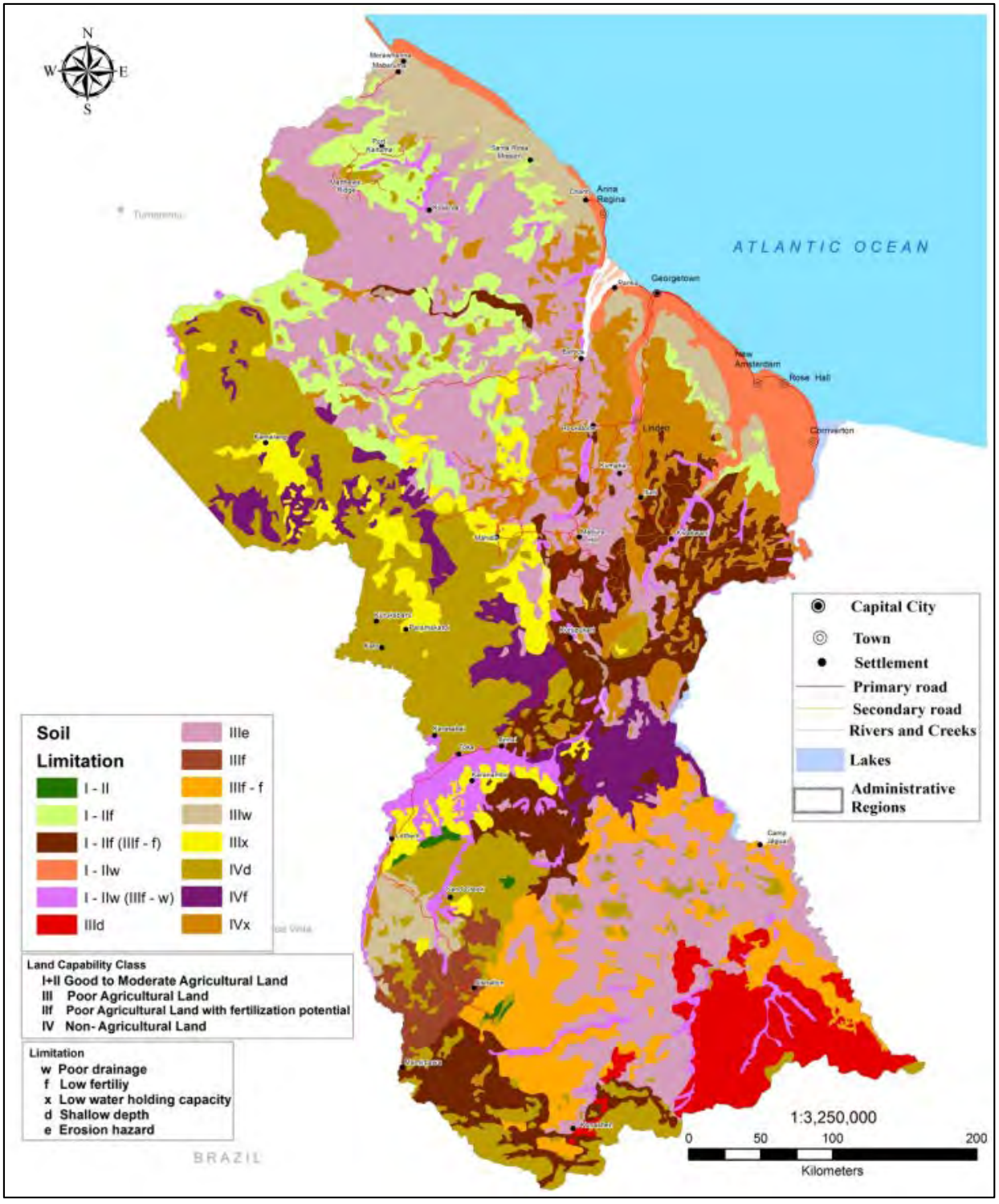

Figure 2: Map of Guyana showing Land Capabilities Classification and Limitations to Agriculture (Guyana Lands and Surveys, 2013).

1.2.3. International Soil Classification

Unified Soil Classification System

The Unified Soil Classification System (U.S. Army Engineer Waterways Experiment Station, 1960) is based on identifying soils according to their textural and plasticity qualities and on their grouping with respect to their behaviour as an engineering construction material. Clays and silts are fine-grained soils which are subdivided into groups based on whether they have a relatively low (L) or high (H) liquid limit. These two groups are further subdivided into inorganic clays – symbol C, groups CL and CH, and inorganic silts and very fine sandy soils, silty or clayey fine sands, micaceous and diatomaceous soils, and elastic silts – symbol M, groups ML and MH.

ML and MH Groups

In these groups, the symbol M has been used to designate predominantly silty materials and micaceous or diatomaceous soils. The symbols L and H represent low and high liquid limits, respectively, and an arbitrary dividing line between the two is set at a liquid limit of 50. The soils in the ML and MH groups are sandy silts, clayey silts, or inorganic silts with relatively low plasticity. Also included are loess-type soils and rock flours. Micaceous and diatomaceous soils generally fall within the MH group but may extend into the ML group when their liquid limit is less than 50. The same is true for certain types of kaolin clays and some elite clays having relatively low plasticity.

CL and CH Groups

In these groups, the symbol C stands for clay, with L and H denoting low or high liquid limit. These soils are primarily inorganic clays. Low-plasticity clays are classified as CL and are usually lean, sandy, or silty clays. The medium and high plasticity clays are classified as CH. These include the fat clays, gumbo clays, certain volcanic clays, and bentonite. The glacial clays of the northern US cover a wide band in the CL and CH groups.

1.3. REGULATORY CONTEXT

Within Guyana, the National Land Use Plan of Guyana, which was issued in June, 2013 by the Guyana Lands and Surveys Commission (GLSC), is the only regulatory document which provides guidance on land development in Guyana. Legislation and regulations which drive the protection of Guyana's soil resources dates back to 1883; however, only certain clauses within the legislation aims to safeguard the soil resources of Guyana. These legislation, regulations, and conventions include: the Environmental Protection Act 1996; Environmental Protection (Hazardous Wastes Management) Regulations 2000; Sea Defence Act 1883, Cap. 64:01; Sea Defence Act 1933, Cap. 64:02; Maritime Zones Act 2010, Cap. 63:01; Guyana Land and Survey Commission Act 1999, Cap. 59:05; Guyana Forests Act 2009; Civil Law of Guyana Act 1917, Cap 6:01; Local Democratic Organs Act 1980, Cap. 28:09; and Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (signed in 2001). These are summarized in Appendix A, Table 7-1.

EEPGL has filed an application with the Guyana Environmental Protection Agency (EPA) for Environmental Authorisation for the Project under the Environmental Protection Act 1996. This process required EEPGL to conduct an EIA, as such this study was completed to support the preparation of said EIA.

1.4. STUDY OBJECTIVES

The main objective of the study was to collect data that can inform the assessment of potential impacts of the Project on the soils resources of the area, and the development of appropriate mitigation measures to address these potential impacts, as warranted. The study serves to:

1. Identify the physical characteristics of the soils resources within the Project area;
2. Determine the soil type and soil classification based on the Unified Soil Classification System Chart;
3. Collect soil samples within the Project area for chemical characterization of soil quality and for the presence of potential contaminants of concern; and
4. Assist with the review and evaluation of the physical and chemical characteristics and properties of the soils types mapped for the area using information available from NAREI.

2.0. METHODOLOGY

This section provides an outline of the approaches that were followed during the study. It provides information on the procedures followed and precautions taken during sample collection, and the preservative measures undertaken prior to shipment. Information on the team members and their roles were also included in this section.

2.1. STUDY AREA

The study area is situated in the northern part of Guyana, between latitudes 6°49'34"N and 6°37'N, and longitudes 58°15'08"W and 58°11'31"W. The area was approximately 151.28 square kilometres with a maximum north-south extent of 23.6 kilometres (14.66 miles), and an east-west width of 6.41 kilometres (3.98 miles). It covered 4.9% of Region # 3 and included the Wales Sugar Estate, which was located 13 kilometres south of Vreed-en-Hoop.

The study area was located west of the Demerara River, stretching from Nouvelle Flanders on the west coast to Reynstein South on the west bank, along open farmlands both privately and publicly owned. This area was divided into two sections: the north and south sections. The northern section included the pipeline soil sampling locations from Nouvelle Flanders to La Retraite, while the southern section included the remaining pipeline locations from Belle Vue to Hermitage (see Figure 3) and the NGL property and Materials Offloading Facility (MOF) soil sampling locations from Reynstein to Maria's Lodge (see Figure 3). The NGL Plant will be situated on the west bank of the Demerara River on abandoned sugarcane fields, which have 5 – 7 years of pioneer species overgrowth.

Motorised access into the northern section was made possible due to a network of paved and unpaved roads, passing through several communities including Canal # 1, Canal # 2 and Parfaite Harmonie. However, accessibility was not always assured as some sampling locations were situated away from the road and could not be accessed by vehicle. For these areas, access to the site had to be done via walking.

Partial access into the southern section was made possible due to a network of canals and adjacent tractor access earthen roads, passing through farmlands in Free and Easy, Hermitage and Reynstein. For the other locations, EEPGL's team created temporary access to the site. These areas were accessed using all-terrain vehicles (ATV) or by walking.

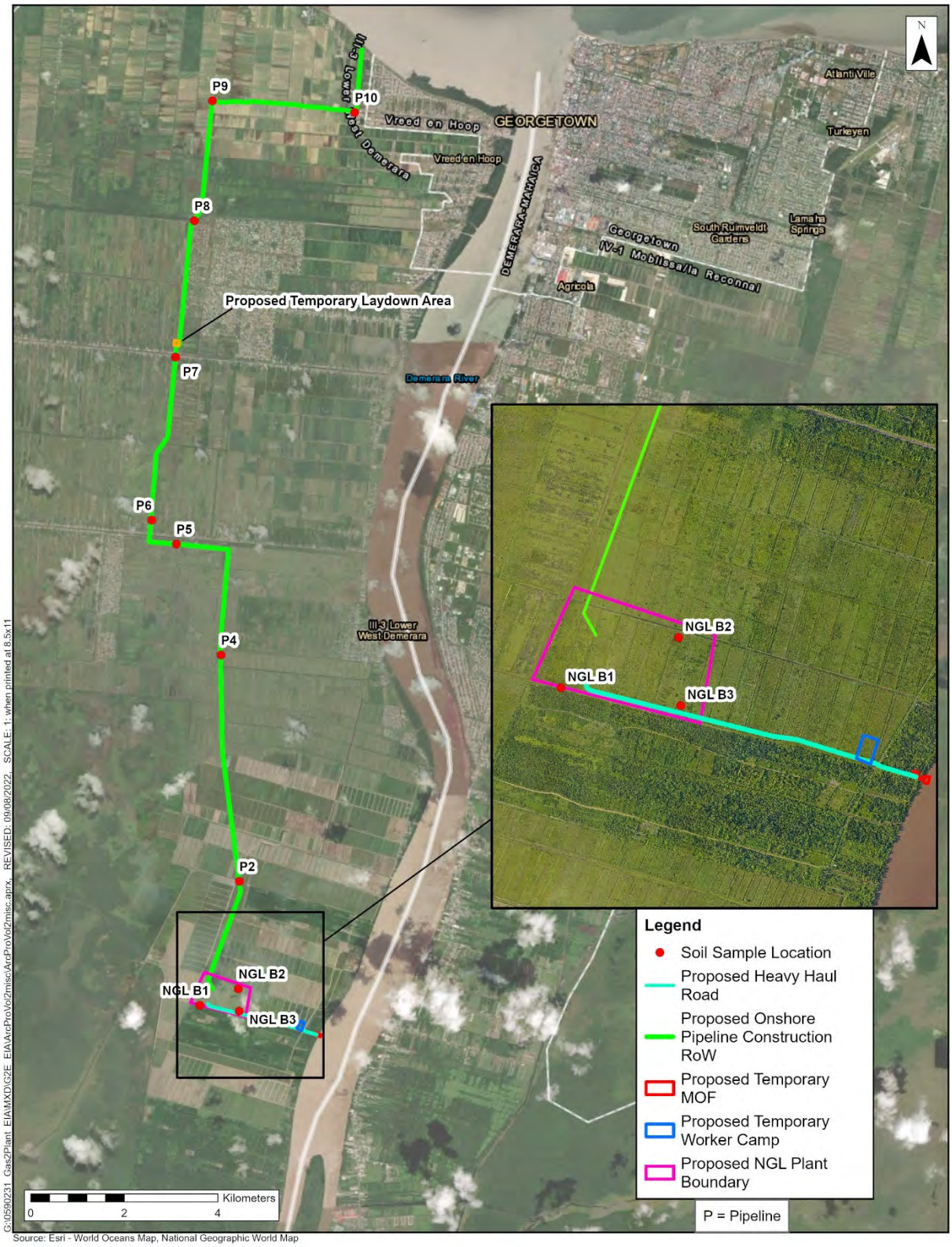

Figure 3: Soil Sampling Locations.

2.2. STUDY TEAM

Experienced professionals were responsible for the design, logistical planning, and sample collection for the study. ERM utilized their international and local Guyanese staff to support the field sampling effort, assist with the utility location and clearance, and provide health and safety oversight. E & A Consultants Inc. (EACI) in Georgetown, Guyana was subcontracted to assist with the soil sample collection. The samples were submitted to ALS Environmental in the United States of America for laboratory analysis. The members of the study team are provided in Table 2-1.

Table 2-1: Study Team - Soils Quality Baseline Study.

Role	Personnel
ERM Client Contact	Herbert Pirela
Project Manager	Matt Erbe
ERM Field Safety Officer	Nico Pineros, B.Sc.; Nicolas Chin B.Sc.
Field Team	Delshah Hamid, B.Sc.; Lalita Gopaul, B.Sc.; Esther Ugraj, B.Sc.; Sean JJ Griffith B.Sc.; Oudho Homenauth, PHD; Nicholas Nagessar.
Logistical Support	Nicolas Chin, B.Sc.; Anasha Ally
Report Preparation	Delshah Hamid, B.Sc.
Information Management/GIS	
Laboratory Analyst	ALS Environmental

2.3. SOIL SAMPLING

2.3.1. Onshore Pipeline

A total of eight (8) soil samples were collected along the pipeline route at approximately 2.5-kilometre-intervals, and to a depth of 0 to 50 centimetres, to be above the water table. Collection of samples from the 0 to 50 centimetres depth facilitated the analysis of shallow top soil which is mainly a characteristic for agricultural land use. Each soil profile was laid out on a clean surface to allow for several field tests conducted by the soil scientist, including the identification of the soil type, the soil classification based on the Unified Soil Classification System Chart and the physical characteristics including:

- Soil Colour;
- Soil Structure;
- Soil Texture; and
- Soil Consistence / Soil Plasticity.

The samples were placed against the Munsell® Soil Colour Charts and assigned a colour. They was hand tested for the other physical characteristics mentioned in the list above. From each sampling location, the sample was placed in a clean, large container, homogenised and sampled as a composite of the entire soil borehole. The composite soil sample was collected in a 1-litre and a 4-ounce laboratory bottles by the soil scientist. These soil samples collected along the onshore pipeline were submitted to a certified laboratory in the United States for chemical characterization of soil quality and for the presence of potential contaminants of concern. They were used to assess the quality of soil being displaced, as well as, to assess the soils that are impacted and may require special handling following excavation.

2.3.2. NGL Plant and Associated Facilities

Soil samples were collected from a north-south-east-west grid placed across the NGL property boundary to characterize the Project Area's soil quality and to assess for the presence of potential contaminants of concern. A total of three (3) soil samples were collected across the NGL property (see Figure 3). Soil sample locations, B4 – B8, were not collected due to access constraints. Additionally, the two (2) soil sample which were required to be collected from the MOF and the main camp area (see Figure 3) were also not collect due to access constraints. These sampling locations were adjusted in the field by the ERM's FSO based on access limitations and field observations. At these locations, the soil sampling methodology used in section 2.3.1. was followed.

2.3.3. Quantity and Location of Samples

The number of samples collected for chemical characterization of soil quality assessment and for the presence potential contaminants of concern are summarized in Table 2-2.

Table 2-2: Total Number of Soil Samples.

Location	Number of Locations	Number of Samples	Comments
NGL Property	8	3	NGL-B-1, B-2, B-3 collected; B4 – B8 not collected due to access.
MOF and Camp	2	0	Not collected due to access.
Pipeline	11	8	P -2, -4, -5, -6, -7, -8, -9, -10 collected; NGL-3 not collected due to access; NGL-11 pending access.
Total	**21**	**101**	**11 Samples Collected**

2.3.4. Disposal of Investigation-Derived Waste

The investigation-derived waste (IDW) generated in the field included the following:

- Cleared vegetation;
- Soil cuttings from hand augering;
- Personal protective equipment (PPE) such as disposable gloves and masks;
- Disposable equipment and items such as garbage bags used to place soil profile onto;
- Decontamination liquids such as non-phosphate detergent solution and wash water; and
- Packing and shipping materials such as tape and labels.

Efforts were made by the field team to minimize the quantity of IDW generated by clearing the least amount of vegetation at the sampling location, re-using the soil waste generated during sampling to backfill the sample boreholes, and using the least amount of decontamination liquids as practicable. In addition, all PPE, disposable equipment and items, and packing and shipping materials were collected and placed in garbage bags for proper disposal in a municipal trash receptacle in Georgetown. All decontamination liquids generated during sampling were discharged to the ground surface away from any storm drain or water body. There was not any wastes with evidence of gross contamination (oil-like material) which were required to be containerised for proper disposal by EEPGL.

2.3.5. Equipment Decontamination

The protocol for decontamination of sampling tools and equipment used during the field activities is described below. The sampling equipment to be cleaned by this procedure are:

- Soil auger; and
- Large soil container.

Sampling methods and equipment have been chosen to minimize decontamination requirements and prevent the possibility of cross contamination. Sampling equipment was decontaminated using the following procedure:

- Initially dry brushing/cleaning equipment of all foreign matter;
- Scrubbing equipment with brushes in a non-phosphate detergent solution;
- Double rinsing equipment with potable water; and
- Allowing equipment to dry.

2.4. DATA COLLECTION

2.4.1. Soil Resources Characterization

The field team identified and recorded the soil type, soil classification (Unified Soil Classification System) and the following physical characteristics mentioned in section 2.3.1. for each soil samples collected. With the aim of assessing the potential impacts of the Project on the soils resources of the area, the physical and chemical characteristics and properties of the soil types mapped for the area was reviewed and evaluated using information available from NAREI of Guyana. The information included the soil types map units and percent coverage, the physical-chemical characteristics, and land use capability.

2.4.2. Analytical Methods and Laboratory

Soil samples were submitted to a certified laboratory in the United States of America for analysis of soil quality and contaminants of potential concern (ALS Environmental in Houston, Texas), including:

- Soil quality parameters;
- General analytes and metals;
- Organic compounds including volatiles and semi-volatile polynuclear aromatic hydrocarbons (PAHs);
- Pesticides and polychlorinated biphenyls (PCBs); and
- Herbicides.

The parameters analysed and the analytical methods followed are presented in Tables 2-3 and 2-4.

Table 2-3: Soil Quality Parameters and Methods.

Parameter	Analytical Method
pH	USEPA 9045
Specific Conductivity	USEPA 120.1
Total Organic Carbon	USEPA 9060
Nitrate Nitrogen (NO_3-N)	USEPA 9056
Phosphorous (P)	USEPA 365.1
Total Metals (Copper, Iron, Potassium, Manganese and Zinc)	USEPA 6020

Table 2-4: Soil General Analytes and Potential Contaminants of Concern List and Methods.

Parameter		Analytical Method
Volatile Organic Compounds		**USEPA 8260**
1,1,1-Trichloroethane 1,1,2,2-Tetrachloroethane 1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113) 1,1,2-Trichloroethane 1,1-Dichloroethane 1,1-Dichloroethene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2-Dibromo-3-chloropropane 1,2-Dibromoethane (EDB) 1,2-Dichlorobenzene 1,2-Dichloroethane (EDC) 1,2-Dichloropropane 1,3-Dichlorobenzene 1,4-Dichlorobenzene 2-Butanone(MEK) 2-Hexanone 4-Methyl-2-pentanone(MIBK) Acetone Benzene Bromochloromethane Bromodichloromethane Bromoform Bromomethane Carbon Disulfide Carbon Tetrachloride	Chlorobenzene Chloroethane Chloroform Chloromethane cis-1,2-Dichloroethene cis-1,3-Dichloropropene Cyclohexane Dibromochloromethane Dichlorodifluoromethane (Freon 12) Ethylbenzene Isopropylbenzene(Cumene) m/p-xylene Methyl acetate Methyl t-Butyl Ether Methylcyclohexane Methylene Chloride o-Xylene Styrene Tetrachloroethene Toluene trans-1,2-Dichloroethene trans-1,3-Dichloropropene Trichloroethene Trichlorofluoromethane (Freon 11) Vinyl Chloride	
Semi-Volatile Organic Compounds by (Polynuclear Aromatic Hydrocarbons) Analyte List		**USEPA 8270**
1-Methylnaphthalene 2-Methylnaphthalene Acenaphthene Acenaphthylene Anthracene Benzo(a)Anthracene Benzo(a)Pyrene Benzo(b)Fluoranthene Benzo(g,h,i)Perylene Benzo(k)Fluoranthene	Chrysene Dibenzo(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)Pyrene Isophorone Naphthalene Phenanthrene Pyrene	
Total Metals		**USEPA 6020**
Antimony	Mercury	

Arsenic Beryllium Cadmium Chromium Lead	Nickel Selenium Silver Thallium Zinc (included in nutrient list)	
Pesticides and PCBs		**USEPA 8081 / 8082**
4,4-DDD 4,4-DDE 4,4-DDT Aldrin alpha-BHC Alpha-Chlordane beta-BHC delta-BHC Dieldrin Endosulfan I Endosulfan II Endosulfan Sulfate Endrin Endrin Aldehyde	Endrin Ketone Gamma-BHC (Lindane) Gamma-Chlordane Heptachlor Heptachlor Epoxide Methoxychlor Toxaphene Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260	
Herbicides		**USEPA 8151**
2,4,5-T 2,4,5-TP (Silvex) 2,4-D 2,4-DB Dalapon Dicamba	Dichloroprop Dinoseb 4-Nitrophenol MCPA MCPP Pentachlorophenol	

2.4.3. Soils Logging

At each sampling location, the field team recorded the GPS coordinates of the area using live coordinates from the Google Maps application prior to sample collection. These readings were differentially corrected, and added to the existing GIS database along with the corresponding analytical data. In addition, all field work were photo-documented for inclusion into this field sampling report.

2.5. SAMPLE DOCUMENTATION, PRESERVATION, AND SHIPMENT

This section describes sample handling procedures including containers, sample preservation, shipment requirements, and holding times. These procedures were designed to ensure that samples are preserved and transported to the laboratory in a manner that is consistent and maintains sample integrity.

2.5.1. Sample Documentation

Sample Identification and Labels

All samples were identified using a unique site-specific sample identification number on a label affixed to the sample container. Each sample was labelled and sealed immediately after collection. To minimize handling of sample containers, labels were filled out prior to sample collection where practicable. Sample information was filled out on the labels in a legible manner using waterproof ink. These labels were firmly affixed to the sample containers and protected with clear mylar tape. Sample labels attached to the sample container were used to properly identify all samples taken in the field. They were placed on the laboratory bottles with the aim of not obscuring any QA/QC data on the bottles. The sample labels provided the following information:

- Name of laboratory;
- Name of client;
- Name of project;
- Sample ID number;
- Date of collection;
- Time of collection;
- Name of sample collector;
- Analysis required;
- Preservatives used; and
- Bottle order number.

The field personnel ensured that all field identification were sufficient so as to enable cross-reference with the field logbook (i.e., the sample labels on the laboratory bottles corresponded with the description of the sample in the field logbook). For chain-of-custody purposes, all QC samples were subjected to the same custodial procedures and documentation as field samples.

Field Notebooks

Field notebooks contained information in a daily log format, including both site and task logs, utility clearance logs and sign-off forms. All field documentation were completed according to ERM's existing standard operating procedures. Information was recorded in black waterproof ink and the language used was objective and factual. Each page was dated and signed by the respective field personnel, and each individual entry included the associated time notation based on the 24-hour clock. In order to ensure both quality assurance and legal defensibility of the field activities:

- The field notebook was bound and contained consecutively numbered pages;
- No pages were removed from the field notebook, even if they were mutilated or illegible; and
- All entries in the field notebook were complete and accurate.

The field team leader was responsible for all logs in the field notebook. These logs included a complete summary of the day's activity at the site including:

- Date;
- Times of arrival and departure;
- Weather conditions;
- Soil sampling location, location ID, sample number and GPS coordinate;
- Depth of borehole;
- Type of soil sampling used;
- Soil type identified;
- Evidence of impact (unnatural odours, staining, oil-like materials, ash);
- A description of any unusual circumstances or project-related difficulties incurred;
- Work summary;
- Name of sampling personnel;
- List of team members on site and their duties;
- Task undertaken and assigned to; and
- Levels of personnel protection employed.

Photographs

For all photographs taken in the field, the following information were provided in this field report:

- Time, date, location, direction, and, if appropriate, weather conditions;
- Complete description of the subject in the photograph and the reason for taking the photograph;
- Sequential number of the photograph; and
- Name of photographer.

A digital camera was used to allow the photographic record to be integrated into the GIS.

Sample Custody

This section describes the procedures which were followed by the sampling personnel for sample chain-of-custody. The purpose of these procedures was to ensure that the integrity of the samples was maintained during their collection, transportation, storage, and analysis. Sample identification documents were carefully prepared to ensure that sample identification and chain-of-custody were maintained and sample disposition controlled. Sample identification documents included field notebooks, sample labels, custody seals, chain-of-custody records, and laboratory sample log-in and tracking forms.

The primary objective of these chain-of-custody procedures was to provide an accurate written record that can be used to trace the possession and handling of a sample from the moment of its collection through its analyses. A sample is in custody if it is:

- In someone's physical procession;
- In someone's view;
- In a secure, locked location; or
- Kept in a secured area that is restricted to authorized personnel.

The following information describes ERM's field custody procedures which were implemented during all sampling tasks:

- Sample bottles were obtained pre-cleaned from the selected certified laboratory;
- Coolers containing cleaned bottles were sealed with a custody tape seal during transport to the field or while in storage prior to use;
- There were as few persons as possible handling samples;
- The sample collector was personally responsible for the care and custody of samples collected until the samples were transported to another person or dispatched properly under chain-of-custody;
- The sample collector recorded the sample date in the field notebook. This included sample bottle lot numbers which must be also be recorded in the chain-of-custody form.
- The project manager determined whether proper custody procedures were followed during the fieldwork and decided if additional samples were required.

Custody Seals

Custody seals are pre-printed adhesive-backed seals with security slots designed to break if the seals are disturbed. A custody seal was placed on the sample shipping containers by the sampling handling technician. Sample shipping containers were sealed in as many places as necessary to ensure security. Seals were signed and dated before use. Strapping tape was placed around the sample shipping containers and on the lid of the sample bottles to ensure that the seals were not accidentally broken during shipment but in a manner that allows easy removal by laboratory personnel. On receipt at the laboratory, the custodian checked (and certified, by completing logbook entries) that seals on boxes and bottles were intact.

Chain-of-Custody Record

The field technician who was designated by the project manager as being responsible for sample shipment to the appropriate laboratory for analysis, completed the chain-of-custody (COC) record fully in duplicate. Bottle lot numbers for all sample bottles were recorded on the COC record.

2.5.2. Sample Preservation and Storage

Soil samples were preserved immediately following collection by cooling the containerised samples to 4° C using ice.

2.5.3. Shipping Requirements and Holding Times

Soil samples were packaged for shipment as follows:

- The caps for the glass jars were secured with filament tape to ensure sample jars were not opened prior to arrival to the laboratory;
- Sample labels were affixed to each sample container and protected with clear mylar tape;
- Each glass jars were secured in bubble wrap and placed in a ziplock bag;
- All sample containers were secured in a large plastic bag to prevent melted ice coming into contact with the containers;
- Containerised samples were store on ice in an ice chest immediately after sample collection and packaging;
- Soil samples were shipped to the laboratory in a sealed ice chest containing chain-of-custody documents; and
- Signed and dated custody seals were affixed to the ice chest prior to shipment.

These soil samples were shipped to ALS Environmental in Houston, Texas for chemical analysis. Due to the travel time through customs in Guyana and the United States, samples may be received out of temperature range and potentially outside of the recommended holding times. ERM and EACI coordinated to the best if their abilities to minimize these impacts.

3.0. HEALTH AND SAFETY

ERM prepared a comprehensive Health and Safety Plan (HASP) along with Job Hazard Analyses (JHAs) for all tasks associated with the scope of work for this study. These materials were shared with EACI prior to the first field survey in the form of a HSSEQ Subcontractor (SUB) Induction on November 5th, 2021 at 09:00 hrs -12:00 hrs. All ERM's and EACI's staff, agreed to adhere to the practices and procedures specified in the HASP as a prerequisite to being considered eligible for fieldwork. Health and Safety briefings and warm-up sessions were conducted by ERM's FSO on a daily basis over the course of the field study, and all work was completed in the presence of that FSO. Team members were equipped with the following PPE as suited for each soil sampling location:

- Safety hard hats / sun hats;
- High-visibility vests;
- Safety boots with steal-toe cap or safety rubber boots;
- Safety glasses;
- Gloves for task (cut-resistant gloves, leather gloves, and/or nitrile gloves);
- Snake guards / gaiters;
- Long-sleeved shirts; and
- Long pants.

The following are some precautions taken during the collection of soil samples:

- Leather or cut-resistant gloves and safety glasses were used when operating the hand-held soil auger;
- The equipment was cleaned with non-phosphate detergent solution and potable water before each use to avoid cross-contamination; and
- Clean nitrile gloves were used at each sampling location to avoid soil contamination.

4.0. FIELD RESULTS

4.1. SOIL RESOURCES CHARACTERISATION

To facilitate the assessment of the potential impacts of the Project on the soils resources of the area, the physical and chemical characteristics and properties of the soil types mapped for the area was identified via both field and laboratory tests. The sampling location, sample ID, sampling date and time, GPS coordinates and weather conditions are indicated in Table 4-1 below.

Table 4-1: Metadata of the Soil Samples Collected during this Study.

Date and Time	Soil Sampling Location	Location ID	Estimated GPS Coordinates	Actual GPS Coordinates	Weather Conditions
13-Nov-2021 at 13:54 hrs	Pipeline	NGL-10	6.81208173257, -58.20779208030	6.8117470, -58.2080863	Cloudy
12-Nov-2021 at 14:46 hrs	Pipeline	NGL-9	6.81382633207, -58.23571436640	6.8138769, -58.2356387	Sunny
13-Nov-2021 at 07:55 hrs	Pipeline	NGL-8	6.79063779456, -58.23896084060	6.7907336, -58.2390132	Cloudy
12-Nov-2021 at 13:30 hrs	Pipeline	NGL-7	6.76442616908, -58.24255522500	6.7644269, -58.2425863	Sunny
12-Nov-2021 at 07:45 hrs	Pipeline	NGL-6	6.74052472830, -58.24643456620	6.7329442, -58.2472157	Sunny/Cloudy
17-Nov-2021 at 12:23 hrs	Pipeline	NGL-5	6.72839632362, -58.24239995630	6.664148, -58.200842	Sunny/Cloudy
17-Nov-2021 at 08:30 hrs	Pipeline	NGL-4	6.71356435122, -58.23338728290	6.707219, -58.233672	Sunny/Cloudy
20-Nov-2021 at 09:33 hrs	Pipeline	NGL-2	6.66329796198, -58.23004100090	6.6633491, -58.2300426	Rainy/Cloudy
23-Nov-2021 at 09:54 hrs	NGL Property	A2	6.64167664206, -58.23075995810	6.638307, -58.230005	Cloudy/Sunny
02-Dec-2021 at 09:50 hrs	NGL Property	B1	6.64120666896, -58.23642273320	6.639429, -58.237620	Cloudy/Sunny
23-Nov-2021 at 12:46 hrs	NGL Property	B2	6.64005019898, -58.23303260030	6.642618, -58.230178	Cloudy/Sunny

4.1.1. Field Physical Characteristics

The field team identified the following soil physical properties for each soil samples collected:

- Soil Colour;
- Soil Structure;
- Soil Texture; and
- Soil Consistence / Soil Plasticity.

Soil compaction and soil porosity could not be determined as the soil bulk density was not measured in the field. Table 4-2 shows the physical characteristics identified by the soil scientist for each soil sample collected.

4.1.2. Soil Classification

From these physical properties identified, the soil scientist assigned a soil type and soil classification based on the Unified Soil Classification System to the soil sample collected at every location (see Table 4-2). The information collected was then reviewed and evaluated using information available from NAREI of Guyana to classify the soil sample according to NAREI's local soil classification system described below. The information included the soil types map units and percent coverage, the physical-chemical characteristics, and land use capability.

Canje Clay

Canje Clay is a category E1 soil which is difficult to drain. This very poorly drained soil is developed from riverain sediments and occurs at slightly higher elevations. It is characterised by a grey to greyish brown clay topsoil over a very firm grey clay subsoil with yellowish brown and red mottling. The soil is very strongly acid throughout and low in nutrients.

These soils have been assigned Land Capability Subclass IIm due to their impermeable subsoils and low fertility, in that they have moderate limitations for general agricultural use. Canje Clay can produce moderately well given above average management and heavy applications of fertilizer and lime.

Kerkenama Clay

Like the Canje Clay, the Kerkenama Clay is a category E1 soil. This very poorly drained soil occurs in slight depressions within old riverain deposits. It is characterised by a black to very dark grey clay topsoil (some areas have a peat layer) over a grey, very firm, mottled subsoil. The soil is extremely acid and low in fertility.

These soils have been assigned Land Capability Subclass IIm due to their impermeable subsoils and low fertility, in that, they have moderate limitations for general agricultural use. Kerkenama Clay can produce moderately well given above average management and heavy applications of fertilizer and lime.

Mara Clay

Mara Clay is a category E2 soil which is typically difficult to drain. This poorly drained soil is developed from fluvio-marine sediments in association with the Canje clays. It occurs at low elevations and is characterised by a thin (<30 centimetres) peaty surface layer over a dark grey clay topsoil over a grey to greenish grey soft clay subsoil. The soil is extremely acid throughout and usually contains toxic acid-sulphate salts.

These soils have been assigned Land Capability Subclass IIIt due to their high concentrations of toxic acid-sulphate salts, in that, they are marginal soils for agriculture with severe limitations. They can be cultivated with difficulty but generally should be left in their natural condition. Mara clay have low fertility and would require very special practices for agricultural development.

Whittaker Clay

The Whittaker Clay is a category C3 soil which is includes poorly drained silt loams to clays with low to moderate fertility. This poorly drained soil is also developed from marine sediments known as 'frontland clays' and has similar characteristics to the Haswell clay, but is not an acid-sulphate soil. It is characterised by a dark grey clay topsoil over a grey, mottled clay subsoil with some concretions. The soil has a high salt content and is difficult to cultivate due to a poor surface structure which makes it prone to waterlogging.

There is a high correlation between this soil unit and the 'Abandoned Land' land use class. Whittaker clays have been assigned Land Capability Subclass IIs due to their high salt levels which would be relatively difficult to remove. They have moderate limitations for general agricultural use, in that the choice of crops is limited and special treatment is required.

Table 4-2: Data Collected on the Physical Characteristics, Type and Classification of Soil Samples.

Location ID	Depth (cm)	Soil Colour	Soil Structure	Soil Texture	Soil Plasticity	Soil Type	Sampling Method	Soil Classification	
								Local Series (NAREI)	Unified Soil Classification System
NGL-10	0 - 15	dark brown (10YR 4/1) clay	blocky structure	clay	slightly sticky and slightly plastic	clay	Composite Sampling	Whittaker Clay	ML
	15 - 30	grey (10YR 5/1) clay	massive structure	clay	sticky and plastic				
	30 - 50	grey (10YR 5/1) clay	massive structure	clay	sticky and plastic				
NGL-9	0 - 15	dark greyish-brown (10YR 3/2) clay	medium and fine granular structure	clay	non-sticky and non-plastic	clay	Composite Sampling	Stewartville Clay	CH
	15 - 30	dark grey (10YR 3/3) clay mixed with light grey clay	fine granular structure	clay	sticky and plastic				
	30 - 50	very dark greyish-brown (10YR 2/2) clay	fine granular structure	clay	sticky and plastic				
NGL-8	0 - 15	dark grey (10YR 4/1) clay	massive structure	clay	slightly sticky and slightly plastic	clay	Composite Sampling	Whittaker Clay	CH
	15 - 30	grey (10YR 5/11) clay	massive structure	clay	slightly sticky and plastic				
	30 - 50	grey (10YR 5/1) clay	massive structure	clay	sticky and plastic				
NGL-7	0 - 15	very dark grayish brown (10YR 3/2) silty clay	moderate to medium sub-angular blocky	silty clay	slightly plastic	clay	Composite Sampling	Mara Clay	ML
	15 - 30	gray (10YR 3/1) clay	moderate medium and sub-angular blocky	clay	slightly sticky and slightly plastic				

	30 - 50	brown silty clay (10YR 5/3) silty clay	blocky structure	clay	slightly sticky and slightly plastic				
NGL-6	0 - 15	very dark gray (10YR 3/1) clay	medium granular structure	clay	plastic and slightly sticky	clay	Composite Sampling	Canje Clay	CL
	15 - 30	gray (10YR 5/1) clay with yellowish brown mottles	moderate fine blocky structure	clay	plastic and sticky				
	30 - 50	gray (10YR 6/1) clay	weak blocky structure	clay	plastic and sticky				
NGL-5	0 - 15	brown (10YR 4/3) clay	prismatic	clay	very sticky and plastic; hard to mould	clay	Composite Sampling	Mara cCay	CH
	15 - 30	brown (10YR 4/3) with light gray (10YR 7/1) and reddish yellow (7.5YR 7/8) mottles clay	structure less	clay	sticky and plastic				
	30 - 50	light gray (10YR 7/1) with reddish yellow (7.5YR 7/8) mottles clay	structure less	clay	sticky and plastic				
NGL-4	0 - 15	dark brown (10YR 3/3) with yellowish red (5YR 5/8) mottles clay	prismatic	clay	very sticky and plastic; hard to mould	clay	Composite Sampling	Mara Clay	CH
	15 - 30	gray (10YR 6/1) with light gray (10YR 7/1) mottles clay	structure less	clay	sticky and plastic				

	30 - 50	light gray (10YR 7/1) with brownish yellow (10YR 6/8) mottles clay	structure less	clay	sticky and plastic				
NGL-2	0 - 15	pale brown (10YR 6/3) with yellow (10YR 7/8) mottles clay	fine blocky structure	clay / aphanitic	sticky and plastic; easily moulded	clay	Composite Sampling	Whittaker Clay	CH
	15 - 30	pale brown (10YR 6/3) clay	structure less	clay / aphanitic	sticky and plastic; easily moulded				
	30 - 50	pale brown (10YR 6/3) clay	structure less	clay / aphanitic	sticky and plastic; easily moulded				
	50 - 60	pale brown (10YR 6/3) with light gray (10YR 7/1) clay	structure less	clay / aphanitic	sticky and plastic; easily moulded				
A2	0 - 15	dark gray (10YR 4/1) clay	fine blocky structure	clay / aphanitic	very sticky	clay	Composite Sampling	Mara Clay	OH
	15 - 30	dark gray (10YR 4/1) with yellow (10YR 8/8) mottles clay	structure less	clay / aphanitic	very sticky				CH
	30 - 50	dark gray (10YR 4/1) with yellow (10YR 8/8) mottles clay	structure less	clay / aphanitic	very sticky				CH
B1	0 - 15	brown (10YR 5/3) with yellowish brown (10YR 5/8) mottles clay	blocky	clay	slightly sticky and plastic	clay	Composite Sampling	Whittaker Clay	ML
	15 - 30	pale brown (10YR 6/3) with strong brown (7.5 YR 5/8) and yellow	structure less	clay	slightly sticky and plastic				

		(10YR 7/8) mottles clay							
	30 - 50	pale brown (10YR 6/3) with brownish yellow (10YR 6/8) mottles clay	structure less	clay	slightly sticky and plastic				
B2	0 - 15	dark grayish brown (10YR 4/2) clay	slightly prismatic	clay	slightly sticky and plastic	clay	Composite Sampling	Kerkenama Clay	CH
	15 - 30	dark grayish brown (10YR 4/2) clay	structure less	clay	slightly sticky and plastic				
	30 - 50	light gray (10YR 7/2) with yellow (10YR 7/8) mottles clay	structure less	clay	slightly sticky and plastic				

5.0. REFERENCE

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6.0. APPENDIX A – LEGISLATIVE FRAMEWORK

Table 7-1: Legislative Framework Governing the Protection of Guyana's Soil Resources.

Year	Legislation	Applicable/Relevant Clause
1996	Environmental Protection Act	The Environmental Protection Act 1996 serves to provide for the management, conservation, protection and improvement of the environment, the prevention or control of pollution, the assessment of the impact of economic development on the environment, the sustainable use of natural resources and for matters incidental thereto or connected therewith. 4. (1) The function of the Agency are – (a) to take such steps as are necessary for the effective management of the natural environment so as to ensure conservation, protection, and sustainable use of its natural resources; (e) to prevent or control environmental pollution; (g) to ensure that any developmental activity which may cause an adverse effect on the natural environment be assessed before such activity is commenced and that such adverse effect be taken into account in deciding whether or not such activity should be authorised; 27. (1) Subject to the provisions of this section, where it appears to the Agency that any activity in any area is such as to pose – (a) a serious threat to natural resources or the environment; or (b) risk of serious pollution of the environment or any damage to public health, the Agency shall serve on the person responsible for the activity, a prohibition notice.
2000	Environmental Protection (Hazardous Wastes Management) Regulations	26. Every person who wilfully or negligently and with the knowledge that serious environmental harm will or might result causes the contamination of any place, except a declared hazardous waste disposal site, shall be guilty of an offence and shall be liable on summary conviction to a fine of not less than eight hundred thousand dollars nor more than two million dollars and to imprisonment for five years. 27. (1) Within two years after the commencement of these Regulations any person who disposes of hazardous waste in a landfill other than a hazardous waste landfill disposal site thereby causing potential

		environmental harm shall be guilty of an offence and shall be liable on summary conviction to a fine of not less than three hundred thousand dollars and to imprisonment for three months. 27. (2) Potential environmental harm is to be treated as serious environmental harm if it involves actual or potential harm to the health or safety of human beings that is of a high impact or on a wide scale. 34. In the event of the occurrence of any spill or accidental discharge of any effluent mentioned in the Register of Hazardous Wastes mentioned in regulation 33 which either directly or indirectly gains or may gain access onto any inland or coastal waters or any land, the person or persons responsible for such occurrence shall immediately notify the Agency of the occurrence.
1883	Sea Defence Act Cap. 64:01	**Regulations for the Protection of Foreshore. [30 of 1992; 6 of 1997]** 13. (1) Subject to affirmative resolution of the National Assembly, the Minister may make regulations for all or any of the following purposes, that is to say, for — (b) the protection of the land and soil between high and low water marks. 14. The proprietor of an estate shall not, if the Chief Officer deems it necessary for the protection of a foreshore and gives him notice to abstain from so doing– (b) remove, or allow to be removed, from the foreshore of his estate any shell, sand, soil, or other materials, or any dead trees, shrubs, or other debris.
1933	Sea Defence Act Cap. 64:02	3. There shall be established a Sea Defence Board which shall (subject to the provisions of this Act) be charged with the care, maintenance, management and construction of the sea defences of Guyana. 18. (1) No person shall, without the previous written sanction of the Board, make or cause or permit or suffer to be made – (a) any drain, trench, or cutting in the earth so as to affect any sea defence. 20. Any person who shall, without the consent of the Board first had and obtained, remove any earth, sand, shell, clay, gravel, shingle, mineral substance, or any sea-weed, or vegetation, or any other matter or thing whatsoever from any sea defence or from any land along

		the foreshore within one half of a mile or mean high water mark, is liable to a fine of twelve thousand dollars and to imprisonment for twelve months, and any such matter or thing together with any article used in connection with the removal thereof shall be forfeited.
2010	Maritime Zones Act Cap 63:01	4. (1) The sovereignty of Guyana extends to the territorial sea, the seabed and its subsoil under and the airspace over that sea. 12. (1) The passage of a foreign vessel is prejudicial to the peace, good order or security of Guyana, that is to say, the passage is not innocent if, while in the territorial sea, the vessel engages in – (g) the wilful discharge of any substance which causes pollution, in contravention of the Convention. 21. (1) In the continental shelf there is vested in Guyana- (a) sovereign and exclusive rights for the purpose of exploring, exploiting, conserving and managing its natural resources. 21. (2) The natural resources to which subsection (1)(a) refers consist of the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or subsoil.
1999	Guyana Land and Survey Commission Act Cap. 59:05	4. (1) The functions of the Commission are – (a) to have charge of and act as guardian over all public lands, rivers and creeks of Guyana; (b) to execute or cause to be executed geodetic, topographic, hydrographic and cadastral surveys in relation to the land and water resources of Guyana; (c) to administer and enforce all laws relating to public lands and land surveys.
2009	Guyana Forests Act	5. (1) Except in accordance with subsection (2), no person shall – (e) clear, cultivate, or turn soil in a State forest. 22. (1) The purpose of this Part is to provide for the protection and conservation of forests. including measures to – (c) conserve soil and water resources.

1917	Civil Law of Guyana Act Cap 6:01	4. (3) No one shall remove any sand, shell, clay, gravel, shingle, or other mineral substance, or any seaweed or vegetation, from the lands without the permission of the Minister responsible for sea defences subject to the like penalties.
1980	Local Democratic Organs Act Cap. 28:09	Duties of local democratic organs. 7. Without prejudice to the generality of section 5, it shall be the duty of each local democratic organ and the members and officers thereof within its area — (b) to protect and improve the physical environment.
Guyana entered into force in 2001	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, adopted in 1989 and entered into force in 1992, aims to protect human health and the environment against the adverse effects resulting from the generation, transboundary movements and management of hazardous wastes and other wastes. It regulates the transboundary movements of hazardous wastes and other wastes and obliges its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner. Parties have an obligation to minimize the quantities of toxic, poisonous, explosive, corrosive, flammable, ecotoxic and infectious wastes that are transported, to treat and dispose of wastes as close as possible to their place of generation and to prevent or minimize the generation of wastes at source.

7.0. APPENDIX B – ACTIVITY PHOTOS

7.1. Health and Safety Briefings

Figure 4: Health and Safety Briefing at Soil Pipe 10 in Crane (Cloudy/Sunny) on November 15th, 2021 at 06:39 hrs (Photo taken by Ms. Delshah Hamid).

Figure 5: Field team equipped with their personal protective equipment (PPE) at B2 within the NGL Plant location (Sunny) on November 23rd, 2021 at 13:19 hrs (Photo taken by Mr. Nico Pineros).

7.2. Access to the Site

Figure 6: Access to Soil Pipe 02 within the Free and Easy area via canals (Cloudy/Rainy) on November 20th, 2021 at 08:35 hrs (Photo taken by Ms. Hamid).

Figure 7: Poor access to A2 within the NGL Plant location via all-terrain vehicles or quad bikes (Cloudy/Sunny) on November 23rd, 2021 at 09:54 hrs (Photo taken by Ms. Lalita Gopaul).

Figure 8: Field team traversing on a poor access road to arrive at B1 within the NGL Plant location (Cloudy/Sunny) on December 2nd, 2021 at 08:09 hrs (Photo taken by Mr. Alexander Ally).

7.3. Soil Sample Collection

Figure 9: Field personnel clearing the area at Soil Pipe 04 in Wales prior to sample collection (Cloudy) on November 23rd, 2021 at 08:26 hrs (Photo taken by Ms. Gopaul).

Figure 10: Field personnel conducting soil boring at Soil Pipe 07 in Canal # 1 using a hand auger (Sunny) on November 12th, 2021 at 13:27 hrs (Photo taken by Ms. Hamid).

Figure 11: Soil Scientist placing the soil profile on a clean surface to identify the physical characteristics of the soil at Soil Pipe 08 in Parfaite Harmonie Backlands (Cloudy) on November 13th, 2021 at 08:01 hrs (Photo taken by Ms. Hamid).

Figure 12: Field team identifying the soil colour using the Munsell® Soil Colour Chart and other physical characteristics via hand tests at Soil Pipe 09 in Cogland Dam (Sunny) on November 12th, 2021 at 14:55 hrs (Photo taken by Ms. Hamid).

Figure 13: Soil profile of Stewartville Clay (CH) at Soil Pipe 09 in Cogland Dam (Sunny) on November 12th, 2021 at 14:56 hrs (Photo taken by Ms. Hamid).

Figure 14: Soil profile of Whittaker Clay (CH) at Soil Pipe 08 in Parfaite Harmonie Backlands (Cloudy) on November 13th, 2021 at 08:04 hrs (Photo taken by Ms. Hamid).

Figure 15: Soil profile of Kerkenama Clay (CH) at B2 within the NGL Plant location (Sunny) on November 23rd, 2021 at 12:48 hrs (Photo taken by Ms. Gopaul).

Figure 16: Soil profile of Mara Clay (ML) at A2 within the NGL Plant location (Sunny) on November 23rd, 2021 at 10:28 hrs (Photo taken by Ms. Gopaul).

Figure 17: Sampling collectors placing soil samples from B1 within the NGL Plant location in laboratory glass jars (Cloudy) on December 2nd, 2021 at 09:57 hrs (Photo taken by Mr. Ally).

Figure 18: Packaging of Soil Samples collected into coolers with ice to be shipped to the laboratory in Houston, Texas (Sunny) on January 27th, 2022 at 08:57 hrs (Photo taken by Ms. Sharadha Sonaram).

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Laboratory Analytical Reports

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January 12, 2022

Herbert Pirela
ERM
180 Admiral Cochrance Dr
Suite 400
Annapolis, MD 21401

Work Order: **HS22010197**

Laboratory Results for: **Gas to Energy Environmental Impact Assessment Study**

Dear Herbert Pirela,

ALS Environmental received 11 sample(s) on Nov 22, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: DAYNA.FISHER
Corey Grandits
Project Manager

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS22010197

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22010197-01	Soil Pipe 06	Soil		12-Nov-2021 08:28	22-Nov-2021 15:55	☐
HS22010197-02	Soil Pipe 07	Soil		12-Nov-2021 13:26	22-Nov-2021 15:55	☐
HS22010197-03	Soil Pipe 08	Soil		13-Nov-2021 07:52	22-Nov-2021 15:55	☐
HS22010197-04	Soil Pipe 09	Soil		12-Nov-2021 14:49	22-Nov-2021 15:55	☐
HS22010197-05	Soil Pipe 10	Soil		13-Nov-2021 13:54	22-Nov-2021 15:55	☐
HS22010197-06	Soil Pipe 04	Soil		17-Nov-2021 08:30	30-Nov-2021 12:45	☐
HS22010197-07	Soil Pipe 05	Soil		17-Nov-2021 12:23	30-Nov-2021 12:45	☐
HS22010197-08	Soil Pipe 02	Soil		20-Nov-2021 09:36	30-Nov-2021 12:45	☐
HS22010197-09	A2	Soil		23-Nov-2021 10:23	10-Dec-2021 12:30	☐
HS22010197-10	B2	Soil		23-Nov-2021 12:43	10-Dec-2021 12:30	☐
HS22010197-11	B1	Soil		02-Dec-2021 09:56	10-Dec-2021 12:30	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS22010197

ECD Organics by Method SW8081

Batch ID: 174239

Sample ID: A2 (HS22010197-09)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: B1 (HS22010197-11)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: B2 (HS22010197-10)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: HS22010205-01MS

- MS and MSD are for an unrelated sample

Sample ID: MBLK-174239

- Chlordane & Toxaphene LCS/LCSD provided as batch quality control. 2nd CCV failure for 4,4 DDT & Methoxychlor and final CCV faiure for Heptachlor, Endrin , 4,4 DDT & Methoxchlor confirms for WOs HS22010205 & HS322010197. Initial analyses reported. Confirmation analyses ECD 15 220111.

Sample ID: Soil Pipe 02 (HS22010197-08)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: Soil Pipe 04 (HS22010197-06)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: Soil Pipe 05 (HS22010197-07)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: Soil Pipe 06 (HS22010197-01)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: Soil Pipe 07 (HS22010197-02)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: Soil Pipe 08 (HS22010197-03)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: Soil Pipe 09 (HS22010197-04)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: Soil Pipe 10 (HS22010197-05)

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Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS22010197

ECD Organics by Method SW8081

Batch ID: 174239

- Surrogate recoveries were outside of the control limits due to matrix interference.
- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: Soil Pipe 06 Lab ID:HS22010197-01
Collection Date: 12-Nov-2021 08:28 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:07
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:07
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:07
Aldrin	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:07
alpha-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:07
beta-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:07
Chlordane	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 08:07
delta-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:07
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:07
Endosulfan I	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:07
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:07
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:07
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:07
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:07
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:07
gamma-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:07
Heptachlor	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:07
Heptachlor epoxide	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:07
Methoxychlor	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 08:07
Toxaphene	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 08:07
alpha-Chlordane	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:07
gamma-Chlordane	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:07
Surr: Decachlorobiphenyl	*82.6*			*59-144*	*%REC*	*5*	*11-Jan-2022 08:07*
Surr: Tetrachloro-m-xylene	*75.1*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 08:07*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: Soil Pipe 07 Lab ID:HS22010197-02
Collection Date: 12-Nov-2021 13:26 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:29
4,4´-DDE	**2.4**	HP	**1.6**	**1.6**	**ug/Kg**	5	11-Jan-2022 08:29
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:29
Aldrin	U	H	0.81	0.81	ug/Kg	5	11-Jan-2022 08:29
alpha-BHC	U	H	0.81	0.81	ug/Kg	5	11-Jan-2022 08:29
beta-BHC	U	H	0.81	0.81	ug/Kg	5	11-Jan-2022 08:29
Chlordane	U	H	8.1	8.1	ug/Kg	5	11-Jan-2022 08:29
delta-BHC	U	H	0.81	0.81	ug/Kg	5	11-Jan-2022 08:29
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:29
Endosulfan I	U	H	0.81	0.81	ug/Kg	5	11-Jan-2022 08:29
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:29
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:29
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:29
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:29
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:29
gamma-BHC	U	H	0.81	0.81	ug/Kg	5	11-Jan-2022 08:29
Heptachlor	U	H	0.81	0.81	ug/Kg	5	11-Jan-2022 08:29
Heptachlor epoxide	U	H	0.81	0.81	ug/Kg	5	11-Jan-2022 08:29
Methoxychlor	U	H	8.1	8.1	ug/Kg	5	11-Jan-2022 08:29
Toxaphene	U	H	8.1	8.1	ug/Kg	5	11-Jan-2022 08:29
alpha-Chlordane	U	H	0.81	0.81	ug/Kg	5	11-Jan-2022 08:29
gamma-Chlordane	U	H	0.81	0.81	ug/Kg	5	11-Jan-2022 08:29
Surr: Decachlorobiphenyl	*94.6*			*59-144*	*%REC*	*5*	*11-Jan-2022 08:29*
Surr: Tetrachloro-m-xylene	*75.9*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 08:29*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: Soil Pipe 08 Lab ID:HS22010197-03
Collection Date: 13-Nov-2021 07:52 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:51
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:51
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:51
Aldrin	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:51
alpha-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:51
beta-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:51
Chlordane	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 08:51
delta-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:51
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:51
Endosulfan I	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:51
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:51
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:51
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:51
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:51
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 08:51
gamma-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:51
Heptachlor	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:51
Heptachlor epoxide	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:51
Methoxychlor	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 08:51
Toxaphene	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 08:51
alpha-Chlordane	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:51
gamma-Chlordane	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 08:51
Surr: Decachlorobiphenyl	*124*			*59-144*	*%REC*	*5*	*11-Jan-2022 08:51*
Surr: Tetrachloro-m-xylene	*60.9*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 08:51*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: Soil Pipe 09 Lab ID:HS22010197-04
Collection Date: 12-Nov-2021 14:49 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:13
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:13
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:13
Aldrin	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 09:13
alpha-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 09:13
beta-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 09:13
Chlordane	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 09:13
delta-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 09:13
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:13
Endosulfan I	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 09:13
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:13
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:13
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:13
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:13
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:13
gamma-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 09:13
Heptachlor	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 09:13
Heptachlor epoxide	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 09:13
Methoxychlor	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 09:13
Toxaphene	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 09:13
alpha-Chlordane	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 09:13
gamma-Chlordane	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 09:13
Surr: Decachlorobiphenyl	*126*			*59-144*	*%REC*	*5*	*11-Jan-2022 09:13*
Surr: Tetrachloro-m-xylene	*76.6*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 09:13*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: Soil Pipe 10 Lab ID:HS22010197-05
Collection Date: 13-Nov-2021 13:54 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:34
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:34
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:34
Aldrin	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 09:34
alpha-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 09:34
beta-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 09:34
Chlordane	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 09:34
delta-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 09:34
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:34
Endosulfan I	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 09:34
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:34
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:34
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:34
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:34
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 09:34
gamma-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 09:34
Heptachlor	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 09:34
Heptachlor epoxide	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 09:34
Methoxychlor	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 09:34
Toxaphene	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 09:34
alpha-Chlordane	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 09:34
gamma-Chlordane	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 09:34
Surr: Decachlorobiphenyl	*198*	*S*		*59-144*	*%REC*	*5*	*11-Jan-2022 09:34*
Surr: Tetrachloro-m-xylene	*102*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 09:34*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: Soil Pipe 04 Lab ID:HS22010197-06
Collection Date: 17-Nov-2021 08:30 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:06
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:06
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:06
Aldrin	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:06
alpha-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:06
beta-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:06
Chlordane	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 12:06
delta-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:06
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:06
Endosulfan I	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:06
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:06
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:06
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:06
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:06
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:06
gamma-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:06
Heptachlor	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:06
Heptachlor epoxide	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:06
Methoxychlor	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 12:06
Toxaphene	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 12:06
alpha-Chlordane	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:06
gamma-Chlordane	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:06
Surr: Decachlorobiphenyl	*117*			*59-144*	*%REC*	*5*	*11-Jan-2022 12:06*
Surr: Tetrachloro-m-xylene	*99.9*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 12:06*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: Soil Pipe 05 Lab ID:HS22010197-07
Collection Date: 17-Nov-2021 12:23 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:28
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:28
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:28
Aldrin	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 12:28
alpha-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 12:28
beta-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 12:28
Chlordane	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 12:28
delta-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 12:28
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:28
Endosulfan I	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 12:28
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:28
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:28
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:28
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:28
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:28
gamma-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 12:28
Heptachlor	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 12:28
Heptachlor epoxide	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 12:28
Methoxychlor	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 12:28
Toxaphene	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 12:28
alpha-Chlordane	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 12:28
gamma-Chlordane	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 12:28
Surr: Decachlorobiphenyl	*123*			*59-144*	*%REC*	*5*	*11-Jan-2022 12:28*
Surr: Tetrachloro-m-xylene	*80.2*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 12:28*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: Soil Pipe 02 Lab ID:HS22010197-08
Collection Date: 20-Nov-2021 09:36 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:49
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:49
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:49
Aldrin	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:49
alpha-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:49
beta-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:49
Chlordane	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 12:49
delta-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:49
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:49
Endosulfan I	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:49
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:49
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:49
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:49
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:49
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 12:49
gamma-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:49
Heptachlor	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:49
Heptachlor epoxide	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:49
Methoxychlor	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 12:49
Toxaphene	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 12:49
alpha-Chlordane	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:49
gamma-Chlordane	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 12:49
Surr: Decachlorobiphenyl	*140*			*59-144*	*%REC*	*5*	*11-Jan-2022 12:49*
Surr: Tetrachloro-m-xylene	*100*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 12:49*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: A2 Lab ID:HS22010197-09
Collection Date: 23-Nov-2021 10:23 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:11
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:11
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:11
Aldrin	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 13:11
alpha-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 13:11
beta-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 13:11
Chlordane	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 13:11
delta-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 13:11
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:11
Endosulfan I	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 13:11
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:11
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:11
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:11
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:11
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:11
gamma-BHC	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 13:11
Heptachlor	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 13:11
Heptachlor epoxide	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 13:11
Methoxychlor	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 13:11
Toxaphene	U	H	8.2	8.2	ug/Kg	5	11-Jan-2022 13:11
alpha-Chlordane	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 13:11
gamma-Chlordane	U	H	0.82	0.82	ug/Kg	5	11-Jan-2022 13:11
Surr: Decachlorobiphenyl	*83.4*			*59-144*	*%REC*	*5*	*11-Jan-2022 13:11*
Surr: Tetrachloro-m-xylene	*85.0*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 13:11*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: B2 Lab ID:HS22010197-10
Collection Date: 23-Nov-2021 12:43 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:33
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:33
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:33
Aldrin	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:33
alpha-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:33
beta-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:33
Chlordane	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 13:33
delta-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:33
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:33
Endosulfan I	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:33
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:33
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:33
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:33
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:33
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:33
gamma-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:33
Heptachlor	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:33
Heptachlor epoxide	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:33
Methoxychlor	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 13:33
Toxaphene	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 13:33
alpha-Chlordane	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:33
gamma-Chlordane	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:33
Surr: Decachlorobiphenyl	*94.7*			*59-144*	*%REC*	*5*	*11-Jan-2022 13:33*
Surr: Tetrachloro-m-xylene	*71.4*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 13:33*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS22010197
Sample ID: B1 Lab ID:HS22010197-11
Collection Date: 02-Dec-2021 09:56 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B	**Method:SW8081**				Prep:SW3546 / 07-Jan-2022		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:55
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:55
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:55
Aldrin	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:55
alpha-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:55
beta-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:55
Chlordane	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 13:55
delta-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:55
Dieldrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:55
Endosulfan I	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:55
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:55
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:55
Endrin	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:55
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:55
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	11-Jan-2022 13:55
gamma-BHC	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:55
Heptachlor	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:55
Heptachlor epoxide	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:55
Methoxychlor	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 13:55
Toxaphene	U	H	8.3	8.3	ug/Kg	5	11-Jan-2022 13:55
alpha-Chlordane	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:55
gamma-Chlordane	U	H	0.83	0.83	ug/Kg	5	11-Jan-2022 13:55
Surr: Decachlorobiphenyl	*104*			*59-144*	*%REC*	*5*	*11-Jan-2022 13:55*
Surr: Tetrachloro-m-xylene	*81.1*			*56.9-130*	*%REC*	*5*	*11-Jan-2022 13:55*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22010197

Batch ID: 174239 **Start Date:** 07 Jan 2022 11:30 **End Date:** 07 Jan 2022 16:30
Method: PESTICIDES MICROWAVE EXTRACTION BY SW3546 **Prep Code:** PESTPR_MW_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010197-01		15.25 (grams)	0.5 (mL)	0.03279	1-L WM glass, Neat
HS22010197-02		15.42 (grams)	0.5 (mL)	0.03243	1-L WM glass, Neat
HS22010197-03		15.19 (grams)	0.5 (mL)	0.03292	1-L WM glass, Neat
HS22010197-04		15.36 (grams)	0.5 (mL)	0.03255	1-L WM glass, Neat
HS22010197-05		15.05 (grams)	0.5 (mL)	0.03322	1-L WM glass, Neat
HS22010197-06		15.09 (grams)	0.5 (mL)	0.03313	1-L WM glass, Neat
HS22010197-07		15.24 (grams)	0.5 (mL)	0.03281	1-L WM glass, Neat
HS22010197-08		15.06 (grams)	0.5 (mL)	0.0332	1-L WM glass, Neat
HS22010197-09		15.3 (grams)	0.5 (mL)	0.03268	1-L WM glass, Neat
HS22010197-10		15.15 (grams)	0.5 (mL)	0.033	1-L WM glass, Neat
HS22010197-11		15.08 (grams)	0.5 (mL)	0.03316	1-L WM glass, Neat

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22010197

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174239 (0)	**Test Name :** ORGANOCHLORINE PESTICIDES BY SW8081B				**Matrix:** Soil	
HS22010197-01	Soil Pipe 06	12 Nov 2021 08:28		07 Jan 2022 11:30	11 Jan 2022 08:07	5
HS22010197-02	Soil Pipe 07	12 Nov 2021 13:26		07 Jan 2022 11:30	11 Jan 2022 08:29	5
HS22010197-03	Soil Pipe 08	13 Nov 2021 07:52		07 Jan 2022 11:30	11 Jan 2022 08:51	5
HS22010197-04	Soil Pipe 09	12 Nov 2021 14:49		07 Jan 2022 11:30	11 Jan 2022 09:13	5
HS22010197-05	Soil Pipe 10	13 Nov 2021 13:54		07 Jan 2022 11:30	11 Jan 2022 09:34	5
HS22010197-06	Soil Pipe 04	17 Nov 2021 08:30		07 Jan 2022 11:30	11 Jan 2022 12:06	5
HS22010197-07	Soil Pipe 05	17 Nov 2021 12:23		07 Jan 2022 11:30	11 Jan 2022 12:28	5
HS22010197-08	Soil Pipe 02	20 Nov 2021 09:36		07 Jan 2022 11:30	11 Jan 2022 12:49	5
HS22010197-09	A2	23 Nov 2021 10:23		07 Jan 2022 11:30	11 Jan 2022 13:11	5
HS22010197-10	B2	23 Nov 2021 12:43		07 Jan 2022 11:30	11 Jan 2022 13:33	5
HS22010197-11	B1	02 Dec 2021 09:56		07 Jan 2022 11:30	11 Jan 2022 13:55	5

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22010197

QC BATCH REPORT

Batch ID: 174239 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MBLK Sample ID: **MBLK-174239** Units: **ug/Kg** Analysis Date: **11-Jan-2022 05:14**
Client ID: Run ID: **ECD_11_400219** SeqNo: **6460415** PrepDate: **07-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	U	0.33								
4,4´-DDE	U	0.33								
4,4´-DDT	U	0.33								
Aldrin	U	0.17								
alpha-BHC	U	0.17								
alpha-Chlordane	U	0.17								
beta-BHC	U	0.17								
Chlordane	U	1.7								
delta-BHC	U	0.17								
Dieldrin	U	0.33								
Endosulfan I	U	0.17								
Endosulfan II	U	0.33								
Endosulfan sulfate	U	0.33								
Endrin	U	0.33								
Endrin aldehyde	U	0.33								
Endrin ketone	U	0.33								
gamma-BHC	U	0.17								
gamma-Chlordane	U	0.17								
Heptachlor	U	0.17								
Heptachlor epoxide	U	0.17								
Methoxychlor	U	1.7								
Toxaphene	U	1.7								
Surr: Decachlorobiphenyl	*0.731*	*0*	*0.6667*	*0*	*110*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.6774*	*0*	*0.6667*	*0*	*102*	*56.9 - 130*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22010197

QC BATCH REPORT

Batch ID: 174239 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS-174239** Units: **ug/Kg** Analysis Date: **11-Jan-2022 03:25**
Client ID: Run ID: **ECD_11_400219** SeqNo: **6460410** PrepDate: **07-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	1.98	0.33	1.667	0	119	53 - 138				
4,4´-DDE	1.94	0.33	1.667	0	116	57 - 136				
4,4´-DDT	1.817	0.33	1.667	0	109	53 - 139				
Aldrin	0.96	0.17	0.8333	0	115	52 - 130				
alpha-BHC	1.013	0.17	0.8333	0	122	52 - 130				
alpha-Chlordane	0.9499	0.17	0.8333	0	114	55 - 132				
beta-BHC	0.8977	0.17	0.8333	0	108	62 - 130				
delta-BHC	0.9734	0.17	0.8333	0	117	41 - 137				
Dieldrin	1.934	0.33	1.667	0	116	54 - 138				
Endosulfan I	0.833	0.17	0.8333	0	100.0	55 - 132				
Endosulfan II	1.549	0.33	1.667	0	92.9	59 - 134				
Endosulfan sulfate	2.016	0.33	1.667	0	121	54 - 141				
Endrin	1.907	0.33	1.667	0	114	60 - 157				
Endrin aldehyde	1.847	0.33	1.667	0	111	56 - 146				
Endrin ketone	2.051	0.33	1.667	0	123	56 - 153				
gamma-BHC	1.002	0.17	0.8333	0	120	52 - 133				
gamma-Chlordane	0.979	0.17	0.8333	0	117	60 - 129				
Heptachlor	0.9131	0.17	0.8333	0	110	54 - 134				
Heptachlor epoxide	0.8949	0.17	0.8333	0	107	58 - 130				
Methoxychlor	8.104	1.7	8.33	0	97.3	60 - 140				
Surr: Decachlorobiphenyl	*0.8713*	*0*	*0.6667*	*0*	*131*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.8427*	*0*	*0.6667*	*0*	*126*	*56.9 - 130*				

LCS Sample ID: **LCS1-174239** Units: **ug/Kg** Analysis Date: **11-Jan-2022 03:47**
Client ID: Run ID: **ECD_11_400219** SeqNo: **6460411** PrepDate: **07-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chlordane	6.933	1.7	8.33	0	83.2	50 - 150				
Surr: Decachlorobiphenyl	*0.8017*	*0*	*0.6667*	*0*	*120*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.7256*	*0*	*0.6667*	*0*	*109*	*56.9 - 130*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22010197

QC BATCH REPORT

Batch ID: 174239 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS1-174239** Units: **ug/Kg** Analysis Date: **11-Jan-2022 04:31**
Client ID: Run ID: **ECD_11_400219** SeqNo: **6460413** PrepDate: **07-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Toxaphene	8.665	1.7	8.33	0	104	50 - 150				
Surr: Decachlorobiphenyl	*0.8068*	*0*	*0.6667*	*0*	*121*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.7634*	*0*	*0.6667*	*0*	*115*	*56.9 - 130*				

LCSD Sample ID: **LCSD1-174239** Units: **ug/Kg** Analysis Date: **11-Jan-2022 04:09**
Client ID: Run ID: **ECD_11_400219** SeqNo: **6460412** PrepDate: **07-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chlordane	6.871	1.7	8.33	0	82.5	50 - 150	6.933	0.894	30	
Surr: Decachlorobiphenyl	*0.788*	*0*	*0.6667*	*0*	*118*	*59 - 144*	*0.8017*	*1.72*	*30*	
Surr: Tetrachloro-m-xylene	*0.7087*	*0*	*0.6667*	*0*	*106*	*56.9 - 130*	*0.7256*	*2.35*	*30*	

LCSD Sample ID: **LCSD1-174239** Units: **ug/Kg** Analysis Date: **11-Jan-2022 04:52**
Client ID: Run ID: **ECD_11_400219** SeqNo: **6460414** PrepDate: **07-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Toxaphene	9.401	1.7	8.33	0	113	50 - 150	8.665	8.14	30	
Surr: Decachlorobiphenyl	*0.815*	*0*	*0.6667*	*0*	*122*	*59 - 144*	*0.8068*	*1.02*	*30*	
Surr: Tetrachloro-m-xylene	*0.7624*	*0*	*0.6667*	*0*	*114*	*56.9 - 130*	*0.7634*	*0.14*	*30*	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22010197

QC BATCH REPORT

Batch ID: 174239 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MS Sample ID: **HS22010205-01MS** Units: **ug/Kg** Analysis Date: **11-Jan-2022 07:24**
Client ID: Run ID: **ECD_11_400219** SeqNo: **6460417** PrepDate: **07-Jan-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	1.67	1.6	1.657	0.01217	100	53 - 138				
4,4´-DDE	U	1.6	1.657	0.01891	-1.14	57 - 136				S
4,4´-DDT	1.998	1.6	1.657	0.02664	119	53 - 139				
Aldrin	U	0.83	0.8284	0	0	52 - 130				S
alpha-BHC	U	0.83	0.8284	0	0	52 - 130				S
alpha-Chlordane	U	0.83	0.8284	0	0	55 - 132				S
beta-BHC	U	0.83	0.8284	0.007895	-0.953	62 - 130				S
delta-BHC	U	0.83	0.8284	0	0	41 - 137				S
Dieldrin	U	1.6	1.657	0.02467	-1.49	54 - 138				S
Endosulfan I	U	0.83	0.8284	0	0	55 - 132				S
Endosulfan II	1.724	1.6	1.657	0	104	59 - 134				
Endosulfan sulfate	1.742	1.6	1.657	0.005263	105	54 - 141				
Endrin	1.87	1.6	1.657	0	113	60 - 157				
Endrin aldehyde	U	1.6	1.657	0.1015	-6.13	56 - 146				S
Endrin ketone	1.868	1.6	1.657	0.1288	105	56 - 153				
gamma-BHC	U	0.83	0.8284	0	0	52 - 133				S
gamma-Chlordane	U	0.83	0.8284	0.03191	-3.85	60 - 129				S
Heptachlor	U	0.83	0.8284	0.02286	-2.76	54 - 134				S
Heptachlor epoxide	U	0.83	0.8284	0	0	58 - 130				S
Methoxychlor	10.18	8.3	8.28	0	123	60 - 140				
Surr: Decachlorobiphenyl	*0.8038*	*0*	*0.6627*	*0*	*121*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.618*	*0*	*0.6627*	*0*	*93.2*	*56.9 - 130*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS22010197

QC BATCH REPORT

Batch ID: 174239 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MSD Sample ID: **HS22010205-01MSD** Units: **ug/Kg** Analysis Date: **11-Jan-2022 07:46**
Client ID: Run ID: **ECD_11_400219** SeqNo: **6460418** PrepDate: **07-Jan-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	U	1.6	1.649	0.01217	-0.738	53 - 138	1.67	0	30	S
4,4´-DDE	U	1.6	1.649	0.01891	-1.15	57 - 136	0	0	30	S
4,4´-DDT	1.732	1.6	1.649	0.02664	103	53 - 139	1.998	14.3	30	
Aldrin	U	0.83	0.8245	0	0	52 - 130	0	0	30	S
alpha-BHC	U	0.83	0.8245	0	0	52 - 130	0	0	30	S
alpha-Chlordane	U	0.83	0.8245	0	0	55 - 132	0	0	30	S
beta-BHC	U	0.83	0.8245	0.007895	-0.957	62 - 130	0	0	30	S
Chlordane	U	8.3	8.242	0	0	50 - 150	0	0	30	S
delta-BHC	U	0.83	0.8245	0	0	41 - 137	0	0	30	S
Dieldrin	U	1.6	1.649	0.02467	-1.50	54 - 138	0	0	30	S
Endosulfan I	U	0.83	0.8245	0	0	55 - 132	0	0	30	S
Endosulfan II	U	1.6	1.649	0	0	59 - 134	1.724	0	30	S
Endosulfan sulfate	1.661	1.6	1.649	0.005263	100	54 - 141	1.742	4.78	30	
Endrin	1.769	1.6	1.649	0	107	60 - 157	1.87	5.56	30	
Endrin aldehyde	U	1.6	1.649	0.1015	-6.15	56 - 146	0	0	30	S
Endrin ketone	1.749	1.6	1.649	0.1288	98.3	56 - 153	1.868	6.55	30	
gamma-BHC	U	0.83	0.8245	0	0	52 - 133	0	0	30	S
gamma-Chlordane	U	0.83	0.8245	0.03191	-3.87	60 - 129	0	0	30	S
Heptachlor	U	0.83	0.8245	0.02286	-2.77	54 - 134	0	0	30	S
Heptachlor epoxide	U	0.83	0.8245	0	0	58 - 130	0	0	30	S
Methoxychlor	9.459	8.3	8.242	0	115	60 - 140	10.18	7.31	30	
Toxaphene	U	8.3	8.242	0	0	50 - 150	0	0	30	S
Surr: Decachlorobiphenyl	*0.7413*	*0*	*0.6596*	*0*	*112*	*59 - 144*	*0.8038*	*8.1*	*30*	
Surr: Tetrachloro-m-xylene	*0.5849*	*0*	*0.6596*	*0*	*88.7*	*56.9 - 130*	*0.618*	*5.49*	*30*	

The following samples were analyzed in this batch:

HS22010197-01	HS22010197-02	HS22010197-03	HS22010197-04
HS22010197-05	HS22010197-06	HS22010197-07	HS22010197-08
HS22010197-09	HS22010197-10	HS22010197-11	

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: **HS22010197**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
Date	
UG/KG	Micrograms per Kilograms

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS22010197

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22010197-01	Soil Pipe 06	Login	1/6/2022 5:29:02 PM	CGG	N068
HS22010197-01	Soil Pipe 06	Login	1/6/2022 5:29:02 PM	CGG	Sub
HS22010197-02	Soil Pipe 07	Login	1/6/2022 5:29:02 PM	CGG	N068
HS22010197-02	Soil Pipe 07	Login	1/6/2022 5:29:02 PM	CGG	Sub
HS22010197-03	Soil Pipe 08	Login	1/6/2022 5:29:02 PM	CGG	N068
HS22010197-03	Soil Pipe 08	Login	1/6/2022 5:29:02 PM	CGG	Sub
HS22010197-04	Soil Pipe 09	Login	1/6/2022 5:29:02 PM	CGG	N068
HS22010197-04	Soil Pipe 09	Login	1/6/2022 5:29:02 PM	CGG	Sub
HS22010197-05	Soil Pipe 10	Login	1/6/2022 5:29:02 PM	CGG	N068
HS22010197-05	Soil Pipe 10	Login	1/6/2022 5:29:02 PM	CGG	Sub

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Sample Receipt Checklist

Work Order ID: HS22010197 **Date/Time Received:** **22-Nov-2021 15:55**

Client Name: ERM Annapolis **Received by:** **Paresh M. Giga**

Completed By:	/S/ Paresh M. Giga	23-Nov-2021 12:29	**Reviewed by:**	/S/ Corey Grandits	06-Jan-2022 17:32
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **Regulated Soil** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☑	Not Present ☐
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	18.7C U/C		IR31
Cooler(s)/Kit(s):	47550		
Date/Time sample(s) sent to storage:	11/23/2021 12:55		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes: Pesticide Re-Log SRC

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

HS22010197

ERM

Gas to Energy Environmental Impact Assessment S

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name	Gas to Energy Environmental Impact Assesment Study	
Work Order		Project Number	0590231	
Company Name	ERM	Bill To Company	ERM	
Send Report To	Herbert Pirela	Invoice Attn.	AP	
Address	190 Admiral Cochrance Dr Suite 400 MD 21401	Address	180 Admiral Cochrance Dr Suite 400 MD 21401	
City/State/Zip		City/State/Zip		
Phone	(410) 972-4124	Phone	(410) 972-4124	
Fax		Fax		
e-Mail Address	herbet.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	

A	8270SIM_Soils (PAHs)
B	9056_Soil (Nitrate)
C	COND_Soil Mod (Conductivity)
D	ICP_Soil_Low (6020/7471 Metals-19)
E	P_Tsoil (Phosphorous)
F	PCB_Soil_Total (8082 PCBs)
G	pH_Soil (9045) & TS_S (total Solids)
H	TOC_Soil (Total Organic Carbon)
I	Volatile Organic Compunds (US EPA 8260)
J	Herbicides (US EPA 8151)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Soil Pipe 04	17/11/2021	8:30 AM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
2	Soil Pipe 05	17/11/2021	12:23 PM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
3	Soil Pipe 02	20/11/2021	9:36 AM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Delshah Hamid Delshah Hamid
Lalita Gopaul

Shipment Method:

Required Turnaround Time: ☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other

Results Due Date:

Relinquished by: Lalita Gopaul	Date: 22/11/2021	Time: 16:00	Received by:	Notes:	
Relinquished by: DHL	Date: 11/30/21	Time: 12:45	Received by (Laboratory): J.	Cooler Temp. 14.6°C	QC Package: (Check Box Below)
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):		x Level II: Standard QC ☐ TRRP-Checklist
					☐ Level III: Std QC + Raw Data ☐ TRRP Level IV
					☐ Level IV: SW846 CLP-Like
					☐ Other:

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

Cooler 43078
IR3: 4°C

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☑ ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

☐ ALS Laboratory Group
3352 128th Avenue
Holland, Michigan 49424
(Tel) 616.399.6070
(Fax) 616.399.6185

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	Gas to Energy Environmental Impact Assessment Study	A	8270SIM_Soils (PAHs)
Work Order		Project Number	0590231	B	9056_Soil (Nitrate)
Company Name	ERM	Bill To Company	ERM	C	COND_Soil Mod (Conductivity)
Send Report To	Herbert Pirela	Invoice Attn	AP	D	ICP_Soil_Low (6020/7471 Metals-19)
Address	190 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr	E	P-TSoil (Phosphorous)
				F	PCB_Soil_Total (8082 PCBs)
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401	G	pH_Soil (9045) & TS_S (Total Solids)
Phone	(410) 972-4124	Phone	(410) 972-4124	H	TOC_Soil (Total Organic Carbon)
Fax		Fax		I	Volatile Organic Compounds (US EPA 8260)
e-Mail Address	herbert.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	J	Herbicides (US EPA 8151)

ALS Project Manager:

Work Order #:

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	A2	23/11/2021	10:23 AM	Soil	8	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2	B2	23/11/2021	12:43 PM	Soil	8	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
3	B1	12/2/2021	9:56 AM	Soil	8	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

HS22010197

ERM

Gas to Energy Environmental Impact Assessment S

Sampler(s): Please Print & Sign
Lalita Gopaul
Delshah Hamid

Shipment Method:

Required Turnaround Time:
☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
Lalita Gopaul	03/12/2021	9:42	
Relinquished by: Guyana Logistics/Support Servs	Date: 3/12/22	Time: 9:42	Received by (Laboratory): 12/10/21 12:30
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler Temp. 19.2°C

QC Package: (Check Box Below)

x	Level II: Standard QC	TRRP-Checklist
	Level III: Std QC + Raw Data	TRRP Level IV
	Level IV: SW846 CLP-Like	
	Other:	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

Color 45805
IM3i CFO

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ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

HS22010197

ERM

Gas to Energy Environmental Impact Assessment S

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name	Gas to Energy Environmental Impact Assesment Study	
Work Order		Project Number	0590231	
Company Name	ERM	Bill To Company	ERM	
Send Report To	Herbert Pirela	Invoice Attn	AP	
Address	190 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr	
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401	
Phone	(410) 972-4124	Phone	(410) 972-4124	
Fax		Fax		
e-Mail Address	herbet.pirela@erm.com	e-Mail Address	ermaaccountspayable@erm.com	

A 8270SIM_Soils (PAHs)
B 9056_Soil (Nitrate)
C COND_Soil Mod (Conductivity)
D ICP_Soil_Low (6020/7471 Metals-19)
E P_Tsoil (Phosphorous)
F PCB_Soil_Total (8082 PCBs)
G pH_Soil (9045) & TS_S (total Solids)
H TOC_Soil (Total Organic Carbon)
I Volatile Organic Compunds (US EPA 8260)
J Herbicides (US EPA 8151)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Soil Pipe 06	12/11/21	8:28 AM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
2	Soil Pipe 07	12/11/21	1:26 PM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
3	Soil Pipe 08	13/11/2021	7:52 AM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
4	Soil Pipe 09	12/11/21	2:49 PM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
5	Soil Pipe 10	13/11/2021	1:54 PM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Delshah Hamid Delshah Hamid
Lalita Gopaul

Shipment Method:

Required Turnaround Time:
☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 3 Wk Days ☐ 24 Hour ☐ Other

Results Due Date:

Relinquished by: Lalita Gopaul — Date: 16/11/2021 — Time: 10 08 am — Received by:

Relinquished by: DHL (GLASS) — Date: — Time: — Received by (Laboratory): 11/22/2021 15:55

Logged by (Laboratory): — Date: — Time: — Checked by (Laboratory):

Notes:

Cooler Temp. 0.1°C 18-7°

QC Package: (Check Box Below)

x	Level II: Standard QC	TRRP-Checklist
	Level III: Std QC + Raw Data	TRRP Level IV
	Level IV: SW846 CLP-Like	
	Other:	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035 -431

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

Courier 47550 C1.5°C

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T: +1 281 530 5656
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December 20, 2021

Herbert Pirela
ERM
180 Admiral Cochrance Dr
Suite 400
Annapolis, MD 21401

Work Order: **HS21111620**

Laboratory Results for: **Gas to Energy Environmental Impact Assessment Study**

Dear Herbert Pirela,

ALS Environmental received 3 sample(s) on Nov 30, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

December 21, 2021

Herbert Pirela
ERM
180 Admiral Cochrance Dr
Suite 400
Annapolis, MD 21401

Work Order: **HS21111398**

Laboratory Results for: **Gas to Energy Environmental Impact Assessment Study**

Dear Herbert Pirela,

ALS Environmental received 5 sample(s) on Nov 22, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111398

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21111398-01	Soil Pipe 06	Soil		12-Nov-2021 08:28	22-Nov-2021 15:55	☐
HS21111398-02	Soil Pipe 07	Soil		12-Nov-2021 13:26	22-Nov-2021 15:55	☐
HS21111398-03	Soil Pipe 08	Soil		13-Nov-2021 07:52	22-Nov-2021 15:55	☐
HS21111398-04	Soil Pipe 09	Soil		12-Nov-2021 14:49	22-Nov-2021 15:55	☐
HS21111398-05	Soil Pipe 10	Soil		13-Nov-2021 13:54	22-Nov-2021 15:55	☐

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Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111398

Work Order Comments

• The analysis for Herbicides was subcontracted to ALS Fort Collins, CO. Final report attached.

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

ECD Organics by Method SW8082

Batch ID: 173020

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

GCMS Semivolatiles by Method SW8270

Batch ID: 172911

Sample ID: Soil Pipe 07 (HS21111398-02MSD)

• The RPD between the MS and MSD was outside of the control limit.

Sample ID: Soil Pipe 10 (HS21111398-05)

• The GCMS semi-volatile extract of this sample was run at a dilution due to a high level of matrix interference.

GCMS Volatiles by Method SW8260

Batch ID: R396442

Sample ID: Soil Pipe 06 (HS21111398-01MS)

• MS/MSD failed QC and RPD limits for some compounds.

Metals by Method SW6020A

Batch ID: 173230

Sample ID: HS21120188-19MS

• MS and MSD are for an unrelated sample

Metals by Method SW7471B

Batch ID: 173034

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9045D

Batch ID: R396871

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111398

WetChemistry by Method SW9050M

Batch ID: R397100

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540G

Batch ID: R397230

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9060

Batch ID: 173396

Sample ID: Soil Pipe 06 (HS21111398-01MS)

- The recovery of the Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) associated with this analyte was outside of the established control limits. However, the LCS was within control limits. The recovery of the MS/MSD may be due to sample matrix interference. (Total Organic Carbon)

WetChemistry by Method E365.3

Batch ID: 173274

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9056

Batch ID: 172914

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 06 Lab ID:HS21111398-01
Collection Date: 12-Nov-2021 08:28 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C	**Method:SW8260**						Analyst: WLR
1,1,1-Trichloroethane	U		0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
1,1,2,2-Tetrachloroethane	U		0.78	4.9	ug/Kg	1	25-Nov-2021 16:40
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.69	4.9	ug/Kg	1	25-Nov-2021 16:40
1,1,2-Trichloroethane	U		0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
1,1-Dichloroethane	U		0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
1,1-Dichloroethene	U		0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
1,2,3-Trichlorobenzene	U		0.98	4.9	ug/Kg	1	25-Nov-2021 16:40
1,2,4-Trichlorobenzene	U		0.98	4.9	ug/Kg	1	25-Nov-2021 16:40
1,2-Dibromo-3-chloropropane	U		0.98	4.9	ug/Kg	1	25-Nov-2021 16:40
1,2-Dibromoethane	U		0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
1,2-Dichlorobenzene	U		0.98	4.9	ug/Kg	1	25-Nov-2021 16:40
1,2-Dichloroethane	U		0.59	4.9	ug/Kg	1	25-Nov-2021 16:40
1,2-Dichloropropane	U		0.78	4.9	ug/Kg	1	25-Nov-2021 16:40
1,3-Dichlorobenzene	U		0.98	4.9	ug/Kg	1	25-Nov-2021 16:40
1,4-Dichlorobenzene	U		0.98	4.9	ug/Kg	1	25-Nov-2021 16:40
2-Butanone	U		1.3	9.8	ug/Kg	1	25-Nov-2021 16:40
2-Hexanone	U		1.4	9.8	ug/Kg	1	25-Nov-2021 16:40
4-Methyl-2-pentanone	U		2.0	9.8	ug/Kg	1	25-Nov-2021 16:40
Acetone	U		2.0	20	ug/Kg	1	25-Nov-2021 16:40
Benzene	U		0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
Bromochloromethane	U		0.88	4.9	ug/Kg	1	25-Nov-2021 16:40
Bromodichloromethane	U		0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
Bromoform	U		0.59	4.9	ug/Kg	1	25-Nov-2021 16:40
Bromomethane	U		0.98	9.8	ug/Kg	1	25-Nov-2021 16:40
Carbon disulfide	U		0.59	9.8	ug/Kg	1	25-Nov-2021 16:40
Carbon tetrachloride	U		0.59	4.9	ug/Kg	1	25-Nov-2021 16:40
Chlorobenzene	U		0.59	4.9	ug/Kg	1	25-Nov-2021 16:40
Chloroethane	U		0.78	9.8	ug/Kg	1	25-Nov-2021 16:40
Chloroform	U		0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
Chloromethane	U		0.49	9.8	ug/Kg	1	25-Nov-2021 16:40
cis-1,2-Dichloroethene	U		0.78	4.9	ug/Kg	1	25-Nov-2021 16:40
cis-1,3-Dichloropropene	U		0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
Cyclohexane	U		0.98	4.9	ug/Kg	1	25-Nov-2021 16:40
Dibromochloromethane	U		0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
Dichlorodifluoromethane	U		0.69	4.9	ug/Kg	1	25-Nov-2021 16:40
Ethylbenzene	U		0.69	4.9	ug/Kg	1	25-Nov-2021 16:40
Isopropylbenzene	U		0.88	4.9	ug/Kg	1	25-Nov-2021 16:40
m,p-Xylene	U		1.6	9.8	ug/Kg	1	25-Nov-2021 16:40
Methyl acetate	U		0.69	4.9	ug/Kg	1	25-Nov-2021 16:40

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 06 Lab ID:HS21111398-01
Collection Date: 12-Nov-2021 08:28 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
Methyl tert-butyl ether		U	0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
Methylcyclohexane		U	0.98	4.9	ug/Kg	1	25-Nov-2021 16:40
Methylene chloride		U	0.98	9.8	ug/Kg	1	25-Nov-2021 16:40
o-Xylene		U	0.98	4.9	ug/Kg	1	25-Nov-2021 16:40
Styrene		U	0.69	4.9	ug/Kg	1	25-Nov-2021 16:40
Tetrachloroethene		U	0.69	4.9	ug/Kg	1	25-Nov-2021 16:40
Toluene		U	0.59	4.9	ug/Kg	1	25-Nov-2021 16:40
trans-1,2-Dichloroethene		U	0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
trans-1,3-Dichloropropene		U	0.59	4.9	ug/Kg	1	25-Nov-2021 16:40
Trichloroethene		U	0.59	4.9	ug/Kg	1	25-Nov-2021 16:40
Trichlorofluoromethane		U	0.49	4.9	ug/Kg	1	25-Nov-2021 16:40
Vinyl chloride		U	0.78	2.0	ug/Kg	1	25-Nov-2021 16:40
Xylenes, Total		U	0.98	4.9	ug/Kg	1	25-Nov-2021 16:40
Surr: 1,2-Dichloroethane-d4	*95.7*			*70-126*	*%REC*	*1*	*25-Nov-2021 16:40*
Surr: 4-Bromofluorobenzene	*83.3*			*70-130*	*%REC*	*1*	*25-Nov-2021 16:40*
Surr: Dibromofluoromethane	*90.4*			*70-130*	*%REC*	*1*	*25-Nov-2021 16:40*
Surr: Toluene-d8	*98.7*			*70-130*	*%REC*	*1*	*25-Nov-2021 16:40*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 06 Lab ID:HS21111398-01
Collection Date: 12-Nov-2021 08:28 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**			Prep:SW3541 / 24-Nov-2021			Analyst: GEY
1-Methylnaphthalene	U		1.5	3.3	ug/Kg	1	07-Dec-2021 21:34
2-Methylnaphthalene	U		0.50	3.3	ug/Kg	1	07-Dec-2021 21:34
Acenaphthene	U		0.50	3.3	ug/Kg	1	07-Dec-2021 21:34
Acenaphthylene	U		1.0	3.3	ug/Kg	1	07-Dec-2021 21:34
Anthracene	U		0.50	3.3	ug/Kg	1	07-Dec-2021 21:34
Benz(a)anthracene	U		1.6	3.3	ug/Kg	1	07-Dec-2021 21:34
Benzo(a)pyrene	U		1.0	3.3	ug/Kg	1	07-Dec-2021 21:34
Benzo(b)fluoranthene	U		1.2	3.3	ug/Kg	1	07-Dec-2021 21:34
Benzo(g,h,i)perylene	U		0.70	3.3	ug/Kg	1	07-Dec-2021 21:34
Benzo(k)fluoranthene	U		0.90	3.3	ug/Kg	1	07-Dec-2021 21:34
Chrysene	U		0.80	3.3	ug/Kg	1	07-Dec-2021 21:34
Dibenz(a,h)anthracene	U		1.6	3.3	ug/Kg	1	07-Dec-2021 21:34
Fluoranthene	U		1.1	3.3	ug/Kg	1	07-Dec-2021 21:34
Fluorene	U		1.1	3.3	ug/Kg	1	07-Dec-2021 21:34
Indeno(1,2,3-cd)pyrene	U		0.80	3.3	ug/Kg	1	07-Dec-2021 21:34
Isophorone	U		0.80	6.6	ug/Kg	1	07-Dec-2021 21:34
Naphthalene	U		0.60	3.3	ug/Kg	1	07-Dec-2021 21:34
Phenanthrene	U		1.5	3.3	ug/Kg	1	07-Dec-2021 21:34
Pyrene	**0.72**	J	**0.60**	**3.3**	**ug/Kg**	1	07-Dec-2021 21:34
Surr: 2-Fluorobiphenyl	*84.6*			*43-125*	*%REC*	*1*	*07-Dec-2021 21:34*
Surr: 4-Terphenyl-d14	*101*			*32-125*	*%REC*	*1*	*07-Dec-2021 21:34*
Surr: Nitrobenzene-d5	*85.8*			*37-125*	*%REC*	*1*	*07-Dec-2021 21:34*
PCBS BY SW8082A	**Method:SW8082**			Prep:SW3541 / 30-Nov-2021			Analyst: JBA
Aroclor 1016	U		0.42	1.7	ug/Kg	1	06-Dec-2021 05:23
Aroclor 1221	U		0.55	1.7	ug/Kg	1	06-Dec-2021 05:23
Aroclor 1232	U		0.44	1.7	ug/Kg	1	06-Dec-2021 05:23
Aroclor 1242	U		0.58	1.7	ug/Kg	1	06-Dec-2021 05:23
Aroclor 1248	U		0.58	1.7	ug/Kg	1	06-Dec-2021 05:23
Aroclor 1254	U		0.46	1.7	ug/Kg	1	06-Dec-2021 05:23
Aroclor 1260	U		0.24	1.7	ug/Kg	1	06-Dec-2021 05:23
Surr: Decachlorobiphenyl	*80.1*			*54-143*	*%REC*	*1*	*06-Dec-2021 05:23*
Surr: Tetrachloro-m-xylene	*65.8*			*50-140*	*%REC*	*1*	*06-Dec-2021 05:23*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 06 Lab ID:HS21111398-01
Collection Date: 12-Nov-2021 08:28 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 07-Dec-2021		Analyst: JC
Antimony	**0.0920**	J	**0.0610**	**0.469**	**mg/Kg**	1	07-Dec-2021 14:21
Arsenic	**6.19**		**0.0657**	**0.469**	**mg/Kg**	1	07-Dec-2021 14:21
Beryllium	**0.189**	J	**0.0197**	**0.469**	**mg/Kg**	1	07-Dec-2021 14:21
Cadmium	U		0.0253	0.469	mg/Kg	1	07-Dec-2021 14:21
Chromium	**19.1**		**0.0216**	**0.469**	**mg/Kg**	1	07-Dec-2021 14:21
Copper	**3.52**		**0.0357**	**0.188**	**mg/Kg**	1	07-Dec-2021 14:21
Iron	**37,500**		**34.4**	**939**	**mg/Kg**	20	07-Dec-2021 15:16
Lead	**10.6**		**0.0122**	**0.469**	**mg/Kg**	1	07-Dec-2021 14:21
Manganese	**12.4**		**0.0404**	**0.469**	**mg/Kg**	1	07-Dec-2021 14:21
Nickel	**2.44**		**0.0451**	**0.469**	**mg/Kg**	1	07-Dec-2021 14:21
Potassium	**976**		**6.31**	**46.9**	**mg/Kg**	1	07-Dec-2021 14:21
Selenium	**0.734**		**0.0854**	**0.469**	**mg/Kg**	1	07-Dec-2021 14:21
Silver	**0.0187**	J	**0.0141**	**0.469**	**mg/Kg**	1	07-Dec-2021 14:21
Thallium	U		0.209	0.469	mg/Kg	1	07-Dec-2021 14:21
Zinc	**13.5**		**0.160**	**0.469**	**mg/Kg**	1	07-Dec-2021 14:21
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 01-Dec-2021		Analyst: MSC
Mercury	**50.8**		**0.500**	**3.54**	**ug/Kg**	1	01-Dec-2021 13:55
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		1.00	2.00	mg/Kg	1	07-Dec-2021 14:20
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**60.4**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
PH SOIL BY SW9045D		**Method:SW9045D**					Analyst: SH
pH	**4.14**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 17:00
Temp Deg C @pH	**22.6**	H	**0**	**0**	**°C**	1	02-Dec-2021 17:00
SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT		**Method:SW9050M**					Analyst: MZD
Conductance, Soil Extract	**405**		**50.0**	**50.0**	**umhos/cm**	10	07-Dec-2021 11:03
ANIONS BY SW9056A		**Method:SW9056**			Prep:SW9056 / 24-Nov-2021		Analyst: YP
Nitrogen, Nitrate (As N)	**1.07**		**0.297**	**0.988**	**mg/Kg**	1	30-Nov-2021 00:59
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 10-Dec-2021		Analyst: JAC
Total Organic Carbon	**3.81**		**0.0597**	**0.995**	**wt%-dry**	1	10-Dec-2021 12:00
SUBCONTRACT ANALYSIS - SPECIALIZED HERBICIDES		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0			1	16-Dec-2021 11:50

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 07 Lab ID:HS21111398-02
Collection Date: 12-Nov-2021 13:26 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C	**Method:SW8260**						Analyst: WLR
1,1,1-Trichloroethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
1,1,2,2-Tetrachloroethane	U		0.78	4.8	ug/Kg	1	25-Nov-2021 17:03
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.68	4.8	ug/Kg	1	25-Nov-2021 17:03
1,1,2-Trichloroethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
1,1-Dichloroethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
1,1-Dichloroethene	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
1,2,3-Trichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:03
1,2,4-Trichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:03
1,2-Dibromo-3-chloropropane	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:03
1,2-Dibromoethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
1,2-Dichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:03
1,2-Dichloroethane	U		0.58	4.8	ug/Kg	1	25-Nov-2021 17:03
1,2-Dichloropropane	U		0.78	4.8	ug/Kg	1	25-Nov-2021 17:03
1,3-Dichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:03
1,4-Dichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:03
2-Butanone	U		1.3	9.7	ug/Kg	1	25-Nov-2021 17:03
2-Hexanone	U		1.4	9.7	ug/Kg	1	25-Nov-2021 17:03
4-Methyl-2-pentanone	U		1.9	9.7	ug/Kg	1	25-Nov-2021 17:03
Acetone	U		1.9	19	ug/Kg	1	25-Nov-2021 17:03
Benzene	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
Bromochloromethane	U		0.87	4.8	ug/Kg	1	25-Nov-2021 17:03
Bromodichloromethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
Bromoform	U		0.58	4.8	ug/Kg	1	25-Nov-2021 17:03
Bromomethane	U		0.97	9.7	ug/Kg	1	25-Nov-2021 17:03
Carbon disulfide	U		0.58	9.7	ug/Kg	1	25-Nov-2021 17:03
Carbon tetrachloride	U		0.58	4.8	ug/Kg	1	25-Nov-2021 17:03
Chlorobenzene	U		0.58	4.8	ug/Kg	1	25-Nov-2021 17:03
Chloroethane	U		0.78	9.7	ug/Kg	1	25-Nov-2021 17:03
Chloroform	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
Chloromethane	U		0.48	9.7	ug/Kg	1	25-Nov-2021 17:03
cis-1,2-Dichloroethene	U		0.78	4.8	ug/Kg	1	25-Nov-2021 17:03
cis-1,3-Dichloropropene	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
Cyclohexane	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:03
Dibromochloromethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
Dichlorodifluoromethane	U		0.68	4.8	ug/Kg	1	25-Nov-2021 17:03
Ethylbenzene	U		0.68	4.8	ug/Kg	1	25-Nov-2021 17:03
Isopropylbenzene	U		0.87	4.8	ug/Kg	1	25-Nov-2021 17:03
m,p-Xylene	U		1.6	9.7	ug/Kg	1	25-Nov-2021 17:03
Methyl acetate	U		0.68	4.8	ug/Kg	1	25-Nov-2021 17:03

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 07 Lab ID:HS21111398-02
Collection Date: 12-Nov-2021 13:26 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
Methyl tert-butyl ether		U	0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
Methylcyclohexane		U	0.97	4.8	ug/Kg	1	25-Nov-2021 17:03
Methylene chloride		U	0.97	9.7	ug/Kg	1	25-Nov-2021 17:03
o-Xylene		U	0.97	4.8	ug/Kg	1	25-Nov-2021 17:03
Styrene		U	0.68	4.8	ug/Kg	1	25-Nov-2021 17:03
Tetrachloroethene		U	0.68	4.8	ug/Kg	1	25-Nov-2021 17:03
Toluene		U	0.58	4.8	ug/Kg	1	25-Nov-2021 17:03
trans-1,2-Dichloroethene		U	0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
trans-1,3-Dichloropropene		U	0.58	4.8	ug/Kg	1	25-Nov-2021 17:03
Trichloroethene		U	0.58	4.8	ug/Kg	1	25-Nov-2021 17:03
Trichlorofluoromethane		U	0.48	4.8	ug/Kg	1	25-Nov-2021 17:03
Vinyl chloride		U	0.78	1.9	ug/Kg	1	25-Nov-2021 17:03
Xylenes, Total		U	0.97	4.8	ug/Kg	1	25-Nov-2021 17:03
Surr: 1,2-Dichloroethane-d4	*102*			*70-126*	*%REC*	*1*	*25-Nov-2021 17:03*
Surr: 4-Bromofluorobenzene	*86.6*			*70-130*	*%REC*	*1*	*25-Nov-2021 17:03*
Surr: Dibromofluoromethane	*96.0*			*70-130*	*%REC*	*1*	*25-Nov-2021 17:03*
Surr: Toluene-d8	*100*			*70-130*	*%REC*	*1*	*25-Nov-2021 17:03*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 07 Lab ID:HS21111398-02
Collection Date: 12-Nov-2021 13:26 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D		**Method:SW8270**			Prep:SW3541 / 24-Nov-2021		Analyst: GEY
1-Methylnaphthalene	U		1.5	3.3	ug/Kg	1	01-Dec-2021 15:56
2-Methylnaphthalene	U		0.50	3.3	ug/Kg	1	01-Dec-2021 15:56
Acenaphthene	U		0.50	3.3	ug/Kg	1	01-Dec-2021 15:56
Acenaphthylene	U		0.99	3.3	ug/Kg	1	01-Dec-2021 15:56
Anthracene	U		0.50	3.3	ug/Kg	1	01-Dec-2021 15:56
Benz(a)anthracene	U		1.6	3.3	ug/Kg	1	01-Dec-2021 15:56
Benzo(a)pyrene	U		0.99	3.3	ug/Kg	1	01-Dec-2021 15:56
Benzo(b)fluoranthene	U		1.2	3.3	ug/Kg	1	01-Dec-2021 15:56
Benzo(g,h,i)perylene	U		0.69	3.3	ug/Kg	1	01-Dec-2021 15:56
Benzo(k)fluoranthene	U		0.89	3.3	ug/Kg	1	01-Dec-2021 15:56
Chrysene	U		0.79	3.3	ug/Kg	1	01-Dec-2021 15:56
Dibenz(a,h)anthracene	U		1.6	3.3	ug/Kg	1	01-Dec-2021 15:56
Fluoranthene	U		1.1	3.3	ug/Kg	1	01-Dec-2021 15:56
Fluorene	U		1.1	3.3	ug/Kg	1	01-Dec-2021 15:56
Indeno(1,2,3-cd)pyrene	U		0.79	3.3	ug/Kg	1	01-Dec-2021 15:56
Isophorone	U		0.79	6.5	ug/Kg	1	01-Dec-2021 15:56
Naphthalene	U		0.60	3.3	ug/Kg	1	01-Dec-2021 15:56
Phenanthrene	U		1.5	3.3	ug/Kg	1	01-Dec-2021 15:56
Pyrene	**1.9**	J	**0.60**	**3.3**	**ug/Kg**	1	01-Dec-2021 15:56
Surr: 2-Fluorobiphenyl	*75.6*			*43-125*	*%REC*	*1*	*01-Dec-2021 15:56*
Surr: 4-Terphenyl-d14	*95.5*			*32-125*	*%REC*	*1*	*01-Dec-2021 15:56*
Surr: Nitrobenzene-d5	*72.8*			*37-125*	*%REC*	*1*	*01-Dec-2021 15:56*
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3541 / 30-Nov-2021		Analyst: JBA
Aroclor 1016	U		0.42	1.7	ug/Kg	1	06-Dec-2021 06:50
Aroclor 1221	U		0.56	1.7	ug/Kg	1	06-Dec-2021 06:50
Aroclor 1232	U		0.45	1.7	ug/Kg	1	06-Dec-2021 06:50
Aroclor 1242	U		0.59	1.7	ug/Kg	1	06-Dec-2021 06:50
Aroclor 1248	U		0.59	1.7	ug/Kg	1	06-Dec-2021 06:50
Aroclor 1254	U		0.47	1.7	ug/Kg	1	06-Dec-2021 06:50
Aroclor 1260	U		0.24	1.7	ug/Kg	1	06-Dec-2021 06:50
Surr: Decachlorobiphenyl	*99.6*			*54-143*	*%REC*	*1*	*06-Dec-2021 06:50*
Surr: Tetrachloro-m-xylene	*71.1*			*50-140*	*%REC*	*1*	*06-Dec-2021 06:50*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 07 Lab ID:HS21111398-02
Collection Date: 12-Nov-2021 13:26 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 07-Dec-2021		Analyst: JC
Antimony	U		0.0602	0.463	mg/Kg	1	07-Dec-2021 14:32
Arsenic	**8.57**		**0.0649**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:32
Beryllium	**0.461**	J	**0.0195**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:32
Cadmium	U		0.0250	0.463	mg/Kg	1	07-Dec-2021 14:32
Chromium	**22.3**		**0.0213**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:32
Copper	**5.51**		**0.0352**	**0.185**	**mg/Kg**	1	07-Dec-2021 14:32
Iron	**21,100**		**17.0**	**463**	**mg/Kg**	10	07-Dec-2021 15:18
Lead	**18.0**		**0.0120**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:32
Manganese	**27.6**		**0.0399**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:32
Nickel	**6.52**		**0.0445**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:32
Potassium	**1,550**		**6.23**	**46.3**	**mg/Kg**	1	07-Dec-2021 14:32
Selenium	**0.696**		**0.0843**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:32
Silver	**0.0170**	J	**0.0139**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:32
Thallium	U		0.207	0.463	mg/Kg	1	07-Dec-2021 14:32
Zinc	**27.8**		**0.158**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:32
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 01-Dec-2021		Analyst: MSC
Mercury	**30.9**		**0.503**	**3.56**	**ug/Kg**	1	01-Dec-2021 13:56
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**46.5**		**0.980**	**1.96**	**mg/Kg**	1	07-Dec-2021 14:20
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**61.4**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
PH SOIL BY SW9045D		**Method:SW9045D**					Analyst: SH
pH	**3.51**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 17:00
Temp Deg C @pH	**22.7**	H	**0**	**0**	**°C**	1	02-Dec-2021 17:00
SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT		**Method:SW9050M**					Analyst: MZD
Conductance, Soil Extract	**1,320**		**50.0**	**50.0**	**umhos/cm**	10	07-Dec-2021 11:03
ANIONS BY SW9056A		**Method:SW9056**			Prep:SW9056 / 24-Nov-2021		Analyst: YP
Nitrogen, Nitrate (As N)	**0.829**	J	**0.298**	**0.994**	**mg/Kg**	1	30-Nov-2021 01:06
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 10-Dec-2021		Analyst: JAC
Total Organic Carbon	**2.01**		**0.0596**	**0.993**	**wt%-dry**	1	10-Dec-2021 12:00
SUBCONTRACT ANALYSIS - SPECIALIZED HERBICIDES		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0			1	16-Dec-2021 11:50

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 08 Lab ID:HS21111398-03
Collection Date: 13-Nov-2021 07:52 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C	**Method:SW8260**						Analyst: WLR
1,1,1-Trichloroethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
1,1,2,2-Tetrachloroethane	U		0.78	4.8	ug/Kg	1	25-Nov-2021 17:25
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.68	4.8	ug/Kg	1	25-Nov-2021 17:25
1,1,2-Trichloroethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
1,1-Dichloroethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
1,1-Dichloroethene	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
1,2,3-Trichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:25
1,2,4-Trichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:25
1,2-Dibromo-3-chloropropane	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:25
1,2-Dibromoethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
1,2-Dichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:25
1,2-Dichloroethane	U		0.58	4.8	ug/Kg	1	25-Nov-2021 17:25
1,2-Dichloropropane	U		0.78	4.8	ug/Kg	1	25-Nov-2021 17:25
1,3-Dichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:25
1,4-Dichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:25
2-Butanone	U		1.3	9.7	ug/Kg	1	25-Nov-2021 17:25
2-Hexanone	U		1.4	9.7	ug/Kg	1	25-Nov-2021 17:25
4-Methyl-2-pentanone	U		1.9	9.7	ug/Kg	1	25-Nov-2021 17:25
Acetone	U		1.9	19	ug/Kg	1	25-Nov-2021 17:25
Benzene	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
Bromochloromethane	U		0.87	4.8	ug/Kg	1	25-Nov-2021 17:25
Bromodichloromethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
Bromoform	U		0.58	4.8	ug/Kg	1	25-Nov-2021 17:25
Bromomethane	U		0.97	9.7	ug/Kg	1	25-Nov-2021 17:25
Carbon disulfide	U		0.58	9.7	ug/Kg	1	25-Nov-2021 17:25
Carbon tetrachloride	U		0.58	4.8	ug/Kg	1	25-Nov-2021 17:25
Chlorobenzene	U		0.58	4.8	ug/Kg	1	25-Nov-2021 17:25
Chloroethane	U		0.78	9.7	ug/Kg	1	25-Nov-2021 17:25
Chloroform	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
Chloromethane	U		0.48	9.7	ug/Kg	1	25-Nov-2021 17:25
cis-1,2-Dichloroethene	U		0.78	4.8	ug/Kg	1	25-Nov-2021 17:25
cis-1,3-Dichloropropene	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
Cyclohexane	U		0.97	4.8	ug/Kg	1	25-Nov-2021 17:25
Dibromochloromethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
Dichlorodifluoromethane	U		0.68	4.8	ug/Kg	1	25-Nov-2021 17:25
Ethylbenzene	U		0.68	4.8	ug/Kg	1	25-Nov-2021 17:25
Isopropylbenzene	U		0.87	4.8	ug/Kg	1	25-Nov-2021 17:25
m,p-Xylene	U		1.6	9.7	ug/Kg	1	25-Nov-2021 17:25
Methyl acetate	U		0.68	4.8	ug/Kg	1	25-Nov-2021 17:25

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 08 Lab ID:HS21111398-03
Collection Date: 13-Nov-2021 07:52 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
Methyl tert-butyl ether		U	0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
Methylcyclohexane		U	0.97	4.8	ug/Kg	1	25-Nov-2021 17:25
Methylene chloride		U	0.97	9.7	ug/Kg	1	25-Nov-2021 17:25
o-Xylene		U	0.97	4.8	ug/Kg	1	25-Nov-2021 17:25
Styrene		U	0.68	4.8	ug/Kg	1	25-Nov-2021 17:25
Tetrachloroethene		U	0.68	4.8	ug/Kg	1	25-Nov-2021 17:25
Toluene		U	0.58	4.8	ug/Kg	1	25-Nov-2021 17:25
trans-1,2-Dichloroethene		U	0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
trans-1,3-Dichloropropene		U	0.58	4.8	ug/Kg	1	25-Nov-2021 17:25
Trichloroethene		U	0.58	4.8	ug/Kg	1	25-Nov-2021 17:25
Trichlorofluoromethane		U	0.48	4.8	ug/Kg	1	25-Nov-2021 17:25
Vinyl chloride		U	0.78	1.9	ug/Kg	1	25-Nov-2021 17:25
Xylenes, Total		U	0.97	4.8	ug/Kg	1	25-Nov-2021 17:25
Surr: 1,2-Dichloroethane-d4	*96.9*			*70-126*	*%REC*	*1*	*25-Nov-2021 17:25*
Surr: 4-Bromofluorobenzene	*84.5*			*70-130*	*%REC*	*1*	*25-Nov-2021 17:25*
Surr: Dibromofluoromethane	*89.3*			*70-130*	*%REC*	*1*	*25-Nov-2021 17:25*
Surr: Toluene-d8	*98.9*			*70-130*	*%REC*	*1*	*25-Nov-2021 17:25*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 08 Lab ID:HS21111398-03
Collection Date: 13-Nov-2021 07:52 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**				Prep:SW3541 / 24-Nov-2021		Analyst: GEY
1-Methylnaphthalene	U		1.5	3.3	ug/Kg	1	07-Dec-2021 21:54
2-Methylnaphthalene	U		0.50	3.3	ug/Kg	1	07-Dec-2021 21:54
Acenaphthene	U		0.50	3.3	ug/Kg	1	07-Dec-2021 21:54
Acenaphthylene	U		1.0	3.3	ug/Kg	1	07-Dec-2021 21:54
Anthracene	U		0.50	3.3	ug/Kg	1	07-Dec-2021 21:54
Benz(a)anthracene	U		1.6	3.3	ug/Kg	1	07-Dec-2021 21:54
Benzo(a)pyrene	**2.3**	J	**1.0**	**3.3**	**ug/Kg**	1	07-Dec-2021 21:54
Benzo(b)fluoranthene	**11**		**1.2**	**3.3**	**ug/Kg**	1	07-Dec-2021 21:54
Benzo(g,h,i)perylene	**4.0**		**0.70**	**3.3**	**ug/Kg**	1	07-Dec-2021 21:54
Benzo(k)fluoranthene	**1.4**	J	**0.90**	**3.3**	**ug/Kg**	1	07-Dec-2021 21:54
Chrysene	**3.4**		**0.80**	**3.3**	**ug/Kg**	1	07-Dec-2021 21:54
Dibenz(a,h)anthracene	U		1.6	3.3	ug/Kg	1	07-Dec-2021 21:54
Fluoranthene	**3.4**		**1.1**	**3.3**	**ug/Kg**	1	07-Dec-2021 21:54
Fluorene	U		1.1	3.3	ug/Kg	1	07-Dec-2021 21:54
Indeno(1,2,3-cd)pyrene	**2.3**	J	**0.80**	**3.3**	**ug/Kg**	1	07-Dec-2021 21:54
Isophorone	U		0.80	6.6	ug/Kg	1	07-Dec-2021 21:54
Naphthalene	U		0.60	3.3	ug/Kg	1	07-Dec-2021 21:54
Phenanthrene	U		1.5	3.3	ug/Kg	1	07-Dec-2021 21:54
Pyrene	**2.7**	J	**0.60**	**3.3**	**ug/Kg**	1	07-Dec-2021 21:54
Surr: 2-Fluorobiphenyl	*69.2*			*43-125*	*%REC*	*1*	*07-Dec-2021 21:54*
Surr: 4-Terphenyl-d14	*90.1*			*32-125*	*%REC*	*1*	*07-Dec-2021 21:54*
Surr: Nitrobenzene-d5	*73.1*			*37-125*	*%REC*	*1*	*07-Dec-2021 21:54*
PCBS BY SW8082A	**Method:SW8082**				Prep:SW3541 / 30-Nov-2021		Analyst: JBA
Aroclor 1016	U		0.42	1.7	ug/Kg	1	06-Dec-2021 07:07
Aroclor 1221	U		0.56	1.7	ug/Kg	1	06-Dec-2021 07:07
Aroclor 1232	U		0.45	1.7	ug/Kg	1	06-Dec-2021 07:07
Aroclor 1242	U		0.58	1.7	ug/Kg	1	06-Dec-2021 07:07
Aroclor 1248	U		0.58	1.7	ug/Kg	1	06-Dec-2021 07:07
Aroclor 1254	U		0.47	1.7	ug/Kg	1	06-Dec-2021 07:07
Aroclor 1260	U		0.24	1.7	ug/Kg	1	06-Dec-2021 07:07
Surr: Decachlorobiphenyl	*96.6*			*54-143*	*%REC*	*1*	*06-Dec-2021 07:07*
Surr: Tetrachloro-m-xylene	*65.9*			*50-140*	*%REC*	*1*	*06-Dec-2021 07:07*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 08 Lab ID:HS21111398-03
Collection Date: 13-Nov-2021 07:52 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 07-Dec-2021		Analyst: JC
Antimony	U		0.0605	0.465	mg/Kg	1	07-Dec-2021 14:34
Arsenic	**9.51**		**0.0651**	**0.465**	**mg/Kg**	1	07-Dec-2021 14:34
Beryllium	**0.313**	J	**0.0195**	**0.465**	**mg/Kg**	1	07-Dec-2021 14:34
Cadmium	U		0.0251	0.465	mg/Kg	1	07-Dec-2021 14:34
Chromium	**20.2**		**0.0214**	**0.465**	**mg/Kg**	1	07-Dec-2021 14:34
Copper	**4.62**		**0.0353**	**0.186**	**mg/Kg**	1	07-Dec-2021 14:34
Iron	**28,700**		**34.0**	**930**	**mg/Kg**	20	07-Dec-2021 15:20
Lead	**13.0**		**0.0121**	**0.465**	**mg/Kg**	1	07-Dec-2021 14:34
Manganese	**22.7**		**0.0400**	**0.465**	**mg/Kg**	1	07-Dec-2021 14:34
Nickel	**3.19**		**0.0447**	**0.465**	**mg/Kg**	1	07-Dec-2021 14:34
Potassium	**1,140**		**6.25**	**46.5**	**mg/Kg**	1	07-Dec-2021 14:34
Selenium	**0.571**		**0.0847**	**0.465**	**mg/Kg**	1	07-Dec-2021 14:34
Silver	**0.0157**	J	**0.0140**	**0.465**	**mg/Kg**	1	07-Dec-2021 14:34
Thallium	U		0.207	0.465	mg/Kg	1	07-Dec-2021 14:34
Zinc	**17.4**		**0.158**	**0.465**	**mg/Kg**	1	07-Dec-2021 14:34
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 01-Dec-2021		Analyst: MSC
Mercury	**34.8**		**0.474**	**3.36**	**ug/Kg**	1	01-Dec-2021 13:58
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.999	2.00	mg/Kg	1	07-Dec-2021 14:20
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**57.1**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
PH SOIL BY SW9045D		**Method:SW9045D**					Analyst: SH
pH	**4.28**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 17:00
Temp Deg C @pH	**22.5**	H	**0**	**0**	**°C**	1	02-Dec-2021 17:00
SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT		**Method:SW9050M**					Analyst: MZD
Conductance, Soil Extract	**279**		**50.0**	**50.0**	**umhos/cm**	10	07-Dec-2021 11:03
ANIONS BY SW9056A		**Method:SW9056**			Prep:SW9056 / 24-Nov-2021		Analyst: YP
Nitrogen, Nitrate (As N)	**1.20**		**0.296**	**0.986**	**mg/Kg**	1	30-Nov-2021 01:13
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 10-Dec-2021		Analyst: JAC
Total Organic Carbon	**3.43**		**0.0591**	**0.985**	**wt%-dry**	1	10-Dec-2021 12:00
SUBCONTRACT ANALYSIS - SPECIALIZED HERBICIDES		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0			1	16-Dec-2021 11:50

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 09 Lab ID:HS21111398-04
Collection Date: 12-Nov-2021 14:49 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C	**Method:SW8260**						Analyst: WLR
1,1,1-Trichloroethane	U		0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
1,1,2,2-Tetrachloroethane	U		0.79	5.0	ug/Kg	1	25-Nov-2021 17:47
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.69	5.0	ug/Kg	1	25-Nov-2021 17:47
1,1,2-Trichloroethane	U		0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
1,1-Dichloroethane	U		0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
1,1-Dichloroethene	U		0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
1,2,3-Trichlorobenzene	U		0.99	5.0	ug/Kg	1	25-Nov-2021 17:47
1,2,4-Trichlorobenzene	U		0.99	5.0	ug/Kg	1	25-Nov-2021 17:47
1,2-Dibromo-3-chloropropane	U		0.99	5.0	ug/Kg	1	25-Nov-2021 17:47
1,2-Dibromoethane	U		0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
1,2-Dichlorobenzene	U		0.99	5.0	ug/Kg	1	25-Nov-2021 17:47
1,2-Dichloroethane	U		0.59	5.0	ug/Kg	1	25-Nov-2021 17:47
1,2-Dichloropropane	U		0.79	5.0	ug/Kg	1	25-Nov-2021 17:47
1,3-Dichlorobenzene	U		0.99	5.0	ug/Kg	1	25-Nov-2021 17:47
1,4-Dichlorobenzene	U		0.99	5.0	ug/Kg	1	25-Nov-2021 17:47
2-Butanone	U		1.3	9.9	ug/Kg	1	25-Nov-2021 17:47
2-Hexanone	U		1.4	9.9	ug/Kg	1	25-Nov-2021 17:47
4-Methyl-2-pentanone	U		2.0	9.9	ug/Kg	1	25-Nov-2021 17:47
Acetone	U		2.0	20	ug/Kg	1	25-Nov-2021 17:47
Benzene	U		0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
Bromochloromethane	U		0.89	5.0	ug/Kg	1	25-Nov-2021 17:47
Bromodichloromethane	U		0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
Bromoform	U		0.59	5.0	ug/Kg	1	25-Nov-2021 17:47
Bromomethane	U		0.99	9.9	ug/Kg	1	25-Nov-2021 17:47
Carbon disulfide	U		0.59	9.9	ug/Kg	1	25-Nov-2021 17:47
Carbon tetrachloride	U		0.59	5.0	ug/Kg	1	25-Nov-2021 17:47
Chlorobenzene	U		0.59	5.0	ug/Kg	1	25-Nov-2021 17:47
Chloroethane	U		0.79	9.9	ug/Kg	1	25-Nov-2021 17:47
Chloroform	U		0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
Chloromethane	U		0.50	9.9	ug/Kg	1	25-Nov-2021 17:47
cis-1,2-Dichloroethene	U		0.79	5.0	ug/Kg	1	25-Nov-2021 17:47
cis-1,3-Dichloropropene	U		0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
Cyclohexane	U		0.99	5.0	ug/Kg	1	25-Nov-2021 17:47
Dibromochloromethane	U		0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
Dichlorodifluoromethane	U		0.69	5.0	ug/Kg	1	25-Nov-2021 17:47
Ethylbenzene	U		0.69	5.0	ug/Kg	1	25-Nov-2021 17:47
Isopropylbenzene	U		0.89	5.0	ug/Kg	1	25-Nov-2021 17:47
m,p-Xylene	U		1.6	9.9	ug/Kg	1	25-Nov-2021 17:47
Methyl acetate	U		0.69	5.0	ug/Kg	1	25-Nov-2021 17:47

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 09 Lab ID:HS21111398-04
Collection Date: 12-Nov-2021 14:49 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
Methyl tert-butyl ether		U	0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
Methylcyclohexane		U	0.99	5.0	ug/Kg	1	25-Nov-2021 17:47
Methylene chloride		U	0.99	9.9	ug/Kg	1	25-Nov-2021 17:47
o-Xylene		U	0.99	5.0	ug/Kg	1	25-Nov-2021 17:47
Styrene		U	0.69	5.0	ug/Kg	1	25-Nov-2021 17:47
Tetrachloroethene		U	0.69	5.0	ug/Kg	1	25-Nov-2021 17:47
Toluene		U	0.59	5.0	ug/Kg	1	25-Nov-2021 17:47
trans-1,2-Dichloroethene		U	0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
trans-1,3-Dichloropropene		U	0.59	5.0	ug/Kg	1	25-Nov-2021 17:47
Trichloroethene		U	0.59	5.0	ug/Kg	1	25-Nov-2021 17:47
Trichlorofluoromethane		U	0.50	5.0	ug/Kg	1	25-Nov-2021 17:47
Vinyl chloride		U	0.79	2.0	ug/Kg	1	25-Nov-2021 17:47
Xylenes, Total		U	0.99	5.0	ug/Kg	1	25-Nov-2021 17:47
Surr: 1,2-Dichloroethane-d4	*104*			*70-126*	*%REC*	*1*	*25-Nov-2021 17:47*
Surr: 4-Bromofluorobenzene	*84.8*			*70-130*	*%REC*	*1*	*25-Nov-2021 17:47*
Surr: Dibromofluoromethane	*92.6*			*70-130*	*%REC*	*1*	*25-Nov-2021 17:47*
Surr: Toluene-d8	*96.0*			*70-130*	*%REC*	*1*	*25-Nov-2021 17:47*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 09 Lab ID:HS21111398-04
Collection Date: 12-Nov-2021 14:49 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**				Prep:SW3541 / 24-Nov-2021		Analyst: GEY
1-Methylnaphthalene	U		1.5	3.3	ug/Kg	1	07-Dec-2021 22:13
2-Methylnaphthalene	U		0.49	3.3	ug/Kg	1	07-Dec-2021 22:13
Acenaphthene	U		0.49	3.3	ug/Kg	1	07-Dec-2021 22:13
Acenaphthylene	U		0.99	3.3	ug/Kg	1	07-Dec-2021 22:13
Anthracene	U		0.49	3.3	ug/Kg	1	07-Dec-2021 22:13
Benz(a)anthracene	U		1.6	3.3	ug/Kg	1	07-Dec-2021 22:13
Benzo(a)pyrene	U		0.99	3.3	ug/Kg	1	07-Dec-2021 22:13
Benzo(b)fluoranthene	U		1.2	3.3	ug/Kg	1	07-Dec-2021 22:13
Benzo(g,h,i)perylene	**1.9**	J	**0.69**	**3.3**	**ug/Kg**	1	07-Dec-2021 22:13
Benzo(k)fluoranthene	U		0.89	3.3	ug/Kg	1	07-Dec-2021 22:13
Chrysene	U		0.79	3.3	ug/Kg	1	07-Dec-2021 22:13
Dibenz(a,h)anthracene	U		1.6	3.3	ug/Kg	1	07-Dec-2021 22:13
Fluoranthene	U		1.1	3.3	ug/Kg	1	07-Dec-2021 22:13
Fluorene	U		1.1	3.3	ug/Kg	1	07-Dec-2021 22:13
Indeno(1,2,3-cd)pyrene	U		0.79	3.3	ug/Kg	1	07-Dec-2021 22:13
Isophorone	U		0.79	6.5	ug/Kg	1	07-Dec-2021 22:13
Naphthalene	**0.71**	J	**0.59**	**3.3**	**ug/Kg**	1	07-Dec-2021 22:13
Phenanthrene	U		1.5	3.3	ug/Kg	1	07-Dec-2021 22:13
Pyrene	**0.64**	J	**0.59**	**3.3**	**ug/Kg**	1	07-Dec-2021 22:13
Surr: 2-Fluorobiphenyl	*80.5*			*43-125*	*%REC*	*1*	*07-Dec-2021 22:13*
Surr: 4-Terphenyl-d14	*97.5*			*32-125*	*%REC*	*1*	*07-Dec-2021 22:13*
Surr: Nitrobenzene-d5	*88.1*			*37-125*	*%REC*	*1*	*07-Dec-2021 22:13*
PCBS BY SW8082A	**Method:SW8082**				Prep:SW3541 / 30-Nov-2021		Analyst: JBA
Aroclor 1016	U		0.42	1.7	ug/Kg	1	06-Dec-2021 07:25
Aroclor 1221	U		0.56	1.7	ug/Kg	1	06-Dec-2021 07:25
Aroclor 1232	U		0.45	1.7	ug/Kg	1	06-Dec-2021 07:25
Aroclor 1242	U		0.59	1.7	ug/Kg	1	06-Dec-2021 07:25
Aroclor 1248	U		0.59	1.7	ug/Kg	1	06-Dec-2021 07:25
Aroclor 1254	U		0.47	1.7	ug/Kg	1	06-Dec-2021 07:25
Aroclor 1260	U		0.24	1.7	ug/Kg	1	06-Dec-2021 07:25
Surr: Decachlorobiphenyl	*66.5*			*54-143*	*%REC*	*1*	*06-Dec-2021 07:25*
Surr: Tetrachloro-m-xylene	*76.4*			*50-140*	*%REC*	*1*	*06-Dec-2021 07:25*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 09 Lab ID:HS21111398-04
Collection Date: 12-Nov-2021 14:49 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 07-Dec-2021		Analyst: JC
Antimony	**0.235**	J	**0.0602**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:36
Arsenic	**6.47**		**0.0648**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:36
Beryllium	**0.928**		**0.0195**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:36
Cadmium	**0.0644**	J	**0.0250**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:36
Chromium	**22.9**		**0.0213**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:36
Copper	**11.4**		**0.0352**	**0.185**	**mg/Kg**	1	07-Dec-2021 14:36
Iron	**28,900**		**33.9**	**926**	**mg/Kg**	20	07-Dec-2021 15:34
Lead	**60.1**		**0.0120**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:36
Manganese	**405**		**0.797**	**9.26**	**mg/Kg**	20	07-Dec-2021 15:34
Nickel	**13.6**		**0.0445**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:36
Potassium	**1,600**		**6.22**	**46.3**	**mg/Kg**	1	07-Dec-2021 14:36
Selenium	**0.296**	J	**0.0843**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:36
Silver	**0.0299**	J	**0.0139**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:36
Thallium	U		0.207	0.463	mg/Kg	1	07-Dec-2021 14:36
Zinc	**89.7**		**0.157**	**0.463**	**mg/Kg**	1	07-Dec-2021 14:36
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 01-Dec-2021		Analyst: MSC
Mercury	**32.7**		**0.510**	**3.61**	**ug/Kg**	1	01-Dec-2021 14:29
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**136**		**4.89**	**9.78**	**mg/Kg**	5	07-Dec-2021 14:20
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**66.3**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
PH SOIL BY SW9045D		**Method:SW9045D**					Analyst: SH
pH	**6.40**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 17:00
Temp Deg C @pH	**22.6**	H	**0**	**0**	**°C**	1	02-Dec-2021 17:00
SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT		**Method:SW9050M**					Analyst: MZD
Conductance, Soil Extract	**339**		**50.0**	**50.0**	**umhos/cm**	10	07-Dec-2021 11:03
ANIONS BY SW9056A		**Method:SW9056**			Prep:SW9056 / 24-Nov-2021		Analyst: YP
Nitrogen, Nitrate (As N)	**4.02**		**0.299**	**0.997**	**mg/Kg**	1	30-Nov-2021 01:21
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 10-Dec-2021		Analyst: JAC
Total Organic Carbon	**1.20**		**0.0589**	**0.981**	**wt%-dry**	1	10-Dec-2021 12:00
SUBCONTRACT ANALYSIS - SPECIALIZED HERBICIDES		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0			1	16-Dec-2021 11:50

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 10 Lab ID:HS21111398-05
Collection Date: 13-Nov-2021 13:54 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C	**Method:SW8260**						Analyst: WLR
1,1,1-Trichloroethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
1,1,2,2-Tetrachloroethane	U		0.78	4.8	ug/Kg	1	25-Nov-2021 18:10
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.68	4.8	ug/Kg	1	25-Nov-2021 18:10
1,1,2-Trichloroethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
1,1-Dichloroethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
1,1-Dichloroethene	U		0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
1,2,3-Trichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 18:10
1,2,4-Trichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 18:10
1,2-Dibromo-3-chloropropane	U		0.97	4.8	ug/Kg	1	25-Nov-2021 18:10
1,2-Dibromoethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
1,2-Dichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 18:10
1,2-Dichloroethane	U		0.58	4.8	ug/Kg	1	25-Nov-2021 18:10
1,2-Dichloropropane	U		0.78	4.8	ug/Kg	1	25-Nov-2021 18:10
1,3-Dichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 18:10
1,4-Dichlorobenzene	U		0.97	4.8	ug/Kg	1	25-Nov-2021 18:10
2-Butanone	U		1.3	9.7	ug/Kg	1	25-Nov-2021 18:10
2-Hexanone	U		1.4	9.7	ug/Kg	1	25-Nov-2021 18:10
4-Methyl-2-pentanone	U		1.9	9.7	ug/Kg	1	25-Nov-2021 18:10
Acetone	U		1.9	19	ug/Kg	1	25-Nov-2021 18:10
Benzene	U		0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
Bromochloromethane	U		0.87	4.8	ug/Kg	1	25-Nov-2021 18:10
Bromodichloromethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
Bromoform	U		0.58	4.8	ug/Kg	1	25-Nov-2021 18:10
Bromomethane	U		0.97	9.7	ug/Kg	1	25-Nov-2021 18:10
Carbon disulfide	U		0.58	9.7	ug/Kg	1	25-Nov-2021 18:10
Carbon tetrachloride	U		0.58	4.8	ug/Kg	1	25-Nov-2021 18:10
Chlorobenzene	U		0.58	4.8	ug/Kg	1	25-Nov-2021 18:10
Chloroethane	U		0.78	9.7	ug/Kg	1	25-Nov-2021 18:10
Chloroform	U		0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
Chloromethane	U		0.48	9.7	ug/Kg	1	25-Nov-2021 18:10
cis-1,2-Dichloroethene	U		0.78	4.8	ug/Kg	1	25-Nov-2021 18:10
cis-1,3-Dichloropropene	U		0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
Cyclohexane	U		0.97	4.8	ug/Kg	1	25-Nov-2021 18:10
Dibromochloromethane	U		0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
Dichlorodifluoromethane	U		0.68	4.8	ug/Kg	1	25-Nov-2021 18:10
Ethylbenzene	U		0.68	4.8	ug/Kg	1	25-Nov-2021 18:10
Isopropylbenzene	U		0.87	4.8	ug/Kg	1	25-Nov-2021 18:10
m,p-Xylene	U		1.6	9.7	ug/Kg	1	25-Nov-2021 18:10
Methyl acetate	U		0.68	4.8	ug/Kg	1	25-Nov-2021 18:10

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 10 Lab ID:HS21111398-05
Collection Date: 13-Nov-2021 13:54 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
Methyl tert-butyl ether		U	0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
Methylcyclohexane		U	0.97	4.8	ug/Kg	1	25-Nov-2021 18:10
Methylene chloride		U	0.97	9.7	ug/Kg	1	25-Nov-2021 18:10
o-Xylene		U	0.97	4.8	ug/Kg	1	25-Nov-2021 18:10
Styrene		U	0.68	4.8	ug/Kg	1	25-Nov-2021 18:10
Tetrachloroethene		U	0.68	4.8	ug/Kg	1	25-Nov-2021 18:10
Toluene		U	0.58	4.8	ug/Kg	1	25-Nov-2021 18:10
trans-1,2-Dichloroethene		U	0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
trans-1,3-Dichloropropene		U	0.58	4.8	ug/Kg	1	25-Nov-2021 18:10
Trichloroethene		U	0.58	4.8	ug/Kg	1	25-Nov-2021 18:10
Trichlorofluoromethane		U	0.48	4.8	ug/Kg	1	25-Nov-2021 18:10
Vinyl chloride		U	0.78	1.9	ug/Kg	1	25-Nov-2021 18:10
Xylenes, Total		U	0.97	4.8	ug/Kg	1	25-Nov-2021 18:10
Surr: 1,2-Dichloroethane-d4	*106*			*70-126*	*%REC*	*1*	*25-Nov-2021 18:10*
Surr: 4-Bromofluorobenzene	*86.1*			*70-130*	*%REC*	*1*	*25-Nov-2021 18:10*
Surr: Dibromofluoromethane	*94.9*			*70-130*	*%REC*	*1*	*25-Nov-2021 18:10*
Surr: Toluene-d8	*97.7*			*70-130*	*%REC*	*1*	*25-Nov-2021 18:10*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 10 Lab ID:HS21111398-05
Collection Date: 13-Nov-2021 13:54 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**				Prep:SW3541 / 24-Nov-2021		Analyst: GEY
1-Methylnaphthalene	U		15	33	ug/Kg	10	07-Dec-2021 22:33
2-Methylnaphthalene	U		5.0	33	ug/Kg	10	07-Dec-2021 22:33
Acenaphthene	U		5.0	33	ug/Kg	10	07-Dec-2021 22:33
Acenaphthylene	U		9.9	33	ug/Kg	10	07-Dec-2021 22:33
Anthracene	U		5.0	33	ug/Kg	10	07-Dec-2021 22:33
Benz(a)anthracene	U		16	33	ug/Kg	10	07-Dec-2021 22:33
Benzo(a)pyrene	**10**	J	**9.9**	**33**	**ug/Kg**	10	07-Dec-2021 22:33
Benzo(b)fluoranthene	**110**		**12**	**33**	**ug/Kg**	10	07-Dec-2021 22:33
Benzo(g,h,i)perylene	**27**	J	**7.0**	**33**	**ug/Kg**	10	07-Dec-2021 22:33
Benzo(k)fluoranthene	**25**	J	**8.9**	**33**	**ug/Kg**	10	07-Dec-2021 22:33
Chrysene	**27**	J	**7.9**	**33**	**ug/Kg**	10	07-Dec-2021 22:33
Dibenz(a,h)anthracene	U		16	33	ug/Kg	10	07-Dec-2021 22:33
Fluoranthene	**17**	J	**11**	**33**	**ug/Kg**	10	07-Dec-2021 22:33
Fluorene	U		11	33	ug/Kg	10	07-Dec-2021 22:33
Indeno(1,2,3-cd)pyrene	U		7.9	33	ug/Kg	10	07-Dec-2021 22:33
Isophorone	U		7.9	66	ug/Kg	10	07-Dec-2021 22:33
Naphthalene	U		6.0	33	ug/Kg	10	07-Dec-2021 22:33
Phenanthrene	U		15	33	ug/Kg	10	07-Dec-2021 22:33
Pyrene	**15**	J	**6.0**	**33**	**ug/Kg**	10	07-Dec-2021 22:33
Surr: 2-Fluorobiphenyl	*79.3*			*43-125*	*%REC*	*10*	*07-Dec-2021 22:33*
Surr: 4-Terphenyl-d14	*109*			*32-125*	*%REC*	*10*	*07-Dec-2021 22:33*
Surr: Nitrobenzene-d5	*85.1*			*37-125*	*%REC*	*10*	*07-Dec-2021 22:33*
PCBS BY SW8082A	**Method:SW8082**				Prep:SW3541 / 30-Nov-2021		Analyst: JBA
Aroclor 1016	U		0.42	1.7	ug/Kg	1	06-Dec-2021 04:31
Aroclor 1221	U		0.56	1.7	ug/Kg	1	06-Dec-2021 04:31
Aroclor 1232	U		0.45	1.7	ug/Kg	1	06-Dec-2021 04:31
Aroclor 1242	U		0.59	1.7	ug/Kg	1	06-Dec-2021 04:31
Aroclor 1248	U		0.59	1.7	ug/Kg	1	06-Dec-2021 04:31
Aroclor 1254	U		0.47	1.7	ug/Kg	1	06-Dec-2021 04:31
Aroclor 1260	U		0.24	1.7	ug/Kg	1	06-Dec-2021 04:31
Surr: Decachlorobiphenyl	*117*			*54-143*	*%REC*	*1*	*06-Dec-2021 04:31*
Surr: Tetrachloro-m-xylene	*67.6*			*50-140*	*%REC*	*1*	*06-Dec-2021 04:31*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111398
Sample ID: Soil Pipe 10 Lab ID:HS21111398-05
Collection Date: 13-Nov-2021 13:54 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 07-Dec-2021		Analyst: JC
Antimony	U		0.0615	0.473	mg/Kg	1	07-Dec-2021 14:38
Arsenic	**18.6**		**0.0662**	**0.473**	**mg/Kg**	1	07-Dec-2021 14:38
Beryllium	**1.16**		**0.0199**	**0.473**	**mg/Kg**	1	07-Dec-2021 14:38
Cadmium	**0.0767**	J	**0.0255**	**0.473**	**mg/Kg**	1	07-Dec-2021 14:38
Chromium	**22.8**		**0.0218**	**0.473**	**mg/Kg**	1	07-Dec-2021 14:38
Copper	**9.91**		**0.0360**	**0.189**	**mg/Kg**	1	07-Dec-2021 14:38
Iron	**37,000**		**34.6**	**946**	**mg/Kg**	20	07-Dec-2021 15:36
Lead	**35.0**		**0.0123**	**0.473**	**mg/Kg**	1	07-Dec-2021 14:38
Manganese	**527**		**0.814**	**9.46**	**mg/Kg**	20	07-Dec-2021 15:36
Nickel	**19.1**		**0.0454**	**0.473**	**mg/Kg**	1	07-Dec-2021 14:38
Potassium	**1,710**		**6.36**	**47.3**	**mg/Kg**	1	07-Dec-2021 14:38
Selenium	**0.367**	J	**0.0861**	**0.473**	**mg/Kg**	1	07-Dec-2021 14:38
Silver	**0.0340**	J	**0.0142**	**0.473**	**mg/Kg**	1	07-Dec-2021 14:38
Thallium	U		0.211	0.473	mg/Kg	1	07-Dec-2021 14:38
Zinc	**205**		**3.22**	**9.46**	**mg/Kg**	20	07-Dec-2021 15:36
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 01-Dec-2021		Analyst: MSC
Mercury	**49.2**		**0.471**	**3.34**	**ug/Kg**	1	01-Dec-2021 14:31
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**109**		**4.60**	**9.19**	**mg/Kg**	5	07-Dec-2021 14:20
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**71.2**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
PH SOIL BY SW9045D		**Method:SW9045D**					Analyst: SH
pH	**5.90**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 17:00
Temp Deg C @pH	**22.7**	H	**0**	**0**	**°C**	1	02-Dec-2021 17:00
SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT		**Method:SW9050M**					Analyst: MZD
Conductance, Soil Extract	**1,630**		**50.0**	**50.0**	**umhos/cm**	10	07-Dec-2021 11:03
ANIONS BY SW9056A		**Method:SW9056**			Prep:SW9056 / 24-Nov-2021		Analyst: YP
Nitrogen, Nitrate (As N)	**2.02**		**0.297**	**0.991**	**mg/Kg**	1	30-Nov-2021 01:51
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 10-Dec-2021		Analyst: JAC
Total Organic Carbon	**0.972**	J	**0.0587**	**0.978**	**wt%-dry**	1	10-Dec-2021 12:00
SUBCONTRACT ANALYSIS - SPECIALIZED HERBICIDES		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0			1	16-Dec-2021 11:50

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

Batch ID: 4689 **Start Date:** 24 Nov 2021 10:25 **End Date:** 24 Nov 2021 10:25
Method: VOLATILES BY SW8260C

Sample ID	Container	Sample Wt/Vol	Final Volume	Weight Factor	Container Type
HS21111398-01	1	5.117 (g)	5 (mL)	0.98	Bulk (5030B)
HS21111398-02	1	5.143 (g)	5 (mL)	0.97	Bulk (5030B)
HS21111398-03	1	5.135 (g)	5 (mL)	0.97	Bulk (5030B)
HS21111398-04	1	5.03 (g)	5 (mL)	0.99	Bulk (5030B)
HS21111398-05	1	5.165 (g)	5 (mL)	0.97	Bulk (5030B)

Batch ID: 172911 **Start Date:** 24 Nov 2021 12:00 **End Date:** 24 Nov 2021 16:30
Method: SV SOXHLET EXTRACT-LOWLEVEL-SW3541 **Prep Code:** 3541_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111398-01		30.05 (g)	1 (mL)	0.03328	1-L WM glass, Neat
HS21111398-02		30.24 (g)	1 (mL)	0.03307	1-L WM glass, Neat
HS21111398-03		30.03 (g)	1 (mL)	0.0333	1-L WM glass, Neat
HS21111398-04		30.42 (g)	1 (mL)	0.03287	1-L WM glass, Neat
HS21111398-05		30.21 (g)	1 (mL)	0.0331	1-L WM glass, Neat

Batch ID: 172914 **Start Date:** 24 Nov 2021 13:02 **End Date:** 24 Nov 2021 15:00
Method: 9056 ANIONS SOIL PREP **Prep Code:** 9056_S_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111398-01		5.0585 (g)	50 (mL)	9.884	1-L WM glass, Neat
HS21111398-02		5.0286 (g)	50 (mL)	9.943	1-L WM glass, Neat
HS21111398-03		5.0711 (g)	50 (mL)	9.86	1-L WM glass, Neat
HS21111398-04		5.0165 (g)	50 (mL)	9.967	1-L WM glass, Neat
HS21111398-05		5.0445 (g)	50 (mL)	9.912	1-L WM glass, Neat

Batch ID: 173020 **Start Date:** 30 Nov 2021 15:00 **End Date:** 30 Nov 2021 18:30
Method: PCB_3541_LO **Prep Code:** PCBPR_SOX_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111398-01		30.35 (grams)	1 (mL)	0.03295	1-L WM glass, Neat
HS21111398-02		30.24 (grams)	1 (mL)	0.03307	1-L WM glass, Neat
HS21111398-03		30.27 (grams)	1 (mL)	0.03304	1-L WM glass, Neat
HS21111398-04		30.13 (grams)	1 (mL)	0.03319	1-L WM glass, Neat
HS21111398-05		30.21 (grams)	1 (mL)	0.0331	1-L WM glass, Neat

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Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

Batch ID: 173034 **Start Date:** 01 Dec 2021 09:00 **End Date:** 01 Dec 2021 11:00
Method: MERCURY PREP - SOLID - 7471B **Prep Code:** HG_S_LOWPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111398-01		0.5643 (grams)	40 (mL)	70.88	1-L WM glass, Neat
HS21111398-02		0.5606 (grams)	40 (mL)	71.35	1-L WM glass, Neat
HS21111398-03		0.5944 (grams)	40 (mL)	67.29	1-L WM glass, Neat
HS21111398-04		0.5528 (grams)	40 (mL)	72.36	1-L WM glass, Neat
HS21111398-05		0.5981 (grams)	40 (mL)	66.88	1-L WM glass, Neat

Batch ID: 173230 **Start Date:** 07 Dec 2021 07:30 **End Date:** 07 Dec 2021 13:30
Method: METALS PREP - SOLIDS - SW3050B **Prep Code:** 3050_I_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111398-01		0.5327 (g)	50 (mL)	93.86	1-L WM glass, Neat
HS21111398-02		0.5395 (g)	50 (mL)	92.68	1-L WM glass, Neat
HS21111398-03		0.5375 (g)	50 (mL)	93.02	1-L WM glass, Neat
HS21111398-04		0.5398 (g)	50 (mL)	92.63	1-L WM glass, Neat
HS21111398-05		0.5285 (g)	50 (mL)	94.61	1-L WM glass, Neat

Batch ID: 173274 **Start Date:** 07 Dec 2021 10:00 **End Date:** 07 Dec 2021 12:00
Method: PHOSPHOROUS **Prep Code:** P_TS_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111398-01		0.998 (g)	50 (mL)	50.1	1-L WM glass, Neat
HS21111398-02		1.02 (g)	50 (mL)	49.02	1-L WM glass, Neat
HS21111398-03		1.001 (g)	50 (mL)	49.95	1-L WM glass, Neat
HS21111398-04		1.022 (g)	50 (mL)	48.92	1-L WM glass, Neat
HS21111398-05		1.088 (g)	50 (mL)	45.96	1-L WM glass, Neat

Batch ID: 173396 **Start Date:** 10 Dec 2021 10:45 **End Date:** 10 Dec 2021 12:00
Method: TOC SOLID PREP **Prep Code:** TOC_SOLID_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111398-01		0.2011 (grams)	0.2 (mL)	0.9945	1-L WM glass, Neat
HS21111398-02		0.2015 (grams)	0.2 (mL)	0.9926	1-L WM glass, Neat
HS21111398-03		0.2031 (grams)	0.2 (mL)	0.9847	1-L WM glass, Neat
HS21111398-04		0.2039 (grams)	0.2 (mL)	0.9809	1-L WM glass, Neat
HS21111398-05		0.2045 (grams)	0.2 (mL)	0.978	1-L WM glass, Neat

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 172911 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28		24 Nov 2021 12:00	07 Dec 2021 21:34	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26		24 Nov 2021 12:00	01 Dec 2021 15:56	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52		24 Nov 2021 12:00	07 Dec 2021 21:54	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49		24 Nov 2021 12:00	07 Dec 2021 22:13	1
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54		24 Nov 2021 12:00	07 Dec 2021 22:33	10
Batch ID: 172914 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28		24 Nov 2021 13:02	30 Nov 2021 00:59	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26		24 Nov 2021 13:02	30 Nov 2021 01:06	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52		24 Nov 2021 13:02	30 Nov 2021 01:13	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49		24 Nov 2021 13:02	30 Nov 2021 01:21	1
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54		24 Nov 2021 13:02	30 Nov 2021 01:51	1
Batch ID: 173020 (0)	**Test Name :** PCBS BY SW8082A				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28		30 Nov 2021 15:00	06 Dec 2021 05:23	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26		30 Nov 2021 15:00	06 Dec 2021 06:50	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52		30 Nov 2021 15:00	06 Dec 2021 07:07	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49		30 Nov 2021 15:00	06 Dec 2021 07:25	1
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54		30 Nov 2021 15:00	06 Dec 2021 04:31	1
Batch ID: 173034 (0)	**Test Name :** MERCURY BY SW7471B				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28		01 Dec 2021 11:00	01 Dec 2021 13:55	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26		01 Dec 2021 11:00	01 Dec 2021 13:56	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52		01 Dec 2021 11:00	01 Dec 2021 13:58	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49		01 Dec 2021 11:00	01 Dec 2021 14:29	1
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54		01 Dec 2021 11:00	01 Dec 2021 14:31	1
Batch ID: 173230 (0)	**Test Name :** METALS BY SW6020A				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28		07 Dec 2021 13:30	07 Dec 2021 15:16	20
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28		07 Dec 2021 13:30	07 Dec 2021 14:21	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26		07 Dec 2021 13:30	07 Dec 2021 15:18	10
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26		07 Dec 2021 13:30	07 Dec 2021 14:32	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52		07 Dec 2021 13:30	07 Dec 2021 15:20	20
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52		07 Dec 2021 13:30	07 Dec 2021 14:34	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49		07 Dec 2021 13:30	07 Dec 2021 15:34	20
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49		07 Dec 2021 13:30	07 Dec 2021 14:36	1
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54		07 Dec 2021 13:30	07 Dec 2021 15:36	20
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54		07 Dec 2021 13:30	07 Dec 2021 14:38	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173274 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28		07 Dec 2021 10:00	07 Dec 2021 14:20	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26		07 Dec 2021 10:00	07 Dec 2021 14:20	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52		07 Dec 2021 10:00	07 Dec 2021 14:20	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49		07 Dec 2021 10:00	07 Dec 2021 14:20	5
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54		07 Dec 2021 10:00	07 Dec 2021 14:20	5
Batch ID: 173396 (0)	**Test Name :** TOTAL ORGANIC CARBON BY SW9060A				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28		10 Dec 2021 10:45	10 Dec 2021 12:00	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26		10 Dec 2021 10:45	10 Dec 2021 12:00	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52		10 Dec 2021 10:45	10 Dec 2021 12:00	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49		10 Dec 2021 10:45	10 Dec 2021 12:00	1
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54		10 Dec 2021 10:45	10 Dec 2021 12:00	1
Batch ID: R396442 (0)	**Test Name :** VOLATILES BY SW8260C				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28			25 Nov 2021 16:40	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26			25 Nov 2021 17:03	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52			25 Nov 2021 17:25	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49			25 Nov 2021 17:47	1
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54			25 Nov 2021 18:10	1
Batch ID: R396871 (0)	**Test Name :** PH SOIL BY SW9045D				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28			02 Dec 2021 17:00	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26			02 Dec 2021 17:00	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52			02 Dec 2021 17:00	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49			02 Dec 2021 17:00	1
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54			02 Dec 2021 17:00	1
Batch ID: R397100 (0)	**Test Name :** SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28			07 Dec 2021 11:03	10
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26			07 Dec 2021 11:03	10
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52			07 Dec 2021 11:03	10
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49			07 Dec 2021 11:03	10
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54			07 Dec 2021 11:03	10
Batch ID: R397230 (0)	**Test Name :** TOTAL SOLIDS BY SM2540G-2011				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28			08 Dec 2021 11:30	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26			08 Dec 2021 11:30	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52			08 Dec 2021 11:30	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49			08 Dec 2021 11:30	1
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54			08 Dec 2021 11:30	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R397749 (0)	**Test Name :** SUBCONTRACT ANALYSIS - SPECIALIZED HERBICIDES				**Matrix:** Soil	
HS21111398-01	Soil Pipe 06	12 Nov 2021 08:28			16 Dec 2021 11:50	1
HS21111398-02	Soil Pipe 07	12 Nov 2021 13:26			16 Dec 2021 11:50	1
HS21111398-03	Soil Pipe 08	13 Nov 2021 07:52			16 Dec 2021 11:50	1
HS21111398-04	Soil Pipe 09	12 Nov 2021 14:49			16 Dec 2021 11:50	1
HS21111398-05	Soil Pipe 10	13 Nov 2021 13:54			16 Dec 2021 11:50	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173020 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MBLK Sample ID: **MBLK-173020** Units: **ug/Kg** Analysis Date: **06-Dec-2021 05:41**
Client ID: Run ID: **ECD_7_396978** SeqNo: **6405988** PrepDate: **30-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	U	1.7								
Aroclor 1221	U	1.7								
Aroclor 1232	U	1.7								
Aroclor 1242	U	1.7								
Aroclor 1248	U	1.7								
Aroclor 1254	U	1.7								
Aroclor 1260	U	1.7								
Surr: Decachlorobiphenyl	*0.5691*	*0.16*	*0.6667*	*0*	*85.4*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.4761*	*0.16*	*0.6667*	*0*	*71.4*	*50 - 140*				

LCS Sample ID: **LCS-173020** Units: **ug/Kg** Analysis Date: **06-Dec-2021 05:58**
Client ID: Run ID: **ECD_7_396978** SeqNo: **6405989** PrepDate: **30-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	13.95	1.7	16.67	0	83.7	53 - 135				
Aroclor 1260	15.93	1.7	16.67	0	95.6	54 - 137				
Surr: Decachlorobiphenyl	*0.6764*	*0.16*	*0.6667*	*0*	*101*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.5941*	*0.16*	*0.6667*	*0*	*89.1*	*50 - 140*				

MS Sample ID: **HS21111398-05MS** Units: **ug/Kg** Analysis Date: **06-Dec-2021 04:49**
Client ID: **Soil Pipe 10** Run ID: **ECD_7_396978** SeqNo: **6405985** PrepDate: **30-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	11.77	1.6	16.4	0	71.8	53 - 135				
Aroclor 1260	13.37	1.6	16.4	0	81.5	54 - 137				
Surr: Decachlorobiphenyl	*0.6829*	*0.16*	*0.656*	*0*	*104*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.4147*	*0.16*	*0.656*	*0*	*63.2*	*50 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173020 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MSD Sample ID: **HS21111398-05MSD** Units: **ug/Kg** Analysis Date: **06-Dec-2021 05:06**
Client ID: **Soil Pipe 10** Run ID: **ECD_7_396978** SeqNo: **6405986** PrepDate: **30-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	12.2	1.7	16.49	0	74.0	53 - 135	11.77	3.58	30	
Aroclor 1260	11.21	1.7	16.49	0	68.0	54 - 137	13.37	17.6	30	
Surr: Decachlorobiphenyl	*0.7637*	*0.16*	*0.6594*	*0*	*116*	*54 - 143*	*0.6829*	*11.2*	*30*	
Surr: Tetrachloro-m-xylene	*0.4401*	*0.16*	*0.6594*	*0*	*66.7*	*50 - 140*	*0.4147*	*5.95*	*30*	

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173034 (0) **Instrument: HG03** **Method: MERCURY BY SW7471B**

MBLK Sample ID: **MBLK-173034** Units: **ug/Kg** Analysis Date: **01-Dec-2021 13:03**
Client ID: Run ID: **HG03_396712** SeqNo: **6399975** PrepDate: **01-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	2.005	3.33								J

LCS Sample ID: **LCS-173034** Units: **ug/Kg** Analysis Date: **01-Dec-2021 13:05**
Client ID: Run ID: **HG03_396712** SeqNo: **6399976** PrepDate: **01-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	294.5	3.49	349.8	0	84.2	80 - 120				

MS Sample ID: **HS21111212-01MS** Units: **ug/Kg** Analysis Date: **01-Dec-2021 13:13**
Client ID: Run ID: **HG03_396712** SeqNo: **6399980** PrepDate: **01-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	314.5	3.43	344.1	11.22	88.1	80 - 120				

MSD Sample ID: **HS21111212-01MSD** Units: **ug/Kg** Analysis Date: **01-Dec-2021 13:26**
Client ID: Run ID: **HG03_396712** SeqNo: **6399984** PrepDate: **01-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	300.6	3.36	337	11.22	85.9	80 - 120	314.5	4.51	20	

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

MBLK Sample ID: **MBLK-173230** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:04**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409221** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.498								
Arsenic	U	0.498								
Beryllium	U	0.498								
Cadmium	U	0.498								
Chromium	U	0.498								
Copper	U	0.199								
Iron	U	49.8								
Lead	U	0.498								
Manganese	U	0.498								
Nickel	U	0.498								
Potassium	U	49.8								
Selenium	U	0.498								
Silver	U	0.498								
Thallium	U	0.498								
Zinc	U	0.498								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

LCS Sample ID: **LCS-173230** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:06**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409222** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	9.765	0.494	9.885	0	98.8	80 - 120				
Arsenic	9.893	0.494	9.885	0	100	80 - 120				
Beryllium	9.587	0.494	9.885	0	97.0	80 - 120				
Cadmium	9.898	0.494	9.885	0	100	80 - 120				
Chromium	10.19	0.494	9.885	0	103	80 - 120				
Copper	10.17	0.198	9.885	0	103	80 - 120				
Iron	1044	49.4	988.5	0	106	80 - 120				
Lead	10.3	0.494	9.885	0	104	80 - 120				
Manganese	10.12	0.494	9.885	0	102	80 - 120				
Nickel	10.65	0.494	9.885	0	108	80 - 120				
Potassium	1060	49.4	988.5	0	107	80 - 120				
Selenium	10.11	0.494	9.885	0	102	80 - 120				
Silver	10.62	0.494	9.885	0	107	80 - 120				
Thallium	10.42	0.494	9.885	0	105	80 - 120				
Zinc	9.932	0.494	9.885	0	100	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

MS Sample ID: **HS21120188-19MS** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:13**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409225** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	3.943	0.496	9.915	0.1324	38.4	75 - 125				S
Arsenic	10.36	0.496	9.915	0.5568	98.8	75 - 125				
Beryllium	9.997	0.496	9.915	0.1305	99.5	75 - 125				
Cadmium	10.1	0.496	9.915	0.01158	102	75 - 125				
Chromium	16.42	0.496	9.915	4.523	120	75 - 125				
Copper	11.21	0.198	9.915	1.578	97.1	75 - 125				
Iron	4581	49.6	991.5	2686	191	75 - 125				S
Lead	15.27	0.496	9.915	3.679	117	75 - 125				
Manganese	21.02	0.496	9.915	7.923	132	75 - 125				S
Nickel	12.08	0.496	9.915	1.497	107	75 - 125				
Potassium	1595	49.6	991.5	481.2	112	75 - 125				
Selenium	9.64	0.496	9.915	0.1263	96.0	75 - 125				
Silver	10.44	0.496	9.915	0.02098	105	75 - 125				
Thallium	10.71	0.496	9.915	0.09265	107	75 - 125				
Zinc	16.73	0.496	9.915	5.874	110	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

MSD Sample ID: **HS21120188-19MSD** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:15**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409226** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	3.798	0.482	9.638	0.1324	38.0	75 - 125	3.943	3.75	20	S
Arsenic	9.826	0.482	9.638	0.5568	96.2	75 - 125	10.36	5.24	20	
Beryllium	9.445	0.482	9.638	0.1305	96.6	75 - 125	9.997	5.68	20	
Cadmium	9.616	0.482	9.638	0.01158	99.7	75 - 125	10.1	4.87	20	
Chromium	16.03	0.482	9.638	4.523	119	75 - 125	16.42	2.37	20	
Copper	11.17	0.193	9.638	1.578	99.5	75 - 125	11.21	0.37	20	
Iron	4409	48.2	963.8	2686	179	75 - 125	4581	3.83	20	S
Lead	14.81	0.482	9.638	3.679	116	75 - 125	15.27	3.07	20	
Manganese	22.31	0.482	9.638	7.923	149	75 - 125	21.02	5.96	20	S
Nickel	12	0.482	9.638	1.497	109	75 - 125	12.08	0.622	20	
Potassium	1545	48.2	963.8	481.2	110	75 - 125	1595	3.19	20	
Selenium	9.742	0.482	9.638	0.1263	99.8	75 - 125	9.64	1.05	20	
Silver	9.966	0.482	9.638	0.02098	103	75 - 125	10.44	4.69	20	
Thallium	10.57	0.482	9.638	0.09265	109	75 - 125	10.71	1.3	20	
Zinc	16.27	0.482	9.638	5.874	108	75 - 125	16.73	2.79	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

PDS Sample ID: **HS21120188-19PDS** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:17**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409227** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	9.249	0.475	9.493	0.1324	96.0	75 - 125				
Arsenic	10.23	0.475	9.493	0.5568	102	75 - 125				
Beryllium	9.757	0.475	9.493	0.1305	101	75 - 125				
Cadmium	9.839	0.475	9.493	0.01158	104	75 - 125				
Chromium	15.51	0.475	9.493	4.523	116	75 - 125				
Copper	11.1	0.190	9.493	1.578	100	75 - 125				
Iron	3675	47.5	949.3	2686	104	75 - 125				
Lead	14.46	0.475	9.493	3.679	114	75 - 125				
Manganese	18.7	0.475	9.493	7.923	114	75 - 125				
Nickel	11.5	0.475	9.493	1.497	105	75 - 125				
Potassium	1500	47.5	949.3	481.2	107	75 - 125				
Selenium	10.02	0.475	9.493	0.1263	104	75 - 125				
Silver	9.915	0.475	9.493	0.02098	104	75 - 125				
Thallium	10.71	0.475	9.493	0.09265	112	75 - 125				
Zinc	15.35	0.475	9.493	5.874	99.8	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

SD Sample ID: **HS21120188-19SD** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:11**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409224** PrepDate: **07-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	2.37					0.1324	0	10	
Arsenic	0.5269	2.37					0.5568	0	10	J
Beryllium	0.1332	2.37					0.1305	0	10	J
Cadmium	U	2.37					0.01158	0	10	
Chromium	4.129	2.37					4.523	8.71	10	
Copper	1.552	0.949					1.578	1.68	10	
Iron	2502	237					2686	6.86	10	
Lead	3.565	2.37					3.679	3.08	10	
Manganese	7.384	2.37					7.923	6.8	10	
Nickel	1.424	2.37					1.497	0	10	J
Potassium	448.3	237					481.2	6.84	10	
Selenium	U	2.37					0.1263	0	10	
Silver	U	2.37					0.02098	0	10	
Thallium	U	2.37					0.09265	0	10	
Zinc	5.822	2.37					5.874	0.897	10	

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 172911 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-172911** Units: **ug/Kg** Analysis Date: **01-Dec-2021 14:39**
Client ID: Run ID: **SV-7_396816** SeqNo: **6402714** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	3.3								
2-Methylnaphthalene	U	3.3								
Acenaphthene	U	3.3								
Acenaphthylene	U	3.3								
Anthracene	U	3.3								
Benz(a)anthracene	U	3.3								
Benzo(a)pyrene	U	3.3								
Benzo(b)fluoranthene	U	3.3								
Benzo(g,h,i)perylene	U	3.3								
Benzo(k)fluoranthene	U	3.3								
Chrysene	U	3.3								
Dibenz(a,h)anthracene	U	3.3								
Fluoranthene	U	3.3								
Fluorene	U	3.3								
Indeno(1,2,3-cd)pyrene	U	3.3								
Isophorone	U	6.6								
Naphthalene	U	3.3								
Phenanthrene	U	3.3								
Pyrene	U	3.3								
Surr: 2-Fluorobiphenyl	*144.5*	*6.6*	*167*	*0*	*86.5*	*43 - 125*				
Surr: 4-Terphenyl-d14	*185.7*	*6.6*	*167*	*0*	*111*	*32 - 125*				
Surr: Nitrobenzene-d5	*140.9*	*6.6*	*167*	*0*	*84.3*	*37 - 125*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 172911 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCS Sample ID: **LCS-172911** Units: **ug/Kg** Analysis Date: **01-Dec-2021 14:58**
Client ID: Run ID: **SV-7_396816** SeqNo: **6402715** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	145.2	3.3	167	0	86.9	50 - 120				
2-Methylnaphthalene	133.4	3.3	167	0	79.9	50 - 120				
Acenaphthene	129.4	3.3	167	0	77.5	50 - 120				
Acenaphthylene	143.1	3.3	167	0	85.7	50 - 120				
Anthracene	169.4	3.3	167	0	101	50 - 123				
Benz(a)anthracene	149.9	3.3	167	0	89.8	40 - 140				
Benzo(a)pyrene	181	3.3	167	0	108	50 - 130				
Benzo(b)fluoranthene	151.5	3.3	167	0	90.7	50 - 137				
Benzo(g,h,i)perylene	173.5	3.3	167	0	104	50 - 130				
Benzo(k)fluoranthene	167.8	3.3	167	0	100	50 - 143				
Chrysene	155	3.3	167	0	92.8	50 - 130				
Dibenz(a,h)anthracene	175.9	3.3	167	0	105	50 - 130				
Fluoranthene	173.2	3.3	167	0	104	50 - 131				
Fluorene	140.5	3.3	167	0	84.1	50 - 125				
Indeno(1,2,3-cd)pyrene	207.9	3.3	167	0	124	45 - 139				
Isophorone	129.5	6.6	167	0	77.5	45 - 130				
Naphthalene	132.2	3.3	167	0	79.2	50 - 125				
Phenanthrene	151.6	3.3	167	0	90.8	50 - 125				
Pyrene	147.2	3.3	167	0	88.1	45 - 130				
Surr: 2-Fluorobiphenyl	*138.4*	*6.6*	*167*	*0*	*82.9*	*43 - 125*				
Surr: 4-Terphenyl-d14	*161*	*6.6*	*167*	*0*	*96.4*	*32 - 125*				
Surr: Nitrobenzene-d5	*120*	*6.6*	*167*	*0*	*71.8*	*37 - 125*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 172911 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MS Sample ID: **HS21111398-02MS** Units: **ug/Kg** Analysis Date: **01-Dec-2021 16:15**
Client ID: **Soil Pipe 07** Run ID: **SV-7_396816** SeqNo: **6402718** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	150.2	3.3	166.3	0	90.3	50 - 120				
2-Methylnaphthalene	147.3	3.3	166.3	0	88.6	50 - 120				
Acenaphthene	129.4	3.3	166.3	0	77.8	50 - 120				
Acenaphthylene	145.1	3.3	166.3	0	87.2	50 - 120				
Anthracene	159.4	3.3	166.3	0	95.9	50 - 123				
Benz(a)anthracene	169.8	3.3	166.3	0	102	40 - 140				
Benzo(a)pyrene	185.3	3.3	166.3	0	111	50 - 130				
Benzo(b)fluoranthene	164.7	3.3	166.3	0	99.0	50 - 137				
Benzo(g,h,i)perylene	188.2	3.3	166.3	0	113	50 - 130				
Benzo(k)fluoranthene	182.7	3.3	166.3	0	110	50 - 143				
Chrysene	147.8	3.3	166.3	0	88.9	50 - 130				
Dibenz(a,h)anthracene	185.7	3.3	166.3	0	112	50 - 130				
Fluoranthene	171.4	3.3	166.3	0	103	50 - 131				
Fluorene	151	3.3	166.3	0	90.8	50 - 125				
Indeno(1,2,3-cd)pyrene	165	3.3	166.3	0	99.2	45 - 139				
Isophorone	131.6	6.6	166.3	0	79.1	45 - 130				
Naphthalene	137.4	3.3	166.3	0	82.6	50 - 125				
Phenanthrene	158.7	3.3	166.3	0	95.5	50 - 125				
Pyrene	156.9	3.3	166.3	1.921	93.2	45 - 130				
Surr: 2-Fluorobiphenyl	*139.4*	*6.6*	*166.3*	*0*	*83.8*	*43 - 125*				
Surr: 4-Terphenyl-d14	*164.2*	*6.6*	*166.3*	*0*	*98.7*	*32 - 125*				
Surr: Nitrobenzene-d5	*120.3*	*6.6*	*166.3*	*0*	*72.4*	*37 - 125*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 172911 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MSD Sample ID: **HS21111398-02MSD** Units: **ug/Kg** Analysis Date: **01-Dec-2021 16:34**
Client ID: **Soil Pipe 07** Run ID: **SV-7_396816** SeqNo: **6402719** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	187.3	3.3	166.1	0	113	50 - 120	150.2	22	30	
2-Methylnaphthalene	164.6	3.3	166.1	0	99.1	50 - 120	147.3	11.1	30	
Acenaphthene	150.3	3.3	166.1	0	90.5	50 - 120	129.4	14.9	30	
Acenaphthylene	165.3	3.3	166.1	0	99.5	50 - 120	145.1	13	30	
Anthracene	179.6	3.3	166.1	0	108	50 - 123	159.4	11.9	30	
Benz(a)anthracene	185.3	3.3	166.1	0	112	40 - 140	169.8	8.74	30	
Benzo(a)pyrene	207.8	3.3	166.1	0	125	50 - 130	185.3	11.5	30	
Benzo(b)fluoranthene	177.5	3.3	166.1	0	107	50 - 137	164.7	7.51	30	
Benzo(g,h,i)perylene	200.3	3.3	166.1	0	121	50 - 130	188.2	6.22	30	
Benzo(k)fluoranthene	204.6	3.3	166.1	0	123	50 - 143	182.7	11.3	30	
Chrysene	180.1	3.3	166.1	0	108	50 - 130	147.8	19.7	30	
Dibenz(a,h)anthracene	201.5	3.3	166.1	0	121	50 - 130	185.7	8.19	30	
Fluoranthene	187.6	3.3	166.1	0	113	50 - 131	171.4	8.98	30	
Fluorene	169.2	3.3	166.1	0	102	50 - 125	151	11.4	30	
Indeno(1,2,3-cd)pyrene	195.7	3.3	166.1	0	118	45 - 139	165	17.1	30	
Isophorone	167	6.6	166.1	0	101	45 - 130	131.6	23.8	30	
Naphthalene	158.3	3.3	166.1	0	95.3	50 - 125	137.4	14.1	30	
Phenanthrene	171.7	3.3	166.1	0	103	50 - 125	158.7	7.84	30	
Pyrene	178.7	3.3	166.1	1.921	106	45 - 130	156.9	12.9	30	
Surr: 2-Fluorobiphenyl	*189.6*	*6.6*	*166.1*	*0*	*114*	*43 - 125*	*139.4*	*30.5*	*30*	R
Surr: 4-Terphenyl-d14	*190.2*	*6.6*	*166.1*	*0*	*115*	*32 - 125*	*164.2*	*14.7*	*30*	
Surr: Nitrobenzene-d5	*137.2*	*6.6*	*166.1*	*0*	*82.6*	*37 - 125*	*120.3*	*13.1*	*30*	

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R396442 (0) **Instrument:** VOA5 **Method:** VOLATILES BY SW8260C

MBLK Sample ID: **VBLKS1-112521** Units: **ug/Kg** Analysis Date: **25-Nov-2021 16:18**
Client ID: Run ID: **VOA5_396442** SeqNo: **6393153** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	5.0								
1,1,2,2-Tetrachloroethane	U	5.0								
1,1,2-Trichlor-1,2,2-trifluoroethane	U	5.0								
1,1,2-Trichloroethane	U	5.0								
1,1-Dichloroethane	U	5.0								
1,1-Dichloroethene	U	5.0								
1,2,3-Trichlorobenzene	U	5.0								
1,2,4-Trichlorobenzene	U	5.0								
1,2-Dibromo-3-chloropropane	U	5.0								
1,2-Dibromoethane	U	5.0								
1,2-Dichlorobenzene	U	5.0								
1,2-Dichloroethane	U	5.0								
1,2-Dichloropropane	U	5.0								
1,3-Dichlorobenzene	U	5.0								
1,4-Dichlorobenzene	U	5.0								
2-Butanone	U	10								
2-Hexanone	U	10								
4-Methyl-2-pentanone	U	10								
Acetone	U	20								
Benzene	U	5.0								
Bromochloromethane	U	5.0								
Bromodichloromethane	U	5.0								
Bromoform	U	5.0								
Bromomethane	U	10								
Carbon disulfide	U	10								
Carbon tetrachloride	U	5.0								
Chlorobenzene	U	5.0								
Chloroethane	U	10								
Chloroform	U	5.0								
Chloromethane	U	10								
cis-1,2-Dichloroethene	U	5.0								
cis-1,3-Dichloropropene	U	5.0								
Cyclohexane	U	5.0								
Dibromochloromethane	U	5.0								

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R396442 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKS1-112521** Units: **ug/Kg** Analysis Date: **25-Nov-2021 16:18**
Client ID: Run ID: **VOA5_396442** SeqNo: **6393153** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	U	5.0								
Ethylbenzene	U	5.0								
Isopropylbenzene	U	5.0								
m,p-Xylene	U	10								
Methyl acetate	U	5.0								
Methyl tert-butyl ether	U	5.0								
Methylcyclohexane	U	5.0								
Methylene chloride	U	10								
o-Xylene	U	5.0								
Styrene	U	5.0								
Tetrachloroethene	U	5.0								
Toluene	U	5.0								
trans-1,2-Dichloroethene	U	5.0								
trans-1,3-Dichloropropene	U	5.0								
Trichloroethene	U	5.0								
Trichlorofluoromethane	U	5.0								
Vinyl chloride	U	2.0								
Xylenes, Total	U	5.0								
Surr: 1,2-Dichloroethane-d4	*47.22*	*0*	*50*	*0*	*94.4*	*76 - 125*				
Surr: 4-Bromofluorobenzene	*42.78*	*0*	*50*	*0*	*85.6*	*80 - 120*				
Surr: Dibromofluoromethane	*45.25*	*0*	*50*	*0*	*90.5*	*80 - 119*				
Surr: Toluene-d8	*49.66*	*0*	*50*	*0*	*99.3*	*81 - 118*				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R396442 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

LCS Sample ID: **VLCSS1-112521** Units: **ug/Kg** Analysis Date: **25-Nov-2021 15:33**
Client ID: Run ID: **VOA5_396442** SeqNo: **6393152** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	44.45	5.0	50	0	88.9	72 - 130				
1,1,2,2-Tetrachloroethane	41.67	5.0	50	0	83.3	71 - 124				
1,1,2-Trichlor-1,2,2-trifluoroethane	49.96	5.0	50	0	99.9	70 - 130				
1,1,2-Trichloroethane	44.02	5.0	50	0	88.0	78 - 117				
1,1-Dichloroethane	50.37	5.0	50	0	101	76 - 128				
1,1-Dichloroethene	51.37	5.0	50	0	103	72 - 130				
1,2,3-Trichlorobenzene	44.52	5.0	50	0	89.0	76 - 125				
1,2,4-Trichlorobenzene	43.81	5.0	50	0	87.6	70 - 128				
1,2-Dibromo-3-chloropropane	37.37	5.0	50	0	74.7	70 - 128				
1,2-Dibromoethane	41.55	5.0	50	0	83.1	78 - 120				
1,2-Dichlorobenzene	44.37	5.0	50	0	88.7	79 - 121				
1,2-Dichloroethane	45.65	5.0	50	0	91.3	77 - 120				
1,2-Dichloropropane	44.15	5.0	50	0	88.3	77 - 121				
1,3-Dichlorobenzene	46.15	5.0	50	0	92.3	78 - 121				
1,4-Dichlorobenzene	44.93	5.0	50	0	89.9	78 - 120				
2-Butanone	82.34	10	100	0	82.3	70 - 128				
2-Hexanone	72.01	10	100	0	72.0	72 - 127				
4-Methyl-2-pentanone	77.75	10	100	0	77.8	70 - 128				
Acetone	85.57	20	100	0	85.6	70 - 130				
Benzene	45.77	5.0	50	0	91.5	75 - 124				
Bromochloromethane	44.46	5.0	50	0	88.9	74 - 124				
Bromodichloromethane	43.27	5.0	50	0	86.5	78 - 122				
Bromoform	39.74	5.0	50	0	79.5	74 - 120				
Bromomethane	37.07	10	50	0	74.1	70 - 130				
Carbon disulfide	92.07	10	100	0	92.1	70 - 122				
Carbon tetrachloride	44.6	5.0	50	0	89.2	72 - 128				
Chlorobenzene	45.6	5.0	50	0	91.2	78 - 122				
Chloroethane	57.48	10	50	0	115	70 - 130				
Chloroform	47.11	5.0	50	0	94.2	73 - 127				
Chloromethane	47.5	10	50	0	95.0	70 - 130				
cis-1,2-Dichloroethene	45.91	5.0	50	0	91.8	77 - 125				
cis-1,3-Dichloropropene	39.16	5.0	50	0	78.3	78 - 122				
Cyclohexane	45.44	5.0	50	0	90.9	74 - 126				
Dibromochloromethane	49.4	5.0	50	0	98.8	78 - 120				

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R396442 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

LCS Sample ID: **VLCSS1-112521** Units: **ug/Kg** Analysis Date: **25-Nov-2021 15:33**
Client ID: Run ID: **VOA5_396442** SeqNo: **6393152** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	48.31	5.0	50	0	96.6	70 - 130				
Ethylbenzene	47.18	5.0	50	0	94.4	70 - 123				
Isopropylbenzene	44.56	5.0	50	0	89.1	78 - 127				
m,p-Xylene	94.42	10	100	0	94.4	77 - 125				
Methyl acetate	36.48	5.0	50	0	73.0	69 - 123				
Methyl tert-butyl ether	47	5.0	50	0	94.0	70 - 128				
Methylcyclohexane	44.45	5.0	50	0	88.9	77 - 127				
Methylene chloride	46	10	50	0	92.0	71 - 125				
o-Xylene	46.46	5.0	50	0	92.9	78 - 122				
Styrene	42.62	5.0	50	0	85.2	80 - 123				
Tetrachloroethene	50.62	5.0	50	0	101	70 - 130				
Toluene	46.66	5.0	50	0	93.3	76 - 122				
trans-1,2-Dichloroethene	48.82	5.0	50	0	97.6	75 - 128				
trans-1,3-Dichloropropene	38.58	5.0	50	0	77.2	75 - 123				
Trichloroethene	47.27	5.0	50	0	94.5	78 - 125				
Trichlorofluoromethane	54.2	5.0	50	0	108	70 - 130				
Vinyl chloride	52.12	2.0	50	0	104	70 - 130				
Xylenes, Total	140.9	5.0	150	0	93.9	77 - 128				
Surr: 1,2-Dichloroethane-d4	*48.83*	*0*	*50*	*0*	*97.7*	*76 - 125*				
Surr: 4-Bromofluorobenzene	*46.42*	*0*	*50*	*0*	*92.8*	*80 - 120*				
Surr: Dibromofluoromethane	*49.48*	*0*	*50*	*0*	*99.0*	*80 - 119*				
Surr: Toluene-d8	*48.56*	*0*	*50*	*0*	*97.1*	*81 - 118*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R396442 (0) **Instrument:** VOA5 **Method:** VOLATILES BY SW8260C

MS Sample ID: **HS21111398-01MS** Units: **ug/Kg** Analysis Date: **25-Nov-2021 18:55**
Client ID: **Soil Pipe 06** Run ID: **VOA5_396442** SeqNo: **6393160** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	31.19	4.8	47.5	0	65.7	70 - 130				S
1,1,2,2-Tetrachloroethane	25.67	4.8	47.5	0	54.0	70 - 130				S
1,1,2-Trichlor-1,2,2-trifluoroethane	39.72	4.8	47.5	0	83.6	70 - 130				
1,1,2-Trichloroethane	30.7	4.8	47.5	0	64.6	70 - 130				S
1,1-Dichloroethane	33.05	4.8	47.5	0	69.6	70 - 130				S
1,1-Dichloroethene	42.64	4.8	47.5	0	89.8	70 - 130				
1,2,3-Trichlorobenzene	8.261	4.8	47.5	0	17.4	70 - 130				S
1,2,4-Trichlorobenzene	10.05	4.8	47.5	0	21.2	70 - 130				S
1,2-Dibromo-3-chloropropane	18.96	4.8	47.5	0	39.9	70 - 130				S
1,2-Dibromoethane	24.92	4.8	47.5	0	52.5	70 - 120				S
1,2-Dichlorobenzene	15.53	4.8	47.5	0	32.7	70 - 130				S
1,2-Dichloroethane	35.12	4.8	47.5	0	73.9	70 - 130				
1,2-Dichloropropane	33.01	4.8	47.5	0	69.5	70 - 130				S
1,3-Dichlorobenzene	16.7	4.8	47.5	0	35.2	70 - 130				S
1,4-Dichlorobenzene	16.13	4.8	47.5	0	34.0	70 - 130				S
2-Butanone	42.86	9.5	95	0	45.1	70 - 130				S
2-Hexanone	39.68	9.5	95	0	41.8	70 - 130				S
4-Methyl-2-pentanone	311	9.5	95	0	327	70 - 128				S
Acetone	590.6	19	95	0	622	70 - 130				SE
Benzene	34.08	4.8	47.5	0	71.8	70 - 130				
Bromochloromethane	33.8	4.8	47.5	0	71.2	70 - 130				
Bromodichloromethane	30.14	4.8	47.5	0	63.4	70 - 130				S
Bromoform	22.72	4.8	47.5	0	47.8	70 - 130				S
Bromomethane	30.98	9.5	47.5	0	65.2	70 - 130				S
Carbon disulfide	57.04	9.5	95	0	60.0	70 - 130				S
Carbon tetrachloride	33.66	4.8	47.5	0	70.9	70 - 130				
Chlorobenzene	25.16	4.8	47.5	0	53.0	70 - 130				S
Chloroethane	40.69	9.5	47.5	0	85.7	70 - 130				
Chloroform	36.98	4.8	47.5	0	77.8	70 - 130				
Chloromethane	39.7	9.5	47.5	0	83.6	70 - 130				
cis-1,2-Dichloroethene	33.85	4.8	47.5	0	71.3	70 - 130				
cis-1,3-Dichloropropene	16.31	4.8	47.5	0	34.3	70 - 130				S
Cyclohexane	32.42	4.8	47.5	0	68.3	74 - 126				S
Dibromochloromethane	33.04	4.8	47.5	0	69.6	70 - 130				S

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R396442 (0) **Instrument:** VOA5 **Method:** VOLATILES BY SW8260C

MS Sample ID: **HS21111398-01MS** Units: **ug/Kg** Analysis Date: **25-Nov-2021 18:55**
Client ID: **Soil Pipe 06** Run ID: **VOA5_396442** SeqNo: **6393160** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	42.65	4.8	47.5	0	89.8	70 - 130				
Ethylbenzene	28.76	4.8	47.5	0	60.5	70 - 130				S
Isopropylbenzene	25.23	4.8	47.5	0	53.1	70 - 130				S
m,p-Xylene	55.67	9.5	95	0	58.6	70 - 130				S
Methyl acetate	9.366	4.8	47.5	0	19.7	69 - 123				S
Methyl tert-butyl ether	38.55	4.8	47.5	0	81.2	70 - 130				
Methylcyclohexane	28.07	4.8	47.5	0	59.1	77 - 127				S
Methylene chloride	39.5	9.5	47.5	0	83.2	70 - 130				
o-Xylene	25.08	4.8	47.5	0	52.8	70 - 130				S
Styrene	19.82	4.8	47.5	0	41.7	70 - 130				S
Tetrachloroethene	33.85	4.8	47.5	0	71.3	70 - 130				
Toluene	32.05	4.8	47.5	0	67.5	70 - 130				S
trans-1,2-Dichloroethene	38.03	4.8	47.5	0	80.1	70 - 130				
trans-1,3-Dichloropropene	16.59	4.8	47.5	0	34.9	70 - 130				S
Trichloroethene	32.93	4.8	47.5	0	69.3	70 - 130				S
Trichlorofluoromethane	43.52	4.8	47.5	0	91.6	70 - 130				
Vinyl chloride	42.43	1.9	47.5	0	89.3	70 - 130				
Xylenes, Total	80.75	4.8	142.5	0	56.7	70 - 130				S
Surr: 1,2-Dichloroethane-d4	*49.43*	*0*	*47.5*	*0*	*104*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*44.22*	*0*	*47.5*	*0*	*93.1*	*70 - 130*				
Surr: Dibromofluoromethane	*47.15*	*0*	*47.5*	*0*	*99.3*	*70 - 130*				
Surr: Toluene-d8	*48.84*	*0*	*47.5*	*0*	*103*	*70 - 130*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R396442 (0) **Instrument:** VOA5 **Method:** VOLATILES BY SW8260C

MSD Sample ID: **HS21111398-01MSD** Units: **ug/Kg** Analysis Date: **25-Nov-2021 19:17**
Client ID: **Soil Pipe 06** Run ID: **VOA5_396442** SeqNo: **6393161** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	26.18	4.8	48	0	54.5	70 - 130	31.19	17.5	30	S
1,1,2,2-Tetrachloroethane	21.73	4.8	48	0	45.3	70 - 130	25.67	16.6	30	S
1,1,2-Trichlor-1,2,2-trifluoroethane	34.33	4.8	48	0	71.5	70 - 130	39.72	14.6	30	
1,1,2-Trichloroethane	26.03	4.8	48	0	54.2	70 - 130	30.7	16.5	30	S
1,1-Dichloroethane	36.6	4.8	48	0	76.2	70 - 130	33.05	10.2	30	
1,1-Dichloroethene	36.01	4.8	48	0	75.0	70 - 130	42.64	16.9	30	
1,2,3-Trichlorobenzene	8.31	4.8	48	0	17.3	70 - 130	8.261	0.591	30	S
1,2,4-Trichlorobenzene	10.32	4.8	48	0	21.5	70 - 130	10.05	2.65	30	S
1,2-Dibromo-3-chloropropane	15.83	4.8	48	0	33.0	70 - 130	18.96	18	30	S
1,2-Dibromoethane	19.23	4.8	48	0	40.1	70 - 120	24.92	25.8	30	S
1,2-Dichlorobenzene	14.46	4.8	48	0	30.1	70 - 130	15.53	7.1	30	S
1,2-Dichloroethane	30.06	4.8	48	0	62.6	70 - 130	35.12	15.5	30	S
1,2-Dichloropropane	28.02	4.8	48	0	58.4	70 - 130	33.01	16.4	30	S
1,3-Dichlorobenzene	16.21	4.8	48	0	33.8	70 - 130	16.7	3	30	S
1,4-Dichlorobenzene	14.95	4.8	48	0	31.1	70 - 130	16.13	7.63	30	S
2-Butanone	25.86	9.6	96	0	26.9	70 - 130	42.86	49.5	30	SR
2-Hexanone	33.67	9.6	96	0	35.1	70 - 130	39.68	16.4	30	S
4-Methyl-2-pentanone	355.2	9.6	96	0	370	70 - 128	311	13.3	30	S
Acetone	561.5	19	96	0	585	70 - 130	590.6	5.05	30	SE
Benzene	29.2	4.8	48	0	60.8	70 - 130	34.08	15.4	30	S
Bromochloromethane	29.19	4.8	48	0	60.8	70 - 130	33.8	14.7	30	S
Bromodichloromethane	25.95	4.8	48	0	54.1	70 - 130	30.14	14.9	30	S
Bromoform	19.35	4.8	48	0	40.3	70 - 130	22.72	16	30	S
Bromomethane	17.71	9.6	48	0	36.9	70 - 130	30.98	54.5	30	SR
Carbon disulfide	49.65	9.6	96	0	51.7	70 - 130	57.04	13.9	30	S
Carbon tetrachloride	30.25	4.8	48	0	63.0	70 - 130	33.66	10.7	30	S
Chlorobenzene	22.26	4.8	48	0	46.4	70 - 130	25.16	12.2	30	S
Chloroethane	36.62	9.6	48	0	76.3	70 - 130	40.69	10.5	30	
Chloroform	32.14	4.8	48	0	67.0	70 - 130	36.98	14	30	S
Chloromethane	32.68	9.6	48	0	68.1	70 - 130	39.7	19.4	30	S
cis-1,2-Dichloroethene	28.6	4.8	48	0	59.6	70 - 130	33.85	16.8	30	S
cis-1,3-Dichloropropene	12.81	4.8	48	0	26.7	70 - 130	16.31	24	30	S
Cyclohexane	28.64	4.8	48	0	59.7	74 - 126	32.42	12.4	30	S
Dibromochloromethane	29.11	4.8	48	0	60.6	70 - 130	33.04	12.7	30	S

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R396442 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MSD Sample ID: **HS21111398-01MSD** Units: **ug/Kg** Analysis Date: **25-Nov-2021 19:17**
Client ID: **Soil Pipe 06** Run ID: **VOA5_396442** SeqNo: **6393161** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	37.34	4.8	48	0	77.8	70 - 130	42.65	13.3	30	
Ethylbenzene	25.67	4.8	48	0	53.5	70 - 130	28.76	11.4	30	S
Isopropylbenzene	23.6	4.8	48	0	49.2	70 - 130	25.23	6.68	30	S
m,p-Xylene	48.79	9.6	96	0	50.8	70 - 130	55.67	13.2	30	S
Methyl acetate	5.319	4.8	48	0	11.1	69 - 123	9.366	55.1	30	SR
Methyl tert-butyl ether	34.65	4.8	48	0	72.2	70 - 130	38.55	10.7	30	
Methylcyclohexane	25.04	4.8	48	0	52.2	77 - 127	28.07	11.4	30	S
Methylene chloride	34.15	9.6	48	0	71.1	70 - 130	39.5	14.5	30	
o-Xylene	22.85	4.8	48	0	47.6	70 - 130	25.08	9.3	30	S
Styrene	17.27	4.8	48	0	36.0	70 - 130	19.82	13.7	30	S
Tetrachloroethene	29.57	4.8	48	0	61.6	70 - 130	33.85	13.5	30	S
Toluene	28.25	4.8	48	0	58.9	70 - 130	32.05	12.6	30	S
trans-1,2-Dichloroethene	31.91	4.8	48	0	66.5	70 - 130	38.03	17.5	30	S
trans-1,3-Dichloropropene	12.72	4.8	48	0	26.5	70 - 130	16.59	26.4	30	S
Trichloroethene	27.59	4.8	48	0	57.5	70 - 130	32.93	17.7	30	S
Trichlorofluoromethane	39.4	4.8	48	0	82.1	70 - 130	43.52	9.95	30	
Vinyl chloride	39.11	1.9	48	0	81.5	70 - 130	42.43	8.16	30	
Xylenes, Total	71.64	4.8	144	0	49.8	70 - 130	80.75	12	30	S
Surr: 1,2-Dichloroethane-d4	*48.5*	*0*	*48*	*0*	*101*	*70 - 126*	*49.43*	*1.9*	*30*	
Surr: 4-Bromofluorobenzene	*44.93*	*0*	*48*	*0*	*93.6*	*70 - 130*	*44.22*	*1.6*	*30*	
Surr: Dibromofluoromethane	*48.39*	*0*	*48*	*0*	*101*	*70 - 130*	*47.15*	*2.58*	*30*	
Surr: Toluene-d8	*51.26*	*0*	*48*	*0*	*107*	*70 - 130*	*48.84*	*4.83*	*30*	

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 172914 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **MBLK-172914** Units: **mg/Kg** Analysis Date: **30-Nov-2021 05:06**
Client ID: Run ID: **ICS-Integrion_396707** SeqNo: **6399836** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	U	1.00								

LCS Sample ID: **LCS-172914** Units: **mg/Kg** Analysis Date: **30-Nov-2021 05:14**
Client ID: Run ID: **ICS-Integrion_396707** SeqNo: **6399837** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	42.36	1.00	40	0	106	80 - 120				

MS Sample ID: **HS21111443-01MS** Units: **mg/Kg** Analysis Date: **30-Nov-2021 02:06**
Client ID: Run ID: **ICS-Integrion_396707** SeqNo: **6399825** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	22.73	0.987	19.75	1.338	108	80 - 120				

MSD Sample ID: **HS21111443-01MSD** Units: **mg/Kg** Analysis Date: **30-Nov-2021 02:13**
Client ID: Run ID: **ICS-Integrion_396707** SeqNo: **6399826** PrepDate: **24-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	22.96	0.993	19.86	1.338	109	80 - 120	22.73	0.999	20	

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173274 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173274** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:20**
Client ID: Run ID: **UV-2450_397125** SeqNo: **6409273** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	2.00								

LCS Sample ID: **LCS-173274** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:20**
Client ID: Run ID: **UV-2450_397125** SeqNo: **6409272** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	11.9	2.00	12.5	0	95.2	80 - 120				

MS Sample ID: **HS21111398-01MS** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:20**
Client ID: **Soil Pipe 06** Run ID: **UV-2450_397125** SeqNo: **6409270** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	11.97	2.00	12.47	0.2004	94.4	80 - 120				

MSD Sample ID: **HS21111398-01MSD** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:20**
Client ID: **Soil Pipe 06** Run ID: **UV-2450_397125** SeqNo: **6409271** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	12.06	1.99	12.46	0.2004	95.2	80 - 120	11.97	0.74	20	

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: 173396 (0) **Instrument: TOC_03** **Method: TOTAL ORGANIC CARBON BY SW9060A**

MBLK Sample ID: **MBLK-173396** Units: **wt%-dry** Analysis Date: **10-Dec-2021 12:00**
Client ID: Run ID: **TOC_03_397434** SeqNo: **6416678** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	0.1046	0.997								J

LCS Sample ID: **LCS-173396** Units: **wt%-dry** Analysis Date: **10-Dec-2021 12:00**
Client ID: Run ID: **TOC_03_397434** SeqNo: **6416676** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.492	0.947	3.786	0	92.2	80 - 120				

LCSD Sample ID: **LCSD-173396** Units: **wt%-dry** Analysis Date: **10-Dec-2021 12:00**
Client ID: Run ID: **TOC_03_397434** SeqNo: **6416677** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.383	0.940	3.759	0	90.0	80 - 120	3.492	3.18	20	

MS Sample ID: **HS21111398-01MS** Units: **wt%-dry** Analysis Date: **10-Dec-2021 12:00**
Client ID: **Soil Pipe 06** Run ID: **TOC_03_397434** SeqNo: **6416674** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	5.889	0.937	3.747	3.809	55.5	80 - 120				S

MSD Sample ID: **HS21111398-01MSD** Units: **wt%-dry** Analysis Date: **10-Dec-2021 12:00**
Client ID: **Soil Pipe 06** Run ID: **TOC_03_397434** SeqNo: **6416675** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	6.245	0.946	3.784	3.809	64.4	80 - 120	5.889	5.86	20	S

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R396871 (0) **Instrument: WetChem_HS** **Method: PH SOIL BY SW9045D**

DUP Sample ID: **HS21111627-01DUP** Units: **pH Units** Analysis Date: **02-Dec-2021 17:00**
Client ID: Run ID: **WetChem_HS_396871** SeqNo: **6403793** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	7.73	0.100					7.78	0.645	10	
Temp Deg C @pH	22.5	0					22.5	0	10	

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R397100 (0) **Instrument: WetChem_HS** **Method: SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT**

MBLK Sample ID: **MBLK-R397100** Units: **umhos/cm** Analysis Date: **07-Dec-2021 11:03**
Client ID: Run ID: **WetChem_HS_397100** SeqNo: **6408691** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Conductance, Soil Extract	U	5.00								

LCS Sample ID: **LCS-R397100** Units: **umhos/cm** Analysis Date: **07-Dec-2021 11:03**
Client ID: Run ID: **WetChem_HS_397100** SeqNo: **6408690** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Conductance, Soil Extract	1458	5.00	1413	0	103	85 - 115				

DUP Sample ID: **HS21111620-03DUP** Units: **umhos/cm** Analysis Date: **07-Dec-2021 11:03**
Client ID: Run ID: **WetChem_HS_397100** SeqNo: **6408692** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Conductance, Soil Extract	119	50.0					118.6	0.337	20	

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111398

QC BATCH REPORT

Batch ID: R397230 (0) **Instrument:** Balance1 **Method:** TOTAL SOLIDS BY SM2540G-2011

DUP Sample ID: **HS21111398-01DUP** Units: **wt%** Analysis Date: **08-Dec-2021 11:30**
Client ID: **Soil Pipe 06** Run ID: **Balance1_397230** SeqNo: **6411988** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Solids	61.91	0.0100					60.39	2.49	20	

The following samples were analyzed in this batch: HS21111398-01 HS21111398-02 HS21111398-03 HS21111398-04 HS21111398-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: **HS21111398**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
Date	

RIGHT SOLUTIONS | RIGHT PARTNER

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Dept of Defense	PJLA L20-507-R2	22-Dec-2021
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS21111398 **Date/Time Received:** **22-Nov-2021 15:55**

Client Name: ERM Annapolis **Received by:** **Paresh M. Giga**

Completed By: */S/ Paresh M. Giga* (eSignature) 23-Nov-2021 12:29 (Date/Time) **Reviewed by:** */S/ Corey Grandits* (eSignature)

Matrices: **Regulated Soil** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☑	Not Present ☐
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	18.7C U/C	IR31	
Cooler(s)/Kit(s):	47550		
Date/Time sample(s) sent to storage:	11/23/2021 12:55		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes: PPQ Label No. 61 received. No Soil Permit. Proceed per CG.
Times differ : 06 - COC-8:28 Label-08:35.
07 - COC-1:26 Label-13:30. 08 COC-7:52 Label-8:00 & 08:01.
09 - COC-2:47 Label-14:57 & 14:58.
Metals code logged in per project - CG

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

HS21111398

ERM

Gas to Energy Environmental Impact Assessment S

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	Gas to Energy Environmental Impact Assesment Study
Work Order		Project Number	0590231
Company Name	ERM	Bill To Company	ERM
Send Report To	Herbert Pirela	Invoice Attn.	AP
Address	190 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401
Phone	(410) 972-4124	Phone	(410) 972-4124
Fax		Fax	
e-Mail Address	herbet.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

A	8270SIM_Soils (PAHs)
B	9056_Soil (Nitrate)
C	COND_Soil Mod (Conductivity)
D	ICP_Soil_Low (6020/7471 Metals-19)
E	P_Tsoil (Phosphorous)
F	PCB_Soil_Total (8082 PCBs)
G	pH_Soil (9045) & TS_S (total Solids)
H	TOC_Soil (Total Organic Carbon)
I	Volatile Organic Compunds (US EPA 8260)
J	Herbicides (US EPA 8151)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Soil Pipe 06	12/11/21	8:28 AM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
2	Soil Pipe 07	12/11/21	1:26 PM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
3	Soil Pipe 08	13/11/2021	7:52 AM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
4	Soil Pipe 09	12/11/21	2:49 PM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
5	Soil Pipe 10	13/11/2021	1:54 PM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Delshah Hamid Delshah Hamid
Lalita Gopaul

Shipment Method:

Required Turnaround Time: ☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other

Results Due Date:

Relinquished by: Lalita Gopaul	Date: 16/11/2021	Time: 10:08 am	Received by:	Notes:
Relinquished by: D+L (GLASS)	Date:	Time:	Received by (Laboratory): 11/22/2021 15:55	Cooler Temp. 18.7°
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

QC Package: (Check Box Below)

x	Level II: Standard QC	TRRP-Checklist
	Level III: Std QC + Raw Data	TRRP Level IV
	Level IV: SW846 CLP-Like	
	Other:	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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47550

CUSTODY SEAL

Date: 16th Nov 2021 Time: [illegible]
Name: Leila Gopaul
Company: EPA Consultants Inc

Seal Broken By: GM
Date: 11/22/21

47550 NOV 22 2021

ALS
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47550

CUSTODY SEAL

Date: 16th Nov 2021 Time: 10:45 AM
Name: Leila Gopaul
Company: EPA Consultants Inc

Seal Broken By: GM
Date: 11/22/21

LBS 026 (6/11) OMN

EXPRESS WORLDWIDE WPX DHL

From: [redacted] SUPERMARINE
CHRISTCHURCH
[redacted]
KINGSTON
GEORGETOWN
Guyana (British)

Origin: GEO

To: ALS ABORATORY
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210

47550

77094 HOUSTON Texas
United States of America

US-IAH-HOU

C [redacted] Day Time

Ref: 954631200

Piece/Actual Weight: 48.0/193.0 lbs Piece: 3/4

Contents: WATER SAMPLES

WAYBILL 79 2182 9875

(2L)US77099-48000001

(J) JD01 4600 0091 7280 4059

THC

Thursday, December 16, 2021

Corey Grandits
ALS Environmental
10450 Stancliff Rd, Suite 210
Houston, TX 77099

Re: ALS Workorder: 2111607
Project Name:
Project Number: HS21111398

Dear Mr. Grandits:

Five soil samples were received from ALS Environmental, on 11/24/2021. The samples were scheduled for the following analysis:

Herbicides	pages 2-14

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Janice Winn-Shilling
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.

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2111607

Herbicides:
The sample was analyzed using GC/ECD (electron capture detectors) according to the current revision of SOP 434 based on SW-846 Method 8151A.

All laboratory control sample and laboratory control sample duplicate criteria were met with the following exception:

Spiked Compound	QC Sample	Direction
Dinoseb	LCS/LCSD	High

Because the sensitivity of the analytical system increased and no target compounds were present in the samples, no further action was taken. All reporting limits are supported.

All remaining acceptance criteria were met.

ADDRESS 225 Commerce Drive, Fort Collins Colorado 80524 USA | PHONE +1 970 490 1511 | FAX +1 970 490 1522
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211607
JME

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Houston, TX 77099
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www.alsglobal.com

Subcontract Chain of Custody

SAMPLING STATE: **Maryland**

COC ID: **17451**

SUBCONTRACT TO:

ALS Environmental, Fort Collins
225 Commerce Drive
Fort Collins, CO 80524

Phone: +1 970 490 1511

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	Corey Grandits
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	Corey.Grandits@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS21111398
TSR:	Houston House Acct

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1	**1. HS21111398-01**	**Soil Pipe 06**	**Soil**	**12 Nov 2021 08:28**
	8151 Herbicide Full List			08 Dec 2021
2	**2. HS21111398-02**	**Soil Pipe 07**	**Soil**	**12 Nov 2021 13:26**
	8151 Herbicide Full List			08 Dec 2021
3	**3. HS21111398-03**	**Soil Pipe 08**	**Soil**	**13 Nov 2021 07:52**
	8151 Herbicide Full List			08 Dec 2021
4	**4. HS21111398-04**	**Soil Pipe 09**	**Soil**	**12 Nov 2021 14:49**
	8151 Herbicide Full List			08 Dec 2021
5	**5. HS21111398-05**	**Soil Pipe 10**	**Soil**	**13 Nov 2021 13:54**
	8151 Herbicide Full List			08 Dec 2021

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.
Regulated Foreign Soils. PERMIT ATTACHED

QC Level: STD (Laboratory Standard QC: method blank and LCS required)

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ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS HOUSTON Workorder No: 2111607

Project Manager: JWS Initials: CXT Date: 11/24/2021

		N/A	YES	NO
1.	Are airbills / shipping documents present and/or removable?		x	
	Tracking number: 5300 5225 3698			
2.	Are custody seals on **shipping** containers intact?		x	
3.	Are custody seals on **sample** containers intact?	x		
4.	Is there a COC (chain-of-custody) present?		x	
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		x	
6.	Are short-hold samples present?		x	
7.	Are all samples within holding times for the requested analyses?		x	
8.	Were all sample containers received intact? (not broken or leaking)		x	
9.	Is there sufficient sample for the requested analyses?		x	
10.	Are samples in proper containers for requested analyses? (form 250, *Sample Handling Guidelines*)		x	
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	x		
12.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	x		
13.	Were the samples shipped on ice?		x	
14.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #5	RAD ONLY	x	

Cooler #:	1						
Temperature (°C):	1.8						
# of custody seals on cooler:	2						
External µR/hr reading:	10						
Background µR/hr reading:	10						

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? Yes

*** Please provide details here for NO responses to boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.**

Were unpreserved bottles pH checked? NA All client bottle ID's vs ALS lab ID's double-checked by: ct

If applicable, was the client contacted? **NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: Julie Ellzey

Form 201r29.xls
(10/15/2019)

*IR Gun #3, VWR SN 170647571
*IR Gun #5, VWR SN 192272629

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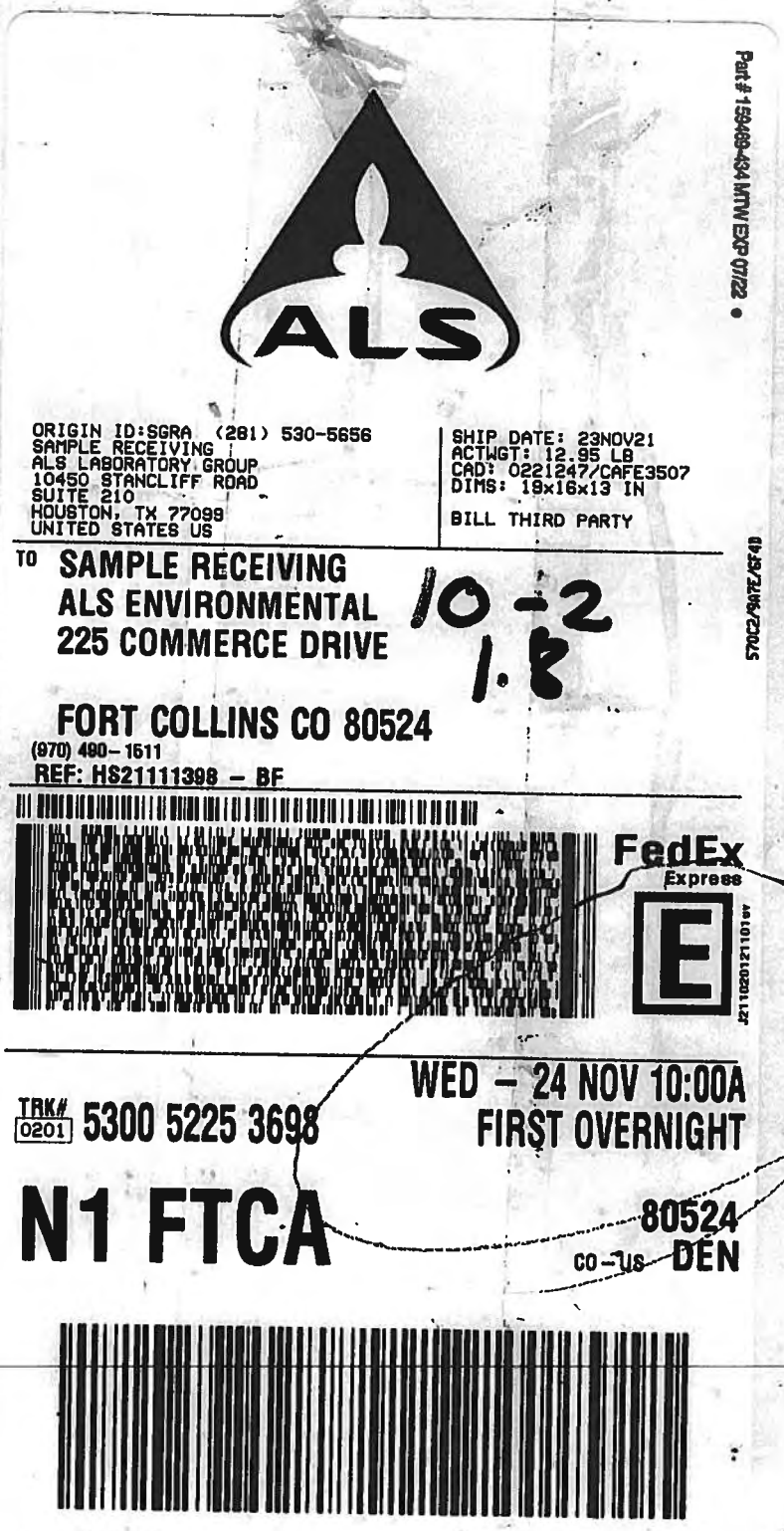

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Client:	ALS Environmental	**Date:**	*16-Dec-21*
Project:	HS21111398	**Work Order:**	2111607
Sample ID:	Soil Pipe 06	**Lab ID:**	2111607-1
Legal Location:		**Matrix:**	SOIL
Collection Date:	11/12/2021 08:28	**Percent Moisture:**	26.4

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	MDL	Date Analyzed
CHLORINATED HERBICIDES BY GC/ECD			**SW8151**		Prep Date: **12/13/2021**		PrepBy: **CPC**
DALAPON	ND		650	UG/KG	1	300	12/14/2021 15:26
DICAMBA	ND		31	UG/KG	1	16	12/14/2021 15:26
MCPP	ND		33000	UG/KG	1	14000	12/14/2021 15:26
MCPA	ND		33000	UG/KG	1	18000	12/14/2021 15:26
DICHLOROPROP	ND		250	UG/KG	1	99	12/14/2021 15:26
2,4-D	ND		440	UG/KG	1	69	12/14/2021 15:26
SILVEX	ND		15	UG/KG	1	8.4	12/14/2021 15:26
2,4,5-T	ND		25	UG/KG	1	9.4	12/14/2021 15:26
2,4-DB	ND		250	UG/KG	1	100	12/14/2021 15:26
DINOSEB	ND		150	UG/KG	1	69	12/14/2021 15:26
Surr: 2,4-DICHLOROPHENYLACETIC ACID	*139*		*10-160*	*%REC*	1		12/14/2021 15:26

Client:	ALS Environmental	**Date:**	*16-Dec-21*
Project:	HS21111398	**Work Order:**	2111607
Sample ID:	Soil Pipe 07	**Lab ID:**	2111607-2
Legal Location:		**Matrix:**	SOIL
Collection Date:	11/12/2021 13:26	**Percent Moisture:**	29.6

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	MDL	Date Analyzed
CHLORINATED HERBICIDES BY GC/ECD			**SW8151**		Prep Date: **12/13/2021**		PrepBy: **CPC**
DALAPON	ND		650	UG/KG	1	300	12/14/2021 15:49
DICAMBA	ND		30	UG/KG	1	16	12/14/2021 15:49
MCPP	ND		33000	UG/KG	1	14000	12/14/2021 15:49
MCPA	ND		33000	UG/KG	1	18000	12/14/2021 15:49
DICHLOROPROP	ND		250	UG/KG	1	99	12/14/2021 15:49
2,4-D	ND		430	UG/KG	1	69	12/14/2021 15:49
SILVEX	ND		15	UG/KG	1	8.4	12/14/2021 15:49
2,4,5-T	ND		25	UG/KG	1	9.4	12/14/2021 15:49
2,4-DB	ND		250	UG/KG	1	100	12/14/2021 15:49
DINOSEB	ND		150	UG/KG	1	69	12/14/2021 15:49
Surr: 2,4-DICHLOROPHENYLACETIC ACID	*113*		*10-160*	*%REC*	1		12/14/2021 15:49

Client:	ALS Environmental	**Date:**	*16-Dec-21*
Project:	HS21111398	**Work Order:**	2111607
Sample ID:	Soil Pipe 08	**Lab ID:**	2111607-3
Legal Location:		**Matrix:**	SOIL
Collection Date:	11/12/2021 07:52	**Percent Moisture:**	32.3

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	MDL	Date Analyzed
CHLORINATED HERBICIDES BY GC/ECD			**SW8151**		Prep Date: **12/13/2021**		PrepBy: **CPC**
DALAPON	ND		840	UG/KG	1	390	12/14/2021 16:12
DICAMBA	ND		39	UG/KG	1	20	12/14/2021 16:12
MCPP	ND		42000	UG/KG	1	18000	12/14/2021 16:12
MCPA	ND		42000	UG/KG	1	23000	12/14/2021 16:12
DICHLOROPROP	ND		320	UG/KG	1	130	12/14/2021 16:12
2,4-D	ND		560	UG/KG	1	89	12/14/2021 16:12
SILVEX	ND		20	UG/KG	1	11	12/14/2021 16:12
2,4,5-T	ND		32	UG/KG	1	12	12/14/2021 16:12
2,4-DB	ND		320	UG/KG	1	130	12/14/2021 16:12
DINOSEB	ND		200	UG/KG	1	89	12/14/2021 16:12
Surr: 2,4-DICHLOROPHENYLACETIC ACID	*66*		*10-160*	*%REC*	1		12/14/2021 16:12

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Client:	ALS Environmental	**Date:**	*16-Dec-21*
Project:	HS21111398	**Work Order:**	2111607
Sample ID:	Soil Pipe 09	**Lab ID:**	2111607-4
Legal Location:		**Matrix:**	SOIL
Collection Date:	11/12/2021 14:49	**Percent Moisture:**	23.7

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	MDL	Date Analyzed
CHLORINATED HERBICIDES BY GC/ECD			**SW8151**		Prep Date: **12/13/2021**		PrepBy: **CPC**
DALAPON	ND		750	UG/KG	1	350	12/14/2021 16:36
DICAMBA	ND		35	UG/KG	1	18	12/14/2021 16:36
MCPP	ND		38000	UG/KG	1	17000	12/14/2021 16:36
MCPA	ND		38000	UG/KG	1	21000	12/14/2021 16:36
DICHLOROPROP	ND		290	UG/KG	1	110	12/14/2021 16:36
2,4-D	ND		500	UG/KG	1	80	12/14/2021 16:36
SILVEX	ND		18	UG/KG	1	9.7	12/14/2021 16:36
2,4,5-T	ND		29	UG/KG	1	11	12/14/2021 16:36
2,4-DB	ND		290	UG/KG	1	120	12/14/2021 16:36
DINOSEB	ND		180	UG/KG	1	80	12/14/2021 16:36
Surr: 2,4-DICHLOROPHENYLACETIC ACID	*123*		*10-160*	*%REC*	1		12/14/2021 16:36

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Client:	ALS Environmental	**Date:**	*16-Dec-21*
Project:	HS21111398	**Work Order:**	2111607
Sample ID:	Soil Pipe 10	**Lab ID:**	2111607-5
Legal Location:		**Matrix:**	SOIL
Collection Date:	11/12/2021 13:54	**Percent Moisture:**	13.3

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	MDL	Date Analyzed
CHLORINATED HERBICIDES BY GC/ECD			**SW8151**		Prep Date: **12/13/2021**		PrepBy: **CPC**
DALAPON	ND		620	UG/KG	1	290	12/14/2021 16:59
DICAMBA	ND		29	UG/KG	1	15	12/14/2021 16:59
MCPP	ND		31000	UG/KG	1	14000	12/14/2021 16:59
MCPA	ND		31000	UG/KG	1	17000	12/14/2021 16:59
DICHLOROPROP	ND		240	UG/KG	1	94	12/14/2021 16:59
2,4-D	ND		410	UG/KG	1	66	12/14/2021 16:59
SILVEX	ND		14	UG/KG	1	8	12/14/2021 16:59
2,4,5-T	ND		24	UG/KG	1	8.9	12/14/2021 16:59
2,4-DB	ND		240	UG/KG	1	98	12/14/2021 16:59
DINOSEB	ND		140	UG/KG	1	66	12/14/2021 16:59
Surr: 2,4-DICHLOROPHENYLACETIC ACID	*94*		*10-160*	*%REC*	1		12/14/2021 16:59

Client:	ALS Environmental	**Date:**	*16-Dec-21*
Project:	HS21111398	**Work Order:**	2111607
Sample ID:	Soil Pipe 10	**Lab ID:**	2111607-5
Legal Location:		**Matrix:**	SOIL
Collection Date:	11/12/2021 13:54	**Percent Moisture:**	13.3

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	MDL	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC
U or ND - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
U or ND - Indicates that the compound was analyzed for but not detected.
E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
M - Duplicate injection precision was not met.
N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
* - Duplicate analysis (relative percent difference) not within control limits.
S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.
B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
E - Analyte concentration exceeds the upper level of the calibration range.
J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
A - A tentatively identified compound is a suspected aldol-condensation product.
X - The analyte was diluted below an accurate quantitation level.
* - The spike recovery is equal to or outside the control criteria used.
+ - The relative percent difference (RPD) equals or exceeds the control criteria.
G - A pattern resembling gasoline was detected in this sample.
D - A pattern resembling diesel was detected in this sample.
M - A pattern resembling motor oil was detected in this sample.
C - A pattern resembling crude oil was detected in this sample.
4 - A pattern resembling JP-4 was detected in this sample.
5 - A pattern resembling JP-5 was detected in this sample.
H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

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Batch ID: **EX211213-1-1** Instrument ID **Herb-1** Method: **SW8151**

LCS Sample ID: **EX211213-1** Units: **UG/KG** Analysis Date: **12/14/2021 14:39**

Client ID: Run ID: **PT211214-10** Prep Date: **12/13/2021** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
DALAPON	420	132	500		84	1-120				130	
DICAMBA	19.4	6.16	20		97	44-137				50	
MCPP	19100	6600	20000		96	46-120				50	
MCPA	19200	6600	20000		96	48-120				50	
DICHLOROPROP	238	51	200		119	52-120				50	
2,4-D	203	88	200		102	42-125				50	
SILVEX	20.5	3.08	20		102	51-121				50	
2,4,5-T	20.6	5.1	20		103	50-120				50	
2,4-DB	221	51	200		110	55-122				50	
DINOSEB	146	30.8	100		146	1-120				170	*
Surr: 2,4-DICHLOROPHENYLACETIC ACID	174		160		109	10-160					

LCSD Sample ID: **EX211213-1** Units: **UG/KG** Analysis Date: **12/14/2021 15:02**

Client ID: Run ID: **PT211214-10** Prep Date: **12/13/2021** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
DALAPON	426	132	500		85	1-120		420	2	130	
DICAMBA	19.4	6.16	20		97	44-137		19.4	0	50	
MCPP	19100	6600	20000		96	46-120		19100	0	50	
MCPA	18900	6600	20000		95	48-120		19200	1	50	
DICHLOROPROP	239	51	200		119	52-120		238	0	50	
2,4-D	204	88	200		102	42-125		203	0	50	
SILVEX	20.5	3.08	20		103	51-121		20.5	0	50	
2,4,5-T	19.8	5.1	20		99	50-120		20.6	4	50	
2,4-DB	223	51	200		111	55-122		221	1	50	
DINOSEB	147	30.8	100		147	1-120		146	1	170	*
Surr: 2,4-DICHLOROPHENYLACETIC ACID	170		160		106	10-160			3		

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ALS Environmental
Work Order: 2111607
Project: HS21111398

QC BATCH REPORT

Batch ID: **EX211213-1-1** Instrument ID **Herb-1** Method: **SW8151**

MB Sample ID: **EX211213-1** Units: **UG/KG** Analysis Date: **12/14/2021 14:16**

Client ID: Run ID: **PT211214-10** Prep Date: **12/13/2021** DF: **1**

Analyte	Result	ReportLimit	MDL			Qual
DALAPON	ND	130	61			
DICAMBA	ND	6.2	3.2			
MCPP	ND	6600	2900			
MCPA	ND	6600	3600			
DICHLOROPROP	ND	51	20			
2,4-D	ND	88	14			
SILVEX	ND	3.1	1.7			
2,4,5-T	ND	5.1	1.9			
2,4-DB	ND	51	21			
DINOSEB	ND	31	14			
Surr: 2,4-DICHLOROPHENYLACETIC ACID	150			94	10-160	

The following samples were analyzed in this batch:

2111607-1	2111607-2	2111607-3
2111607-4	2111607-5	

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111620

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21111620-01	Soil Pipe 04	Soil		17-Nov-2021 08:30	30-Nov-2021 12:45	☐
HS21111620-02	Soil Pipe 05	Soil		17-Nov-2021 12:23	30-Nov-2021 12:45	☐
HS21111620-03	Soil Pipe 02	Soil		20-Nov-2021 09:36	30-Nov-2021 12:45	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111620

Work Order Comments

• The analysis for Herbicides was subcontracted to ALS Fort Collins, CO. Final report attached.

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

ECD Organics by Method SW8082

Batch ID: 173020

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

GCMS Semivolatiles by Method SW8270

Batch ID: 173063

Sample ID: Soil Pipe 04 (HS21111620-01MS)

• The recovery of the Matrix Spike (MS) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The recovery of the MS may be due to sample matrix interference.

Sample ID: Soil Pipe 04 (HS21111620-01MSD)

• The recovery of the Matrix Spike Duplicate (MSD) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The failed recovery of the MSD may be due to sample matrix interference.

• The RPD between the MS and MSD was outside of the control limit.

GCMS Volatiles by Method SW8260

Batch ID: R396613

Sample ID: HS21111550-02MS

• MS and MSD are for an unrelated sample

Metals by Method SW6020A

Batch ID: 173230

Sample ID: HS21120188-19MS

• MS and MSD are for an unrelated sample

Metals by Method SW7471B

Batch ID: 173035

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9045D

Batch ID: R396871

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **CASE NARRATIVE**
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111620

WetChemistry by Method SW9050M

Batch ID: R397100

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540G

Batch ID: R397230

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9060

Batch ID: 173396

Sample ID: HS21111398-01MS

• MS and MSD are for an unrelated sample

WetChemistry by Method E365.3

Batch ID: 173274

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9056

Batch ID: 173185

Sample ID: HS21120046-08MS

• MS and MSD are for an unrelated sample (Nitrogen, Nitrate (As N))

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 04 Lab ID:HS21111620-01
Collection Date: 17-Nov-2021 08:30 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C	**Method:SW8260**						Analyst: WLR
1,1,1-Trichloroethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
1,1,2,2-Tetrachloroethane	U		0.79	5.0	ug/Kg	1	30-Nov-2021 17:50
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.69	5.0	ug/Kg	1	30-Nov-2021 17:50
1,1,2-Trichloroethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
1,1-Dichloroethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
1,1-Dichloroethene	U		0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
1,2,3-Trichlorobenzene	U		0.99	5.0	ug/Kg	1	30-Nov-2021 17:50
1,2,4-Trichlorobenzene	U		0.99	5.0	ug/Kg	1	30-Nov-2021 17:50
1,2-Dibromo-3-chloropropane	U		0.99	5.0	ug/Kg	1	30-Nov-2021 17:50
1,2-Dibromoethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
1,2-Dichlorobenzene	U		0.99	5.0	ug/Kg	1	30-Nov-2021 17:50
1,2-Dichloroethane	U		0.59	5.0	ug/Kg	1	30-Nov-2021 17:50
1,2-Dichloropropane	U		0.79	5.0	ug/Kg	1	30-Nov-2021 17:50
1,3-Dichlorobenzene	U		0.99	5.0	ug/Kg	1	30-Nov-2021 17:50
1,4-Dichlorobenzene	U		0.99	5.0	ug/Kg	1	30-Nov-2021 17:50
2-Butanone	U		1.3	9.9	ug/Kg	1	30-Nov-2021 17:50
2-Hexanone	U		1.4	9.9	ug/Kg	1	30-Nov-2021 17:50
4-Methyl-2-pentanone	U		2.0	9.9	ug/Kg	1	30-Nov-2021 17:50
Acetone	U		2.0	20	ug/Kg	1	30-Nov-2021 17:50
Benzene	U		0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
Bromochloromethane	U		0.89	5.0	ug/Kg	1	30-Nov-2021 17:50
Bromodichloromethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
Bromoform	U		0.59	5.0	ug/Kg	1	30-Nov-2021 17:50
Bromomethane	U		0.99	9.9	ug/Kg	1	30-Nov-2021 17:50
Carbon disulfide	U		0.59	9.9	ug/Kg	1	30-Nov-2021 17:50
Carbon tetrachloride	U		0.59	5.0	ug/Kg	1	30-Nov-2021 17:50
Chlorobenzene	U		0.59	5.0	ug/Kg	1	30-Nov-2021 17:50
Chloroethane	U		0.79	9.9	ug/Kg	1	30-Nov-2021 17:50
Chloroform	U		0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
Chloromethane	U		0.50	9.9	ug/Kg	1	30-Nov-2021 17:50
cis-1,2-Dichloroethene	U		0.79	5.0	ug/Kg	1	30-Nov-2021 17:50
cis-1,3-Dichloropropene	U		0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
Cyclohexane	U		0.99	5.0	ug/Kg	1	30-Nov-2021 17:50
Dibromochloromethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
Dichlorodifluoromethane	U		0.69	5.0	ug/Kg	1	30-Nov-2021 17:50
Ethylbenzene	U		0.69	5.0	ug/Kg	1	30-Nov-2021 17:50
Isopropylbenzene	U		0.89	5.0	ug/Kg	1	30-Nov-2021 17:50
m,p-Xylene	U		1.6	9.9	ug/Kg	1	30-Nov-2021 17:50
Methyl acetate	U		0.69	5.0	ug/Kg	1	30-Nov-2021 17:50

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 04 Lab ID:HS21111620-01
Collection Date: 17-Nov-2021 08:30 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
Methyl tert-butyl ether		U	0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
Methylcyclohexane		U	0.99	5.0	ug/Kg	1	30-Nov-2021 17:50
Methylene chloride		U	0.99	9.9	ug/Kg	1	30-Nov-2021 17:50
o-Xylene		U	0.99	5.0	ug/Kg	1	30-Nov-2021 17:50
Styrene		U	0.69	5.0	ug/Kg	1	30-Nov-2021 17:50
Tetrachloroethene		U	0.69	5.0	ug/Kg	1	30-Nov-2021 17:50
Toluene		U	0.59	5.0	ug/Kg	1	30-Nov-2021 17:50
trans-1,2-Dichloroethene		U	0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
trans-1,3-Dichloropropene		U	0.59	5.0	ug/Kg	1	30-Nov-2021 17:50
Trichloroethene		U	0.59	5.0	ug/Kg	1	30-Nov-2021 17:50
Trichlorofluoromethane		U	0.50	5.0	ug/Kg	1	30-Nov-2021 17:50
Vinyl chloride		U	0.79	2.0	ug/Kg	1	30-Nov-2021 17:50
Xylenes, Total		U	0.99	5.0	ug/Kg	1	30-Nov-2021 17:50
Surr: 1,2-Dichloroethane-d4	*92.1*			*70-126*	*%REC*	*1*	*30-Nov-2021 17:50*
Surr: 4-Bromofluorobenzene	*94.1*			*70-130*	*%REC*	*1*	*30-Nov-2021 17:50*
Surr: Dibromofluoromethane	*85.8*			*70-130*	*%REC*	*1*	*30-Nov-2021 17:50*
Surr: Toluene-d8	*104*			*70-130*	*%REC*	*1*	*30-Nov-2021 17:50*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 04 Lab ID:HS21111620-01
Collection Date: 17-Nov-2021 08:30 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D		**Method:SW8270**			Prep:SW3541 / 01-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U		1.5	3.3	ug/Kg	1	09-Dec-2021 15:47
2-Methylnaphthalene	U		0.49	3.3	ug/Kg	1	09-Dec-2021 15:47
Acenaphthene	U		0.49	3.3	ug/Kg	1	09-Dec-2021 15:47
Acenaphthylene	U		0.99	3.3	ug/Kg	1	09-Dec-2021 15:47
Anthracene	**2.4**	J	**0.49**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Benz(a)anthracene	**32**		**1.6**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Benzo(a)pyrene	**31**		**0.99**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Benzo(b)fluoranthene	**37**		**1.2**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Benzo(g,h,i)perylene	**17**		**0.69**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Benzo(k)fluoranthene	**14**		**0.89**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Chrysene	**33**		**0.79**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Dibenz(a,h)anthracene	**4.4**		**1.6**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Fluoranthene	**31**		**1.1**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Fluorene	U		1.1	3.3	ug/Kg	1	09-Dec-2021 15:47
Indeno(1,2,3-cd)pyrene	**17**		**0.79**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Isophorone	U		0.79	6.5	ug/Kg	1	09-Dec-2021 15:47
Naphthalene	U		0.59	3.3	ug/Kg	1	09-Dec-2021 15:47
Phenanthrene	**5.1**		**1.5**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Pyrene	**26**		**0.59**	**3.3**	**ug/Kg**	1	09-Dec-2021 15:47
Surr: 2-Fluorobiphenyl	*52.5*			*43-125*	*%REC*	*1*	*09-Dec-2021 15:47*
Surr: 4-Terphenyl-d14	*64.3*			*32-125*	*%REC*	*1*	*09-Dec-2021 15:47*
Surr: Nitrobenzene-d5	*56.8*			*37-125*	*%REC*	*1*	*09-Dec-2021 15:47*
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3541 / 30-Nov-2021		Analyst: JBA
Aroclor 1016	U		0.42	1.7	ug/Kg	1	06-Dec-2021 07:42
Aroclor 1221	U		0.56	1.7	ug/Kg	1	06-Dec-2021 07:42
Aroclor 1232	U		0.45	1.7	ug/Kg	1	06-Dec-2021 07:42
Aroclor 1242	U		0.59	1.7	ug/Kg	1	06-Dec-2021 07:42
Aroclor 1248	U		0.59	1.7	ug/Kg	1	06-Dec-2021 07:42
Aroclor 1254	U		0.47	1.7	ug/Kg	1	06-Dec-2021 07:42
Aroclor 1260	U		0.24	1.7	ug/Kg	1	06-Dec-2021 07:42
Surr: Decachlorobiphenyl	*73.6*			*54-143*	*%REC*	*1*	*06-Dec-2021 07:42*
Surr: Tetrachloro-m-xylene	*69.5*			*50-140*	*%REC*	*1*	*06-Dec-2021 07:42*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 04 Lab ID:HS21111620-01
Collection Date: 17-Nov-2021 08:30 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 07-Dec-2021		Analyst: JC
Antimony	U		0.0617	0.475	mg/Kg	1	07-Dec-2021 14:40
Arsenic	**2.82**		**0.0664**	**0.475**	**mg/Kg**	1	07-Dec-2021 14:40
Beryllium	**0.460**	J	**0.0199**	**0.475**	**mg/Kg**	1	07-Dec-2021 14:40
Cadmium	**0.0286**	J	**0.0256**	**0.475**	**mg/Kg**	1	07-Dec-2021 14:40
Chromium	**14.3**		**0.0218**	**0.475**	**mg/Kg**	1	07-Dec-2021 14:40
Copper	**7.68**		**0.0361**	**0.190**	**mg/Kg**	1	07-Dec-2021 14:40
Iron	**9,410**		**1.74**	**47.5**	**mg/Kg**	1	07-Dec-2021 14:40
Lead	**11.3**		**0.0123**	**0.475**	**mg/Kg**	1	07-Dec-2021 14:40
Manganese	**44.9**		**0.0408**	**0.475**	**mg/Kg**	1	07-Dec-2021 14:40
Nickel	**7.02**		**0.0456**	**0.475**	**mg/Kg**	1	07-Dec-2021 14:40
Potassium	**953**		**6.38**	**47.5**	**mg/Kg**	1	07-Dec-2021 14:40
Selenium	**0.416**	J	**0.0864**	**0.475**	**mg/Kg**	1	07-Dec-2021 14:40
Silver	**0.0166**	J	**0.0142**	**0.475**	**mg/Kg**	1	07-Dec-2021 14:40
Thallium	U		0.212	0.475	mg/Kg	1	07-Dec-2021 14:40
Zinc	**30.5**		**0.161**	**0.475**	**mg/Kg**	1	07-Dec-2021 14:40
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 06-Dec-2021		Analyst: MSC
Mercury	**33.5**		**0.486**	**3.43**	**ug/Kg**	1	06-Dec-2021 14:27
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**98.0**		**4.99**	**9.98**	**mg/Kg**	5	07-Dec-2021 14:20
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**61.8**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
PH SOIL BY SW9045D		**Method:SW9045D**					Analyst: SH
pH	**4.37**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 17:00
Temp Deg C @pH	**22.8**	H	**0**	**0**	**°C**	1	02-Dec-2021 17:00
SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT		**Method:SW9050M**					Analyst: MZD
Conductance, Soil Extract	**621**		**50.0**	**50.0**	**umhos/cm**	10	07-Dec-2021 11:03
ANIONS BY SW9056A		**Method:SW9056**			Prep:SW9056 / 03-Dec-2021		Analyst: YP
Nitrogen, Nitrate (As N)	**0.796**	J	**0.298**	**0.994**	**mg/Kg**	1	04-Dec-2021 18:25
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 10-Dec-2021		Analyst: JAC
Total Organic Carbon	**1.52**		**0.0591**	**0.985**	**wt%-dry**	1	10-Dec-2021 12:00
SUBCONTRACT ANALYSIS - SPECIALIZED HERBICIDES		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0			1	20-Dec-2021 17:52

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 05 Lab ID:HS21111620-02
Collection Date: 17-Nov-2021 12:23 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C	**Method:SW8260**						Analyst: WLR
1,1,1-Trichloroethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
1,1,2,2-Tetrachloroethane	U		0.80	5.0	ug/Kg	1	30-Nov-2021 18:13
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.70	5.0	ug/Kg	1	30-Nov-2021 18:13
1,1,2-Trichloroethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
1,1-Dichloroethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
1,1-Dichloroethene	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
1,2,3-Trichlorobenzene	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:13
1,2,4-Trichlorobenzene	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:13
1,2-Dibromo-3-chloropropane	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:13
1,2-Dibromoethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
1,2-Dichlorobenzene	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:13
1,2-Dichloroethane	U		0.60	5.0	ug/Kg	1	30-Nov-2021 18:13
1,2-Dichloropropane	U		0.80	5.0	ug/Kg	1	30-Nov-2021 18:13
1,3-Dichlorobenzene	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:13
1,4-Dichlorobenzene	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:13
2-Butanone	U		1.3	10	ug/Kg	1	30-Nov-2021 18:13
2-Hexanone	U		1.4	10	ug/Kg	1	30-Nov-2021 18:13
4-Methyl-2-pentanone	U		2.0	10	ug/Kg	1	30-Nov-2021 18:13
Acetone	U		2.0	20	ug/Kg	1	30-Nov-2021 18:13
Benzene	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
Bromochloromethane	U		0.90	5.0	ug/Kg	1	30-Nov-2021 18:13
Bromodichloromethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
Bromoform	U		0.60	5.0	ug/Kg	1	30-Nov-2021 18:13
Bromomethane	U		1.0	10	ug/Kg	1	30-Nov-2021 18:13
Carbon disulfide	U		0.60	10	ug/Kg	1	30-Nov-2021 18:13
Carbon tetrachloride	U		0.60	5.0	ug/Kg	1	30-Nov-2021 18:13
Chlorobenzene	U		0.60	5.0	ug/Kg	1	30-Nov-2021 18:13
Chloroethane	U		0.80	10	ug/Kg	1	30-Nov-2021 18:13
Chloroform	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
Chloromethane	U		0.50	10	ug/Kg	1	30-Nov-2021 18:13
cis-1,2-Dichloroethene	U		0.80	5.0	ug/Kg	1	30-Nov-2021 18:13
cis-1,3-Dichloropropene	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
Cyclohexane	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:13
Dibromochloromethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
Dichlorodifluoromethane	U		0.70	5.0	ug/Kg	1	30-Nov-2021 18:13
Ethylbenzene	U		0.70	5.0	ug/Kg	1	30-Nov-2021 18:13
Isopropylbenzene	U		0.90	5.0	ug/Kg	1	30-Nov-2021 18:13
m,p-Xylene	U		1.6	10	ug/Kg	1	30-Nov-2021 18:13
Methyl acetate	U		0.70	5.0	ug/Kg	1	30-Nov-2021 18:13

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 05 Lab ID:HS21111620-02
Collection Date: 17-Nov-2021 12:23 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
Methyl tert-butyl ether		U	0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
Methylcyclohexane		U	1.0	5.0	ug/Kg	1	30-Nov-2021 18:13
Methylene chloride		U	1.0	10	ug/Kg	1	30-Nov-2021 18:13
o-Xylene		U	1.0	5.0	ug/Kg	1	30-Nov-2021 18:13
Styrene		U	0.70	5.0	ug/Kg	1	30-Nov-2021 18:13
Tetrachloroethene		U	0.70	5.0	ug/Kg	1	30-Nov-2021 18:13
Toluene		U	0.60	5.0	ug/Kg	1	30-Nov-2021 18:13
trans-1,2-Dichloroethene		U	0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
trans-1,3-Dichloropropene		U	0.60	5.0	ug/Kg	1	30-Nov-2021 18:13
Trichloroethene		U	0.60	5.0	ug/Kg	1	30-Nov-2021 18:13
Trichlorofluoromethane		U	0.50	5.0	ug/Kg	1	30-Nov-2021 18:13
Vinyl chloride		U	0.80	2.0	ug/Kg	1	30-Nov-2021 18:13
Xylenes, Total		U	1.0	5.0	ug/Kg	1	30-Nov-2021 18:13
Surr: 1,2-Dichloroethane-d4	*92.2*			*70-126*	*%REC*	*1*	*30-Nov-2021 18:13*
Surr: 4-Bromofluorobenzene	*92.2*			*70-130*	*%REC*	*1*	*30-Nov-2021 18:13*
Surr: Dibromofluoromethane	*86.6*			*70-130*	*%REC*	*1*	*30-Nov-2021 18:13*
Surr: Toluene-d8	*103*			*70-130*	*%REC*	*1*	*30-Nov-2021 18:13*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 05 Lab ID:HS21111620-02
Collection Date: 17-Nov-2021 12:23 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D		**Method:SW8270**			Prep:SW3541 / 01-Dec-2021		Analyst: JLJ
1-Methylnaphthalene		U	1.5	3.3	ug/Kg	1	09-Dec-2021 16:46
2-Methylnaphthalene		U	0.50	3.3	ug/Kg	1	09-Dec-2021 16:46
Acenaphthene		U	0.50	3.3	ug/Kg	1	09-Dec-2021 16:46
Acenaphthylene		U	0.99	3.3	ug/Kg	1	09-Dec-2021 16:46
Anthracene		U	0.50	3.3	ug/Kg	1	09-Dec-2021 16:46
Benz(a)anthracene		U	1.6	3.3	ug/Kg	1	09-Dec-2021 16:46
Benzo(a)pyrene		U	0.99	3.3	ug/Kg	1	09-Dec-2021 16:46
Benzo(b)fluoranthene		U	1.2	3.3	ug/Kg	1	09-Dec-2021 16:46
Benzo(g,h,i)perylene		U	0.70	3.3	ug/Kg	1	09-Dec-2021 16:46
Benzo(k)fluoranthene		U	0.89	3.3	ug/Kg	1	09-Dec-2021 16:46
Chrysene		U	0.79	3.3	ug/Kg	1	09-Dec-2021 16:46
Dibenz(a,h)anthracene		U	1.6	3.3	ug/Kg	1	09-Dec-2021 16:46
Fluoranthene		U	1.1	3.3	ug/Kg	1	09-Dec-2021 16:46
Fluorene		U	1.1	3.3	ug/Kg	1	09-Dec-2021 16:46
Indeno(1,2,3-cd)pyrene		U	0.79	3.3	ug/Kg	1	09-Dec-2021 16:46
Isophorone		U	0.79	6.6	ug/Kg	1	09-Dec-2021 16:46
Naphthalene		U	0.60	3.3	ug/Kg	1	09-Dec-2021 16:46
Phenanthrene		U	1.5	3.3	ug/Kg	1	09-Dec-2021 16:46
Pyrene		U	0.60	3.3	ug/Kg	1	09-Dec-2021 16:46
Surr: 2-Fluorobiphenyl	*60.1*			*43-125*	*%REC*	*1*	*09-Dec-2021 16:46*
Surr: 4-Terphenyl-d14	*65.8*			*32-125*	*%REC*	*1*	*09-Dec-2021 16:46*
Surr: Nitrobenzene-d5	*62.2*			*37-125*	*%REC*	*1*	*09-Dec-2021 16:46*
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3541 / 30-Nov-2021		Analyst: JBA
Aroclor 1016		U	0.42	1.7	ug/Kg	1	06-Dec-2021 07:59
Aroclor 1221		U	0.56	1.7	ug/Kg	1	06-Dec-2021 07:59
Aroclor 1232		U	0.45	1.7	ug/Kg	1	06-Dec-2021 07:59
Aroclor 1242		U	0.59	1.7	ug/Kg	1	06-Dec-2021 07:59
Aroclor 1248		U	0.59	1.7	ug/Kg	1	06-Dec-2021 07:59
Aroclor 1254		U	0.47	1.7	ug/Kg	1	06-Dec-2021 07:59
Aroclor 1260		U	0.24	1.7	ug/Kg	1	06-Dec-2021 07:59
Surr: Decachlorobiphenyl	*99.7*			*54-143*	*%REC*	*1*	*06-Dec-2021 07:59*
Surr: Tetrachloro-m-xylene	*74.9*			*50-140*	*%REC*	*1*	*06-Dec-2021 07:59*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 05 Lab ID:HS21111620-02
Collection Date: 17-Nov-2021 12:23 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 07-Dec-2021		Analyst: JC
Antimony	U		0.0616	0.474	mg/Kg	1	07-Dec-2021 14:42
Arsenic	**7.71**		**0.0663**	**0.474**	**mg/Kg**	1	07-Dec-2021 14:42
Beryllium	**0.808**		**0.0199**	**0.474**	**mg/Kg**	1	07-Dec-2021 14:42
Cadmium	U		0.0256	0.474	mg/Kg	1	07-Dec-2021 14:42
Chromium	**26.0**		**0.0218**	**0.474**	**mg/Kg**	1	07-Dec-2021 14:42
Copper	**6.81**		**0.0360**	**0.190**	**mg/Kg**	1	07-Dec-2021 14:42
Iron	**36,800**		**34.7**	**948**	**mg/Kg**	20	07-Dec-2021 15:38
Lead	**16.4**		**0.0123**	**0.474**	**mg/Kg**	1	07-Dec-2021 14:42
Manganese	**140**		**0.0408**	**0.474**	**mg/Kg**	1	07-Dec-2021 14:42
Nickel	**10.8**		**0.0455**	**0.474**	**mg/Kg**	1	07-Dec-2021 14:42
Potassium	**1,550**		**6.37**	**47.4**	**mg/Kg**	1	07-Dec-2021 14:42
Selenium	**0.524**		**0.0862**	**0.474**	**mg/Kg**	1	07-Dec-2021 14:42
Silver	**0.0153**	J	**0.0142**	**0.474**	**mg/Kg**	1	07-Dec-2021 14:42
Thallium	U		0.211	0.474	mg/Kg	1	07-Dec-2021 14:42
Zinc	**42.8**		**0.161**	**0.474**	**mg/Kg**	1	07-Dec-2021 14:42
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 06-Dec-2021		Analyst: MSC
Mercury	**25.9**		**0.510**	**3.61**	**ug/Kg**	1	06-Dec-2021 14:35
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**2.80**		**1.00**	**2.00**	**mg/Kg**	1	07-Dec-2021 14:20
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**59.2**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
PH SOIL BY SW9045D		**Method:SW9045D**					Analyst: SH
pH	**5.18**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 17:00
Temp Deg C @pH	**22.6**	H	**0**	**0**	**°C**	1	02-Dec-2021 17:00
SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT		**Method:SW9050M**					Analyst: MZD
Conductance, Soil Extract	**465**		**50.0**	**50.0**	**umhos/cm**	10	07-Dec-2021 11:03
ANIONS BY SW9056A		**Method:SW9056**			Prep:SW9056 / 03-Dec-2021		Analyst: YP
Nitrogen, Nitrate (As N)	**0.943**	J	**0.298**	**0.994**	**mg/Kg**	1	04-Dec-2021 18:33
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 10-Dec-2021		Analyst: JAC
Total Organic Carbon	**2.20**		**0.0585**	**0.975**	**wt%-dry**	1	10-Dec-2021 12:00
SUBCONTRACT ANALYSIS - SPECIALIZED HERBICIDES		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0			1	20-Dec-2021 17:52

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 02 Lab ID:HS21111620-03
Collection Date: 20-Nov-2021 09:36 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C	**Method:SW8260**						Analyst: WLR
1,1,1-Trichloroethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
1,1,2,2-Tetrachloroethane	U		0.80	5.0	ug/Kg	1	30-Nov-2021 18:35
1,1,2-Trichlor-1,2,2-trifluoroethane	U		0.70	5.0	ug/Kg	1	30-Nov-2021 18:35
1,1,2-Trichloroethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
1,1-Dichloroethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
1,1-Dichloroethene	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
1,2,3-Trichlorobenzene	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:35
1,2,4-Trichlorobenzene	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:35
1,2-Dibromo-3-chloropropane	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:35
1,2-Dibromoethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
1,2-Dichlorobenzene	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:35
1,2-Dichloroethane	U		0.60	5.0	ug/Kg	1	30-Nov-2021 18:35
1,2-Dichloropropane	U		0.80	5.0	ug/Kg	1	30-Nov-2021 18:35
1,3-Dichlorobenzene	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:35
1,4-Dichlorobenzene	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:35
2-Butanone	U		1.3	10	ug/Kg	1	30-Nov-2021 18:35
2-Hexanone	U		1.4	10	ug/Kg	1	30-Nov-2021 18:35
4-Methyl-2-pentanone	U		2.0	10	ug/Kg	1	30-Nov-2021 18:35
Acetone	U		2.0	20	ug/Kg	1	30-Nov-2021 18:35
Benzene	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
Bromochloromethane	U		0.90	5.0	ug/Kg	1	30-Nov-2021 18:35
Bromodichloromethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
Bromoform	U		0.60	5.0	ug/Kg	1	30-Nov-2021 18:35
Bromomethane	U		1.0	10	ug/Kg	1	30-Nov-2021 18:35
Carbon disulfide	U		0.60	10	ug/Kg	1	30-Nov-2021 18:35
Carbon tetrachloride	U		0.60	5.0	ug/Kg	1	30-Nov-2021 18:35
Chlorobenzene	U		0.60	5.0	ug/Kg	1	30-Nov-2021 18:35
Chloroethane	U		0.80	10	ug/Kg	1	30-Nov-2021 18:35
Chloroform	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
Chloromethane	U		0.50	10	ug/Kg	1	30-Nov-2021 18:35
cis-1,2-Dichloroethene	U		0.80	5.0	ug/Kg	1	30-Nov-2021 18:35
cis-1,3-Dichloropropene	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
Cyclohexane	U		1.0	5.0	ug/Kg	1	30-Nov-2021 18:35
Dibromochloromethane	U		0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
Dichlorodifluoromethane	U		0.70	5.0	ug/Kg	1	30-Nov-2021 18:35
Ethylbenzene	U		0.70	5.0	ug/Kg	1	30-Nov-2021 18:35
Isopropylbenzene	U		0.90	5.0	ug/Kg	1	30-Nov-2021 18:35
m,p-Xylene	U		1.6	10	ug/Kg	1	30-Nov-2021 18:35
Methyl acetate	U		0.70	5.0	ug/Kg	1	30-Nov-2021 18:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 02 Lab ID:HS21111620-03
Collection Date: 20-Nov-2021 09:36 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES BY SW8260C		**Method:SW8260**					Analyst: WLR
Methyl tert-butyl ether		U	0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
Methylcyclohexane		U	1.0	5.0	ug/Kg	1	30-Nov-2021 18:35
Methylene chloride		U	1.0	10	ug/Kg	1	30-Nov-2021 18:35
o-Xylene		U	1.0	5.0	ug/Kg	1	30-Nov-2021 18:35
Styrene		U	0.70	5.0	ug/Kg	1	30-Nov-2021 18:35
Tetrachloroethene		U	0.70	5.0	ug/Kg	1	30-Nov-2021 18:35
Toluene		U	0.60	5.0	ug/Kg	1	30-Nov-2021 18:35
trans-1,2-Dichloroethene		U	0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
trans-1,3-Dichloropropene		U	0.60	5.0	ug/Kg	1	30-Nov-2021 18:35
Trichloroethene		U	0.60	5.0	ug/Kg	1	30-Nov-2021 18:35
Trichlorofluoromethane		U	0.50	5.0	ug/Kg	1	30-Nov-2021 18:35
Vinyl chloride		U	0.80	2.0	ug/Kg	1	30-Nov-2021 18:35
Xylenes, Total		U	1.0	5.0	ug/Kg	1	30-Nov-2021 18:35
Surr: 1,2-Dichloroethane-d4	*96.0*			*70-126*	*%REC*	*1*	*30-Nov-2021 18:35*
Surr: 4-Bromofluorobenzene	*93.1*			*70-130*	*%REC*	*1*	*30-Nov-2021 18:35*
Surr: Dibromofluoromethane	*87.8*			*70-130*	*%REC*	*1*	*30-Nov-2021 18:35*
Surr: Toluene-d8	*103*			*70-130*	*%REC*	*1*	*30-Nov-2021 18:35*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 02 Lab ID:HS21111620-03
Collection Date: 20-Nov-2021 09:36 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D		**Method:SW8270**			Prep:SW3541 / 01-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U		1.5	3.3	ug/Kg	1	09-Dec-2021 17:06
2-Methylnaphthalene	U		0.49	3.3	ug/Kg	1	09-Dec-2021 17:06
Acenaphthene	U		0.49	3.3	ug/Kg	1	09-Dec-2021 17:06
Acenaphthylene	U		0.99	3.3	ug/Kg	1	09-Dec-2021 17:06
Anthracene	U		0.49	3.3	ug/Kg	1	09-Dec-2021 17:06
Benz(a)anthracene	U		1.6	3.3	ug/Kg	1	09-Dec-2021 17:06
Benzo(a)pyrene	U		0.99	3.3	ug/Kg	1	09-Dec-2021 17:06
Benzo(b)fluoranthene	U		1.2	3.3	ug/Kg	1	09-Dec-2021 17:06
Benzo(g,h,i)perylene	U		0.69	3.3	ug/Kg	1	09-Dec-2021 17:06
Benzo(k)fluoranthene	U		0.89	3.3	ug/Kg	1	09-Dec-2021 17:06
Chrysene	U		0.79	3.3	ug/Kg	1	09-Dec-2021 17:06
Dibenz(a,h)anthracene	U		1.6	3.3	ug/Kg	1	09-Dec-2021 17:06
Fluoranthene	U		1.1	3.3	ug/Kg	1	09-Dec-2021 17:06
Fluorene	U		1.1	3.3	ug/Kg	1	09-Dec-2021 17:06
Indeno(1,2,3-cd)pyrene	U		0.79	3.3	ug/Kg	1	09-Dec-2021 17:06
Isophorone	U		0.79	6.5	ug/Kg	1	09-Dec-2021 17:06
Naphthalene	U		0.59	3.3	ug/Kg	1	09-Dec-2021 17:06
Phenanthrene	U		1.5	3.3	ug/Kg	1	09-Dec-2021 17:06
Pyrene	U		0.59	3.3	ug/Kg	1	09-Dec-2021 17:06
Surr: 2-Fluorobiphenyl	*66.6*			*43-125*	*%REC*	*1*	*09-Dec-2021 17:06*
Surr: 4-Terphenyl-d14	*73.8*			*32-125*	*%REC*	*1*	*09-Dec-2021 17:06*
Surr: Nitrobenzene-d5	*70.2*			*37-125*	*%REC*	*1*	*09-Dec-2021 17:06*
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3541 / 30-Nov-2021		Analyst: JBA
Aroclor 1016	U		0.42	1.7	ug/Kg	1	06-Dec-2021 08:17
Aroclor 1221	U		0.56	1.7	ug/Kg	1	06-Dec-2021 08:17
Aroclor 1232	U		0.45	1.7	ug/Kg	1	06-Dec-2021 08:17
Aroclor 1242	U		0.59	1.7	ug/Kg	1	06-Dec-2021 08:17
Aroclor 1248	U		0.59	1.7	ug/Kg	1	06-Dec-2021 08:17
Aroclor 1254	U		0.47	1.7	ug/Kg	1	06-Dec-2021 08:17
Aroclor 1260	U		0.24	1.7	ug/Kg	1	06-Dec-2021 08:17
Surr: Decachlorobiphenyl	*79.0*			*54-143*	*%REC*	*1*	*06-Dec-2021 08:17*
Surr: Tetrachloro-m-xylene	*78.4*			*50-140*	*%REC*	*1*	*06-Dec-2021 08:17*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM **ANALYTICAL REPORT**
Project: Gas to Energy Environmental Impact Assessment Study WorkOrder:HS21111620
Sample ID: Soil Pipe 02 Lab ID:HS21111620-03
Collection Date: 20-Nov-2021 09:36 Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 07-Dec-2021		Analyst: JC
Antimony	U		0.0625	0.481	mg/Kg	1	07-Dec-2021 14:45
Arsenic	**5.71**		**0.0673**	**0.481**	**mg/Kg**	1	07-Dec-2021 14:45
Beryllium	**0.640**		**0.0202**	**0.481**	**mg/Kg**	1	07-Dec-2021 14:45
Cadmium	U		0.0260	0.481	mg/Kg	1	07-Dec-2021 14:45
Chromium	**18.9**		**0.0221**	**0.481**	**mg/Kg**	1	07-Dec-2021 14:45
Copper	**3.62**		**0.0365**	**0.192**	**mg/Kg**	1	07-Dec-2021 14:45
Iron	**25,600**		**17.6**	**481**	**mg/Kg**	10	07-Dec-2021 15:40
Lead	**12.1**		**0.0125**	**0.481**	**mg/Kg**	1	07-Dec-2021 14:45
Manganese	**65.8**		**0.0413**	**0.481**	**mg/Kg**	1	07-Dec-2021 14:45
Nickel	**9.41**		**0.0461**	**0.481**	**mg/Kg**	1	07-Dec-2021 14:45
Potassium	**1,280**		**6.46**	**48.1**	**mg/Kg**	1	07-Dec-2021 14:45
Selenium	**0.326**	J	**0.0875**	**0.481**	**mg/Kg**	1	07-Dec-2021 14:45
Silver	U		0.0144	0.481	mg/Kg	1	07-Dec-2021 14:45
Thallium	U		0.214	0.481	mg/Kg	1	07-Dec-2021 14:45
Zinc	**33.0**		**0.163**	**0.481**	**mg/Kg**	1	07-Dec-2021 14:45
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 06-Dec-2021		Analyst: MSC
Mercury	**24.4**		**0.471**	**3.33**	**ug/Kg**	1	06-Dec-2021 14:36
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 07-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**81.2**		**4.84**	**9.69**	**mg/Kg**	5	07-Dec-2021 14:20
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**49.5**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
PH SOIL BY SW9045D		**Method:SW9045D**					Analyst: SH
pH	**5.06**	H	**0.100**	**0.100**	**pH Units**	1	02-Dec-2021 17:00
Temp Deg C @pH	**22.6**	H	**0**	**0**	**°C**	1	02-Dec-2021 17:00
SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT		**Method:SW9050M**					Analyst: MZD
Conductance, Soil Extract	**119**		**50.0**	**50.0**	**umhos/cm**	10	07-Dec-2021 11:03
ANIONS BY SW9056A		**Method:SW9056**			Prep:SW9056 / 03-Dec-2021		Analyst: YP
Nitrogen, Nitrate (As N)	**1.58**		**0.300**	**0.999**	**mg/Kg**	1	04-Dec-2021 19:03
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 10-Dec-2021		Analyst: JAC
Total Organic Carbon	**1.10**		**0.0589**	**0.982**	**wt%-dry**	1	10-Dec-2021 12:00
SUBCONTRACT ANALYSIS - SPECIALIZED HERBICIDES		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0			1	20-Dec-2021 17:52

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

Batch ID: 4697 **Start Date:** 30 Nov 2021 15:03 **End Date:** 30 Nov 2021 15:03
Method: VOLATILES BY SW8260C

Sample ID	Container	Sample Wt/Vol	Final Volume	Weight Factor	Container Type
HS21111620-01	1	5.071 (g)	5 (mL)	0.99	Bulk (5030B)
HS21111620-02	1	4.978 (g)	5 (mL)	1	Bulk (5030B)
HS21111620-03	1	5.016 (g)	5 (mL)	1	Bulk (5030B)

Batch ID: 173020 **Start Date:** 30 Nov 2021 15:00 **End Date:** 30 Nov 2021 18:30
Method: PCB_3541_LO **Prep Code:** PCBPR_SOX_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111620-01		30.14 (grams)	1 (mL)	0.03318	1-L WM glass, Neat
HS21111620-02		30.11 (grams)	1 (mL)	0.03321	1-L WM glass, Neat
HS21111620-03		30.21 (grams)	1 (mL)	0.0331	1-L WM glass, Neat

Batch ID: 173035 **Start Date:** 06 Dec 2021 09:00 **End Date:** 06 Dec 2021 11:00
Method: MERCURY PREP - SOLID - 7471B **Prep Code:** HG_S_LOWPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111620-01		0.5808 (grams)	40 (mL)	68.87	1-L WM glass, Neat
HS21111620-02		0.5528 (grams)	40 (mL)	72.36	1-L WM glass, Neat
HS21111620-03		0.5993 (grams)	40 (mL)	66.74	1-L WM glass, Neat

Batch ID: 173063 **Start Date:** 01 Dec 2021 12:00 **End Date:** 01 Dec 2021 18:00
Method: SV SOXHLET EXTRACT-LOWLEVEL-SW3541 **Prep Code:** 3541_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111620-01		30.33 (g)	1 (mL)	0.03297	1-L WM glass, Neat
HS21111620-02		30.19 (g)	1 (mL)	0.03312	1-L WM glass, Neat
HS21111620-03		30.31 (g)	1 (mL)	0.03299	1-L WM glass, Neat

Batch ID: 173185 **Start Date:** 03 Dec 2021 16:28 **End Date:** 03 Dec 2021 18:30
Method: 9056 ANIONS SOIL PREP **Prep Code:** 9056_S_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111620-01		5.0289 (g)	50 (mL)	9.943	1-L WM glass, Neat
HS21111620-02		5.0288 (g)	50 (mL)	9.943	1-L WM glass, Neat
HS21111620-03		5.003 (g)	50 (mL)	9.994	1-L WM glass, Neat

Batch ID: 173230 **Start Date:** 07 Dec 2021 07:30 **End Date:** 07 Dec 2021 13:30
Method: METALS PREP - SOLIDS - SW3050B **Prep Code:** 3050_I_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111620-01		0.5268 (g)	50 (mL)	94.91	1-L WM glass, Neat
HS21111620-02		0.5276 (g)	50 (mL)	94.77	1-L WM glass, Neat
HS21111620-03		0.5201 (g)	50 (mL)	96.14	1-L WM glass, Neat

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

Batch ID: 173274 **Start Date:** 07 Dec 2021 10:00 **End Date:** 07 Dec 2021 12:00
Method: PHOSPHOROUS **Prep Code:** P_TS_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111620-01		1.0025 (g)	50 (mL)	49.88	1-L WM glass, Neat
HS21111620-02		0.99989 (g)	50 (mL)	50.01	1-L WM glass, Neat
HS21111620-03		1.032 (g)	50 (mL)	48.45	1-L WM glass, Neat

Batch ID: 173396 **Start Date:** 10 Dec 2021 10:45 **End Date:** 10 Dec 2021 12:00
Method: TOC SOLID PREP **Prep Code:** TOC_SOLID_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21111620-01		0.203 (grams)	0.2 (mL)	0.9852	1-L WM glass, Neat
HS21111620-02		0.2052 (grams)	0.2 (mL)	0.9747	1-L WM glass, Neat
HS21111620-03		0.2036 (grams)	0.2 (mL)	0.9823	1-L WM glass, Neat

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173020 (0)	**Test Name :** PCBS BY SW8082A				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30		30 Nov 2021 15:00	06 Dec 2021 07:42	1
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23		30 Nov 2021 15:00	06 Dec 2021 07:59	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36		30 Nov 2021 15:00	06 Dec 2021 08:17	1
Batch ID: 173035 (0)	**Test Name :** MERCURY BY SW7471B				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30		06 Dec 2021 11:00	06 Dec 2021 14:27	1
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23		06 Dec 2021 11:00	06 Dec 2021 14:35	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36		06 Dec 2021 11:00	06 Dec 2021 14:36	1
Batch ID: 173063 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30		01 Dec 2021 12:00	09 Dec 2021 15:47	1
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23		01 Dec 2021 12:00	09 Dec 2021 16:46	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36		01 Dec 2021 12:00	09 Dec 2021 17:06	1
Batch ID: 173185 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30		03 Dec 2021 16:28	04 Dec 2021 18:25	1
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23		03 Dec 2021 16:28	04 Dec 2021 18:33	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36		03 Dec 2021 16:28	04 Dec 2021 19:03	1
Batch ID: 173230 (0)	**Test Name :** METALS BY SW6020A				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30		07 Dec 2021 13:30	07 Dec 2021 14:40	1
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23		07 Dec 2021 13:30	07 Dec 2021 15:38	20
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23		07 Dec 2021 13:30	07 Dec 2021 14:42	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36		07 Dec 2021 13:30	07 Dec 2021 15:40	10
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36		07 Dec 2021 13:30	07 Dec 2021 14:45	1
Batch ID: 173274 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30		07 Dec 2021 10:00	07 Dec 2021 14:20	5
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23		07 Dec 2021 10:00	07 Dec 2021 14:20	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36		07 Dec 2021 10:00	07 Dec 2021 14:20	5
Batch ID: 173396 (0)	**Test Name :** TOTAL ORGANIC CARBON BY SW9060A				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30		10 Dec 2021 10:45	10 Dec 2021 12:00	1
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23		10 Dec 2021 10:45	10 Dec 2021 12:00	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36		10 Dec 2021 10:45	10 Dec 2021 12:00	1
Batch ID: R396613 (0)	**Test Name :** VOLATILES BY SW8260C				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30			30 Nov 2021 17:50	1
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23			30 Nov 2021 18:13	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36			30 Nov 2021 18:35	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R396871 (0)	**Test Name :** PH SOIL BY SW9045D				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30			02 Dec 2021 17:00	1
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23			02 Dec 2021 17:00	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36			02 Dec 2021 17:00	1
Batch ID: R397100 (0)	**Test Name :** SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30			07 Dec 2021 11:03	10
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23			07 Dec 2021 11:03	10
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36			07 Dec 2021 11:03	10
Batch ID: R397230 (0)	**Test Name :** TOTAL SOLIDS BY SM2540G-2011				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30			08 Dec 2021 11:30	1
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23			08 Dec 2021 11:30	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36			08 Dec 2021 11:30	1
Batch ID: R398032 (0)	**Test Name :** SUBCONTRACT ANALYSIS - SPECIALIZED HERBICIDES				**Matrix:** Soil	
HS21111620-01	Soil Pipe 04	17 Nov 2021 08:30			20 Dec 2021 17:52	1
HS21111620-02	Soil Pipe 05	17 Nov 2021 12:23			20 Dec 2021 17:52	1
HS21111620-03	Soil Pipe 02	20 Nov 2021 09:36			20 Dec 2021 17:52	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173020 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MBLK Sample ID: **MBLK-173020** Units: **ug/Kg** Analysis Date: **06-Dec-2021 05:41**
Client ID: Run ID: **ECD_7_396978** SeqNo: **6405988** PrepDate: **30-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	U	1.7								
Aroclor 1221	U	1.7								
Aroclor 1232	U	1.7								
Aroclor 1242	U	1.7								
Aroclor 1248	U	1.7								
Aroclor 1254	U	1.7								
Aroclor 1260	U	1.7								
Surr: Decachlorobiphenyl	*0.5691*	*0.16*	*0.6667*	*0*	*85.4*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.4761*	*0.16*	*0.6667*	*0*	*71.4*	*50 - 140*				

LCS Sample ID: **LCS-173020** Units: **ug/Kg** Analysis Date: **06-Dec-2021 05:58**
Client ID: Run ID: **ECD_7_396978** SeqNo: **6405989** PrepDate: **30-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	13.95	1.7	16.67	0	83.7	53 - 135				
Aroclor 1260	15.93	1.7	16.67	0	95.6	54 - 137				
Surr: Decachlorobiphenyl	*0.6764*	*0.16*	*0.6667*	*0*	*101*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.5941*	*0.16*	*0.6667*	*0*	*89.1*	*50 - 140*				

MS Sample ID: **HS21111398-05MS** Units: **ug/Kg** Analysis Date: **06-Dec-2021 04:49**
Client ID: Run ID: **ECD_7_396978** SeqNo: **6405985** PrepDate: **30-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	11.77	1.6	16.4	0	71.8	53 - 135				
Aroclor 1260	13.37	1.6	16.4	0	81.5	54 - 137				
Surr: Decachlorobiphenyl	*0.6829*	*0.16*	*0.656*	*0*	*104*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.4147*	*0.16*	*0.656*	*0*	*63.2*	*50 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173020 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MSD Sample ID: **HS21111398-05MSD** Units: **ug/Kg** Analysis Date: **06-Dec-2021 05:06**
Client ID: Run ID: **ECD_7_396978** SeqNo: **6405986** PrepDate: **30-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	12.2	1.7	16.49	0	74.0	53 - 135	11.77	3.58	30	
Aroclor 1260	11.21	1.7	16.49	0	68.0	54 - 137	13.37	17.6	30	
Surr: Decachlorobiphenyl	*0.7637*	*0.16*	*0.6594*	*0*	*116*	*54 - 143*	*0.6829*	*11.2*	*30*	
Surr: Tetrachloro-m-xylene	*0.4401*	*0.16*	*0.6594*	*0*	*66.7*	*50 - 140*	*0.4147*	*5.95*	*30*	

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173035 (0) **Instrument: HG03** **Method: MERCURY BY SW7471B**

MBLK Sample ID: **MBLK-173035** Units: **ug/Kg** Analysis Date: **06-Dec-2021 14:21**
Client ID: Run ID: **HG03_397016** SeqNo: **6406965** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.6231	3.45								J

LCS Sample ID: **LCS-173035** Units: **ug/Kg** Analysis Date: **06-Dec-2021 14:23**
Client ID: Run ID: **HG03_397016** SeqNo: **6406966** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	337.8	3.54	354.8	0	95.2	80 - 120				

MS Sample ID: **HS21111620-01MS** Units: **ug/Kg** Analysis Date: **06-Dec-2021 14:31**
Client ID: **Soil Pipe 04** Run ID: **HG03_397016** SeqNo: **6406968** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	317.9	3.37	338.2	33.47	84.1	80 - 120				

MSD Sample ID: **HS21111620-01MSD** Units: **ug/Kg** Analysis Date: **06-Dec-2021 14:33**
Client ID: **Soil Pipe 04** Run ID: **HG03_397016** SeqNo: **6406969** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	317.4	3.38	338.4	33.47	83.9	80 - 120	317.9	0.145	20	

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

MBLK Sample ID: **MBLK-173230** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:04**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409221** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.498								
Arsenic	U	0.498								
Beryllium	U	0.498								
Cadmium	U	0.498								
Chromium	U	0.498								
Copper	U	0.199								
Iron	U	49.8								
Lead	U	0.498								
Manganese	U	0.498								
Nickel	U	0.498								
Potassium	U	49.8								
Selenium	U	0.498								
Silver	U	0.498								
Thallium	U	0.498								
Zinc	U	0.498								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

LCS Sample ID: **LCS-173230** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:06**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409222** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	9.765	0.494	9.885	0	98.8	80 - 120				
Arsenic	9.893	0.494	9.885	0	100	80 - 120				
Beryllium	9.587	0.494	9.885	0	97.0	80 - 120				
Cadmium	9.898	0.494	9.885	0	100	80 - 120				
Chromium	10.19	0.494	9.885	0	103	80 - 120				
Copper	10.17	0.198	9.885	0	103	80 - 120				
Iron	1044	49.4	988.5	0	106	80 - 120				
Lead	10.3	0.494	9.885	0	104	80 - 120				
Manganese	10.12	0.494	9.885	0	102	80 - 120				
Nickel	10.65	0.494	9.885	0	108	80 - 120				
Potassium	1060	49.4	988.5	0	107	80 - 120				
Selenium	10.11	0.494	9.885	0	102	80 - 120				
Silver	10.62	0.494	9.885	0	107	80 - 120				
Thallium	10.42	0.494	9.885	0	105	80 - 120				
Zinc	9.932	0.494	9.885	0	100	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

MS Sample ID: **HS21120188-19MS** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:13**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409225** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	3.943	0.496	9.915	0.1324	38.4	75 - 125				S
Arsenic	10.36	0.496	9.915	0.5568	98.8	75 - 125				
Beryllium	9.997	0.496	9.915	0.1305	99.5	75 - 125				
Cadmium	10.1	0.496	9.915	0.01158	102	75 - 125				
Chromium	16.42	0.496	9.915	4.523	120	75 - 125				
Copper	11.21	0.198	9.915	1.578	97.1	75 - 125				
Iron	4581	49.6	991.5	2686	191	75 - 125				S
Lead	15.27	0.496	9.915	3.679	117	75 - 125				
Manganese	21.02	0.496	9.915	7.923	132	75 - 125				S
Nickel	12.08	0.496	9.915	1.497	107	75 - 125				
Potassium	1595	49.6	991.5	481.2	112	75 - 125				
Selenium	9.64	0.496	9.915	0.1263	96.0	75 - 125				
Silver	10.44	0.496	9.915	0.02098	105	75 - 125				
Thallium	10.71	0.496	9.915	0.09265	107	75 - 125				
Zinc	16.73	0.496	9.915	5.874	110	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

MSD Sample ID: **HS21120188-19MSD** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:15**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409226** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	3.798	0.482	9.638	0.1324	38.0	75 - 125	3.943	3.75	20	S
Arsenic	9.826	0.482	9.638	0.5568	96.2	75 - 125	10.36	5.24	20	
Beryllium	9.445	0.482	9.638	0.1305	96.6	75 - 125	9.997	5.68	20	
Cadmium	9.616	0.482	9.638	0.01158	99.7	75 - 125	10.1	4.87	20	
Chromium	16.03	0.482	9.638	4.523	119	75 - 125	16.42	2.37	20	
Copper	11.17	0.193	9.638	1.578	99.5	75 - 125	11.21	0.37	20	
Iron	4409	48.2	963.8	2686	179	75 - 125	4581	3.83	20	S
Lead	14.81	0.482	9.638	3.679	116	75 - 125	15.27	3.07	20	
Manganese	22.31	0.482	9.638	7.923	149	75 - 125	21.02	5.96	20	S
Nickel	12	0.482	9.638	1.497	109	75 - 125	12.08	0.622	20	
Potassium	1545	48.2	963.8	481.2	110	75 - 125	1595	3.19	20	
Selenium	9.742	0.482	9.638	0.1263	99.8	75 - 125	9.64	1.05	20	
Silver	9.966	0.482	9.638	0.02098	103	75 - 125	10.44	4.69	20	
Thallium	10.57	0.482	9.638	0.09265	109	75 - 125	10.71	1.3	20	
Zinc	16.27	0.482	9.638	5.874	108	75 - 125	16.73	2.79	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

PDS Sample ID: **HS21120188-19PDS** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:17**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409227** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	9.249	0.475	9.493	0.1324	96.0	75 - 125				
Arsenic	10.23	0.475	9.493	0.5568	102	75 - 125				
Beryllium	9.757	0.475	9.493	0.1305	101	75 - 125				
Cadmium	9.839	0.475	9.493	0.01158	104	75 - 125				
Chromium	15.51	0.475	9.493	4.523	116	75 - 125				
Copper	11.1	0.190	9.493	1.578	100	75 - 125				
Iron	3675	47.5	949.3	2686	104	75 - 125				
Lead	14.46	0.475	9.493	3.679	114	75 - 125				
Manganese	18.7	0.475	9.493	7.923	114	75 - 125				
Nickel	11.5	0.475	9.493	1.497	105	75 - 125				
Potassium	1500	47.5	949.3	481.2	107	75 - 125				
Selenium	10.02	0.475	9.493	0.1263	104	75 - 125				
Silver	9.915	0.475	9.493	0.02098	104	75 - 125				
Thallium	10.71	0.475	9.493	0.09265	112	75 - 125				
Zinc	15.35	0.475	9.493	5.874	99.8	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173230 (0) **Instrument: ICPMS05** **Method: METALS BY SW6020A**

SD Sample ID: **HS21120188-19SD** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:11**
Client ID: Run ID: **ICPMS05_397092** SeqNo: **6409224** PrepDate: **07-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	2.37					0.1324	0	10	
Arsenic	0.5269	2.37					0.5568	0	10	J
Beryllium	0.1332	2.37					0.1305	0	10	J
Cadmium	U	2.37					0.01158	0	10	
Chromium	4.129	2.37					4.523	8.71	10	
Copper	1.552	0.949					1.578	1.68	10	
Iron	2502	237					2686	6.86	10	
Lead	3.565	2.37					3.679	3.08	10	
Manganese	7.384	2.37					7.923	6.8	10	
Nickel	1.424	2.37					1.497	0	10	J
Potassium	448.3	237					481.2	6.84	10	
Selenium	U	2.37					0.1263	0	10	
Silver	U	2.37					0.02098	0	10	
Thallium	U	2.37					0.09265	0	10	
Zinc	5.822	2.37					5.874	0.897	10	

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173063 (0) **Instrument: SV-8** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-173063** Units: **ug/Kg** Analysis Date: **09-Dec-2021 13:07**
Client ID: Run ID: **SV-8_397322** SeqNo: **6414020** PrepDate: **01-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	3.3								
2-Methylnaphthalene	U	3.3								
Acenaphthene	U	3.3								
Acenaphthylene	U	3.3								
Anthracene	U	3.3								
Benz(a)anthracene	U	3.3								
Benzo(a)pyrene	U	3.3								
Benzo(b)fluoranthene	U	3.3								
Benzo(g,h,i)perylene	U	3.3								
Benzo(k)fluoranthene	U	3.3								
Chrysene	U	3.3								
Dibenz(a,h)anthracene	U	3.3								
Fluoranthene	U	3.3								
Fluorene	U	3.3								
Indeno(1,2,3-cd)pyrene	U	3.3								
Isophorone	U	6.6								
Naphthalene	U	3.3								
Phenanthrene	U	3.3								
Pyrene	U	3.3								
Surr: 2-Fluorobiphenyl	*132.5*	*6.6*	*167*	*0*	*79.3*	*43 - 125*				
Surr: 4-Terphenyl-d14	*142.9*	*6.6*	*167*	*0*	*85.5*	*32 - 125*				
Surr: Nitrobenzene-d5	*133.8*	*6.6*	*167*	*0*	*80.1*	*37 - 125*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173063 (0) **Instrument: SV-8** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCS Sample ID: **LCS-173063** Units: **ug/Kg** Analysis Date: **09-Dec-2021 13:27**
Client ID: Run ID: **SV-8_397322** SeqNo: **6414021** PrepDate: **01-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	111.8	3.3	167	0	66.9	50 - 120				
2-Methylnaphthalene	108	3.3	167	0	64.7	50 - 120				
Acenaphthene	95.74	3.3	167	0	57.3	50 - 120				
Acenaphthylene	107	3.3	167	0	64.1	50 - 120				
Anthracene	110.1	3.3	167	0	65.9	50 - 123				
Benz(a)anthracene	118.5	3.3	167	0	71.0	40 - 140				
Benzo(a)pyrene	106.6	3.3	167	0	63.8	50 - 130				
Benzo(b)fluoranthene	106.1	3.3	167	0	63.5	50 - 137				
Benzo(g,h,i)perylene	96.01	3.3	167	0	57.5	50 - 130				
Benzo(k)fluoranthene	99.15	3.3	167	0	59.4	50 - 143				
Chrysene	111.2	3.3	167	0	66.6	50 - 130				
Dibenz(a,h)anthracene	96.34	3.3	167	0	57.7	50 - 130				
Fluoranthene	121	3.3	167	0	72.5	50 - 131				
Fluorene	115.9	3.3	167	0	69.4	50 - 125				
Indeno(1,2,3-cd)pyrene	81.33	3.3	167	0	48.7	45 - 139				
Isophorone	110.3	6.6	167	0	66.1	45 - 130				
Naphthalene	102.7	3.3	167	0	61.5	50 - 125				
Phenanthrene	108.7	3.3	167	0	65.1	50 - 125				
Pyrene	110	3.3	167	0	65.9	45 - 130				
Surr: 2-Fluorobiphenyl	*109.1*	*6.6*	*167*	*0*	*65.4*	*43 - 125*				
Surr: 4-Terphenyl-d14	*117*	*6.6*	*167*	*0*	*70.1*	*32 - 125*				
Surr: Nitrobenzene-d5	*111.9*	*6.6*	*167*	*0*	*67.0*	*37 - 125*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173063 (0) **Instrument: SV-8** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MS Sample ID: **HS21111620-01MS** Units: **ug/Kg** Analysis Date: **09-Dec-2021 16:07**
Client ID: **Soil Pipe 04** Run ID: **SV-8_397322** SeqNo: **6425126** PrepDate: **01-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	118.1	3.3	164.9	0	71.6	50 - 120				
2-Methylnaphthalene	113.8	3.3	164.9	0	69.0	50 - 120				
Acenaphthene	103.6	3.3	164.9	0	62.8	50 - 120				
Acenaphthylene	118.8	3.3	164.9	0	72.1	50 - 120				
Anthracene	147.5	3.3	164.9	2.435	88.0	50 - 123				
Benz(a)anthracene	435.1	3.3	164.9	31.91	244	40 - 140				SE
Benzo(a)pyrene	366.8	3.3	164.9	31.06	204	50 - 130				SE
Benzo(b)fluoranthene	378.9	3.3	164.9	37.45	207	50 - 137				SE
Benzo(g,h,i)perylene	223.7	3.3	164.9	16.75	125	50 - 130				
Benzo(k)fluoranthene	211.2	3.3	164.9	13.57	120	50 - 143				
Chrysene	389.1	3.3	164.9	32.63	216	50 - 130				SE
Dibenz(a,h)anthracene	117.3	3.3	164.9	4.378	68.4	50 - 130				
Fluoranthene	592.4	3.3	164.9	30.79	341	50 - 131				SE
Fluorene	122.9	3.3	164.9	0	74.5	50 - 125				
Indeno(1,2,3-cd)pyrene	226	3.3	164.9	17.34	127	45 - 139				
Isophorone	114.6	6.5	164.9	0	69.5	45 - 130				
Naphthalene	108.6	3.3	164.9	0	65.9	50 - 125				
Phenanthrene	146.6	3.3	164.9	5.061	85.8	50 - 125				
Pyrene	483.1	3.3	164.9	26.28	277	45 - 130				SE
Surr: 2-Fluorobiphenyl	*110.3*	*6.5*	*164.9*	*0*	*66.9*	*43 - 125*				
Surr: 4-Terphenyl-d14	*116*	*6.5*	*164.9*	*0*	*70.3*	*32 - 125*				
Surr: Nitrobenzene-d5	*115.7*	*6.5*	*164.9*	*0*	*70.2*	*37 - 125*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173063 (0) **Instrument: SV-8** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MSD Sample ID: **HS21111620-01MSD** Units: **ug/Kg** Analysis Date: **09-Dec-2021 16:26**
Client ID: **Soil Pipe 04** Run ID: **SV-8_397322** SeqNo: **6425127** PrepDate: **01-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	111.8	3.3	165.6	0	67.5	50 - 120	118.1	5.52	30	
2-Methylnaphthalene	106.5	3.3	165.6	0	64.3	50 - 120	113.8	6.62	30	
Acenaphthene	93.62	3.3	165.6	0	56.5	50 - 120	103.6	10.1	30	
Acenaphthylene	104.9	3.3	165.6	0	63.3	50 - 120	118.8	12.4	30	
Anthracene	108.9	3.3	165.6	2.435	64.3	50 - 123	147.5	30.2	30	R
Benz(a)anthracene	148.4	3.3	165.6	31.91	70.3	40 - 140	435.1	98.3	30	R
Benzo(a)pyrene	138.7	3.3	165.6	31.06	65.0	50 - 130	366.8	90.2	30	R
Benzo(b)fluoranthene	141.4	3.3	165.6	37.45	62.8	50 - 137	378.9	91.3	30	R
Benzo(g,h,i)perylene	113	3.3	165.6	16.75	58.1	50 - 130	223.7	65.8	30	R
Benzo(k)fluoranthene	110.5	3.3	165.6	13.57	58.5	50 - 143	211.2	62.6	30	R
Chrysene	138.2	3.3	165.6	32.63	63.7	50 - 130	389.1	95.2	30	R
Dibenz(a,h)anthracene	102	3.3	165.6	4.378	58.9	50 - 130	117.3	14	30	
Fluoranthene	149.5	3.3	165.6	30.79	71.7	50 - 131	592.4	119	30	R
Fluorene	110.7	3.3	165.6	0	66.8	50 - 125	122.9	10.4	30	
Indeno(1,2,3-cd)pyrene	97.94	3.3	165.6	17.34	48.7	45 - 139	226	79.1	30	R
Isophorone	107.1	6.5	165.6	0	64.7	45 - 130	114.6	6.76	30	
Naphthalene	104.3	3.3	165.6	0	63.0	50 - 125	108.6	4.08	30	
Phenanthrene	114.8	3.3	165.6	5.061	66.3	50 - 125	146.6	24.3	30	
Pyrene	133.7	3.3	165.6	26.28	64.8	45 - 130	483.1	113	30	R
Surr: 2-Fluorobiphenyl	*104.7*	*6.5*	*165.6*	*0*	*63.2*	*43 - 125*	*110.3*	*5.24*	*30*	
Surr: 4-Terphenyl-d14	*111.3*	*6.5*	*165.6*	*0*	*67.2*	*32 - 125*	*116*	*4.07*	*30*	
Surr: Nitrobenzene-d5	*110.5*	*6.5*	*165.6*	*0*	*66.7*	*37 - 125*	*115.7*	*4.61*	*30*	

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R396613 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKS1-113121** Units: **ug/Kg** Analysis Date: **30-Nov-2021 12:38**
Client ID: Run ID: **VOA5_396613** SeqNo: **6397930** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	5.0								
1,1,2,2-Tetrachloroethane	U	5.0								
1,1,2-Trichlor-1,2,2-trifluoroethane	U	5.0								
1,1,2-Trichloroethane	U	5.0								
1,1-Dichloroethane	U	5.0								
1,1-Dichloroethene	U	5.0								
1,2,3-Trichlorobenzene	U	5.0								
1,2,4-Trichlorobenzene	U	5.0								
1,2-Dibromo-3-chloropropane	U	5.0								
1,2-Dibromoethane	U	5.0								
1,2-Dichlorobenzene	U	5.0								
1,2-Dichloroethane	U	5.0								
1,2-Dichloropropane	U	5.0								
1,3-Dichlorobenzene	U	5.0								
1,4-Dichlorobenzene	U	5.0								
2-Butanone	U	10								
2-Hexanone	U	10								
4-Methyl-2-pentanone	U	10								
Acetone	U	20								
Benzene	U	5.0								
Bromochloromethane	U	5.0								
Bromodichloromethane	U	5.0								
Bromoform	U	5.0								
Bromomethane	U	10								
Carbon disulfide	U	10								
Carbon tetrachloride	U	5.0								
Chlorobenzene	U	5.0								
Chloroethane	U	10								
Chloroform	U	5.0								
Chloromethane	U	10								
cis-1,2-Dichloroethene	U	5.0								
cis-1,3-Dichloropropene	U	5.0								
Cyclohexane	U	5.0								
Dibromochloromethane	U	5.0								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R396613 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MBLK Sample ID: **VBLKS1-113121** Units: **ug/Kg** Analysis Date: **30-Nov-2021 12:38**
Client ID: Run ID: **VOA5_396613** SeqNo: **6397930** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	U	5.0								
Ethylbenzene	U	5.0								
Isopropylbenzene	U	5.0								
m,p-Xylene	U	10								
Methyl acetate	U	5.0								
Methyl tert-butyl ether	U	5.0								
Methylcyclohexane	U	5.0								
Methylene chloride	U	10								
o-Xylene	U	5.0								
Styrene	U	5.0								
Tetrachloroethene	U	5.0								
Toluene	U	5.0								
trans-1,2-Dichloroethene	U	5.0								
trans-1,3-Dichloropropene	U	5.0								
Trichloroethene	U	5.0								
Trichlorofluoromethane	U	5.0								
Vinyl chloride	U	2.0								
Xylenes, Total	U	5.0								
Surr: 1,2-Dichloroethane-d4	*45.75*	*0*	*50*	*0*	*91.5*	*76 - 125*				
Surr: 4-Bromofluorobenzene	*46.55*	*0*	*50*	*0*	*93.1*	*80 - 120*				
Surr: Dibromofluoromethane	*45.49*	*0*	*50*	*0*	*91.0*	*80 - 119*				
Surr: Toluene-d8	*51.49*	*0*	*50*	*0*	*103*	*81 - 118*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R396613 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

LCS Sample ID: **VLCSS1-113121** Units: **ug/Kg** Analysis Date: **30-Nov-2021 11:53**
Client ID: Run ID: **VOA5_396613** SeqNo: **6397929** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	48.8	5.0	50	0	97.6	72 - 130				
1,1,2,2-Tetrachloroethane	48.38	5.0	50	0	96.8	71 - 124				
1,1,2-Trichlor-1,2,2-trifluoroethane	51.54	5.0	50	0	103	70 - 130				
1,1,2-Trichloroethane	46.21	5.0	50	0	92.4	78 - 117				
1,1-Dichloroethane	43.91	5.0	50	0	87.8	76 - 128				
1,1-Dichloroethene	49.34	5.0	50	0	98.7	72 - 130				
1,2,3-Trichlorobenzene	46.88	5.0	50	0	93.8	76 - 125				
1,2,4-Trichlorobenzene	47.64	5.0	50	0	95.3	70 - 128				
1,2-Dibromo-3-chloropropane	44.09	5.0	50	0	88.2	70 - 128				
1,2-Dibromoethane	44.16	5.0	50	0	88.3	78 - 120				
1,2-Dichlorobenzene	49.5	5.0	50	0	99.0	79 - 121				
1,2-Dichloroethane	47.78	5.0	50	0	95.6	77 - 120				
1,2-Dichloropropane	49.82	5.0	50	0	99.6	77 - 121				
1,3-Dichlorobenzene	50.57	5.0	50	0	101	78 - 121				
1,4-Dichlorobenzene	49.47	5.0	50	0	98.9	78 - 120				
2-Butanone	85.55	10	100	0	85.5	70 - 128				
2-Hexanone	85.05	10	100	0	85.0	72 - 127				
4-Methyl-2-pentanone	86.98	10	100	0	87.0	70 - 128				
Acetone	85.12	20	100	0	85.1	70 - 130				
Benzene	49.33	5.0	50	0	98.7	75 - 124				
Bromochloromethane	48.13	5.0	50	0	96.3	74 - 124				
Bromodichloromethane	45.36	5.0	50	0	90.7	78 - 122				
Bromoform	42.79	5.0	50	0	85.6	74 - 120				
Bromomethane	48.09	10	50	0	96.2	70 - 130				
Carbon disulfide	105.6	10	100	0	106	70 - 122				
Carbon tetrachloride	44.47	5.0	50	0	88.9	72 - 128				
Chlorobenzene	49.03	5.0	50	0	98.1	78 - 122				
Chloroethane	43.29	10	50	0	86.6	70 - 130				
Chloroform	49.87	5.0	50	0	99.7	73 - 127				
Chloromethane	49	10	50	0	98.0	70 - 130				
cis-1,2-Dichloroethene	49.64	5.0	50	0	99.3	77 - 125				
cis-1,3-Dichloropropene	43.74	5.0	50	0	87.5	78 - 122				
Cyclohexane	47.39	5.0	50	0	94.8	74 - 126				
Dibromochloromethane	50.8	5.0	50	0	102	78 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R396613 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

LCS Sample ID: **VLCSS1-113121** Units: **ug/Kg** Analysis Date: **30-Nov-2021 11:53**
Client ID: Run ID: **VOA5_396613** SeqNo: **6397929** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	51.24	5.0	50	0	102	70 - 130				
Ethylbenzene	47.13	5.0	50	0	94.3	70 - 123				
Isopropylbenzene	46.42	5.0	50	0	92.8	78 - 127				
m,p-Xylene	93.26	10	100	0	93.3	77 - 125				
Methyl acetate	40.44	5.0	50	0	80.9	69 - 123				
Methyl tert-butyl ether	49.59	5.0	50	0	99.2	70 - 128				
Methylcyclohexane	47.85	5.0	50	0	95.7	77 - 127				
Methylene chloride	47.71	10	50	0	95.4	71 - 125				
o-Xylene	46.05	5.0	50	0	92.1	78 - 122				
Styrene	44.98	5.0	50	0	90.0	80 - 123				
Tetrachloroethene	50.97	5.0	50	0	102	70 - 130				
Toluene	49.87	5.0	50	0	99.7	76 - 122				
trans-1,2-Dichloroethene	48.46	5.0	50	0	96.9	75 - 128				
trans-1,3-Dichloropropene	41.33	5.0	50	0	82.7	75 - 123				
Trichloroethene	50.53	5.0	50	0	101	78 - 125				
Trichlorofluoromethane	51.12	5.0	50	0	102	70 - 130				
Vinyl chloride	50.24	2.0	50	0	100	70 - 130				
Xylenes, Total	139.3	5.0	150	0	92.9	77 - 128				
Surr: 1,2-Dichloroethane-d4	*49.17*	*0*	*50*	*0*	*98.3*	*76 - 125*				
Surr: 4-Bromofluorobenzene	*50.6*	*0*	*50*	*0*	*101*	*80 - 120*				
Surr: Dibromofluoromethane	*50.13*	*0*	*50*	*0*	*100*	*80 - 119*				
Surr: Toluene-d8	*50.67*	*0*	*50*	*0*	*101*	*81 - 118*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R396613 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MS Sample ID: **HS21111550-02MS** Units: **ug/Kg** Analysis Date: **30-Nov-2021 14:29**
Client ID: Run ID: **VOA5_396613** SeqNo: **6398768** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
1,1,1-Trichloroethane	34.59	4.8	48.5	0	71.3	70 - 130			
1,1,2,2-Tetrachloroethane	25.43	4.8	48.5	0	52.4	70 - 130			S
1,1,2-Trichlor-1,2,2-trifluoroethane	28.78	4.8	48.5	0	59.3	70 - 130			S
1,1,2-Trichloroethane	29.25	4.8	48.5	0	60.3	70 - 130			S
1,1-Dichloroethane	32.84	4.8	48.5	0	67.7	70 - 130			S
1,1-Dichloroethene	28.28	4.8	48.5	0	58.3	70 - 130			S
1,2,3-Trichlorobenzene	28.1	4.8	48.5	0	57.9	70 - 130			S
1,2,4-Trichlorobenzene	29.35	4.8	48.5	0	60.5	70 - 130			S
1,2-Dibromo-3-chloropropane	26.22	4.8	48.5	0	54.1	70 - 130			S
1,2-Dibromoethane	28.23	4.8	48.5	0	58.2	70 - 120			S
1,2-Dichlorobenzene	30.37	4.8	48.5	0	62.6	70 - 130			S
1,2-Dichloroethane	29.33	4.8	48.5	0	60.5	70 - 130			S
1,2-Dichloropropane	31.86	4.8	48.5	0	65.7	70 - 130			S
1,3-Dichlorobenzene	31.51	4.8	48.5	0	65.0	70 - 130			S
1,4-Dichlorobenzene	30.63	4.8	48.5	0	63.2	70 - 130			S
2-Butanone	57.85	9.7	97	0	59.6	70 - 130			S
2-Hexanone	53.52	9.7	97	0	55.2	70 - 130			S
4-Methyl-2-pentanone	55.99	9.7	97	0	57.7	70 - 128			S
Acetone	80.5	19	97	0	83.0	70 - 130			
Benzene	33.52	4.8	48.5	0	69.1	70 - 130			S
Bromochloromethane	30.24	4.8	48.5	0	62.4	70 - 130			S
Bromodichloromethane	25.85	4.8	48.5	0	53.3	70 - 130			S
Bromoform	24.73	4.8	48.5	0	51.0	70 - 130			S
Bromomethane	28.31	9.7	48.5	0	58.4	70 - 130			S
Carbon disulfide	49.43	9.7	97	0	51.0	70 - 130			S
Carbon tetrachloride	26.93	4.8	48.5	0	55.5	70 - 130			S
Chlorobenzene	31.5	4.8	48.5	0	65.0	70 - 130			S
Chloroethane	30.94	9.7	48.5	0	63.8	70 - 130			S
Chloroform	31.12	4.8	48.5	0	64.2	70 - 130			S
Chloromethane	30.7	9.7	48.5	0	63.3	70 - 130			S
cis-1,2-Dichloroethene	31.42	4.8	48.5	0	64.8	70 - 130			S
cis-1,3-Dichloropropene	27.04	4.8	48.5	0	55.7	70 - 130			S
Cyclohexane	33.7	4.8	48.5	0	69.5	74 - 126			S
Dibromochloromethane	33.45	4.8	48.5	0	69.0	70 - 130			S

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R396613 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MS Sample ID: **HS21111550-02MS** Units: **ug/Kg** Analysis Date: **30-Nov-2021 14:29**
Client ID: Run ID: **VOA5_396613** SeqNo: **6398768** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	32.94	4.8	48.5	0	67.9	70 - 130				S
Ethylbenzene	35.27	4.8	48.5	0	72.7	70 - 130				
Isopropylbenzene	32.77	4.8	48.5	0	67.6	70 - 130				S
m,p-Xylene	71.03	9.7	97	4.746	68.3	70 - 130				S
Methyl acetate	19.03	4.8	48.5	0	39.2	69 - 123				S
Methyl tert-butyl ether	30.7	4.8	48.5	0	63.3	70 - 130				S
Methylcyclohexane	32.11	4.8	48.5	39.92	-16.1	77 - 127				S
Methylene chloride	26.44	9.7	48.5	0	54.5	70 - 130				S
o-Xylene	33.07	4.8	48.5	0	68.2	70 - 130				S
Styrene	30.62	4.8	48.5	0	63.1	70 - 130				S
Tetrachloroethene	32.79	4.8	48.5	0	67.6	70 - 130				S
Toluene	33.42	4.8	48.5	0	68.9	70 - 130				S
trans-1,2-Dichloroethene	27.23	4.8	48.5	0	56.1	70 - 130				S
trans-1,3-Dichloropropene	24.69	4.8	48.5	0	50.9	70 - 130				S
Trichloroethene	34.73	4.8	48.5	0	71.6	70 - 130				
Trichlorofluoromethane	31.48	4.8	48.5	0	64.9	70 - 130				S
Vinyl chloride	33.02	1.9	48.5	0	68.1	70 - 130				S
Xylenes, Total	104.1	4.8	145.5	4.746	68.3	70 - 130				S
Surr: 1,2-Dichloroethane-d4	*48.45*	*0*	*48.5*	*0*	*99.9*	*70 - 126*				
Surr: 4-Bromofluorobenzene	*50.32*	*0*	*48.5*	*0*	*104*	*70 - 130*				
Surr: Dibromofluoromethane	*46.04*	*0*	*48.5*	*0*	*94.9*	*70 - 130*				
Surr: Toluene-d8	*49.61*	*0*	*48.5*	*0*	*102*	*70 - 130*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R396613 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MSD Sample ID: **HS21111550-02MSD** Units: **ug/Kg** Analysis Date: **30-Nov-2021 14:52**
Client ID: Run ID: **VOA5_396613** SeqNo: **6398769** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1-Trichloroethane	34.6	4.9	49	0	70.6	70 - 130	34.59	0.0259	30	
1,1,2,2-Tetrachloroethane	31.57	4.9	49	0	64.4	70 - 130	25.43	21.5	30	S
1,1,2-Trichlor-1,2,2-trifluoroethane	30.37	4.9	49	0	62.0	70 - 130	28.78	5.37	30	S
1,1,2-Trichloroethane	31.32	4.9	49	0	63.9	70 - 130	29.25	6.83	30	S
1,1-Dichloroethane	32.6	4.9	49	0	66.5	70 - 130	32.84	0.74	30	S
1,1-Dichloroethene	30.17	4.9	49	0	61.6	70 - 130	28.28	6.47	30	S
1,2,3-Trichlorobenzene	30.02	4.9	49	0	61.3	70 - 130	28.1	6.6	30	S
1,2,4-Trichlorobenzene	30.23	4.9	49	0	61.7	70 - 130	29.35	2.94	30	S
1,2-Dibromo-3-chloropropane	27.85	4.9	49	0	56.8	70 - 130	26.22	6.02	30	S
1,2-Dibromoethane	29.69	4.9	49	0	60.6	70 - 120	28.23	5.04	30	S
1,2-Dichlorobenzene	32.14	4.9	49	0	65.6	70 - 130	30.37	5.68	30	S
1,2-Dichloroethane	31.24	4.9	49	0	63.8	70 - 130	29.33	6.31	30	S
1,2-Dichloropropane	32.81	4.9	49	0	67.0	70 - 130	31.86	2.94	30	S
1,3-Dichlorobenzene	32.58	4.9	49	0	66.5	70 - 130	31.51	3.35	30	S
1,4-Dichlorobenzene	31.83	4.9	49	0	65.0	70 - 130	30.63	3.84	30	S
2-Butanone	74.34	9.8	98	0	75.9	70 - 130	57.85	25	30	
2-Hexanone	61.87	9.8	98	0	63.1	70 - 130	53.52	14.5	30	S
4-Methyl-2-pentanone	63.12	9.8	98	0	64.4	70 - 128	55.99	12	30	S
Acetone	97.19	20	98	0	99.2	70 - 130	80.5	18.8	30	
Benzene	33.37	4.9	49	0	68.1	70 - 130	33.52	0.44	30	S
Bromochloromethane	30.75	4.9	49	0	62.8	70 - 130	30.24	1.66	30	S
Bromodichloromethane	28.14	4.9	49	0	57.4	70 - 130	25.85	8.49	30	S
Bromoform	25.47	4.9	49	0	52.0	70 - 130	24.73	2.98	30	S
Bromomethane	34.24	9.8	49	0	69.9	70 - 130	28.31	19	30	S
Carbon disulfide	60.06	9.8	98	0	61.3	70 - 130	49.43	19.4	30	S
Carbon tetrachloride	28.26	4.9	49	0	57.7	70 - 130	26.93	4.82	30	S
Chlorobenzene	31.84	4.9	49	0	65.0	70 - 130	31.5	1.06	30	S
Chloroethane	31.17	9.8	49	0	63.6	70 - 130	30.94	0.745	30	S
Chloroform	32.34	4.9	49	0	66.0	70 - 130	31.12	3.84	30	S
Chloromethane	30.47	9.8	49	0	62.2	70 - 130	30.7	0.745	30	S
cis-1,2-Dichloroethene	32.41	4.9	49	0	66.2	70 - 130	31.42	3.11	30	S
cis-1,3-Dichloropropene	28.95	4.9	49	0	59.1	70 - 130	27.04	6.84	30	S
Cyclohexane	32.2	4.9	49	0	65.7	74 - 126	33.7	4.54	30	S
Dibromochloromethane	32.97	4.9	49	0	67.3	70 - 130	33.45	1.47	30	S

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R396613 (0) **Instrument: VOA5** **Method: VOLATILES BY SW8260C**

MSD Sample ID: **HS21111550-02MSD** Units: **ug/Kg** Analysis Date: **30-Nov-2021 14:52**
Client ID: Run ID: **VOA5_396613** SeqNo: **6398769** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Dichlorodifluoromethane	33.26	4.9	49	0	67.9	70 - 130	32.94	0.942	30	S
Ethylbenzene	31.85	4.9	49	0	65.0	70 - 130	35.27	10.2	30	S
Isopropylbenzene	31.34	4.9	49	0	64.0	70 - 130	32.77	4.46	30	S
m,p-Xylene	63.96	9.8	98	4.746	60.4	70 - 130	71.03	10.5	30	S
Methyl acetate	28.4	4.9	49	0	58.0	69 - 123	19.03	39.5	30	SR
Methyl tert-butyl ether	36.39	4.9	49	0	74.3	70 - 130	30.7	17	30	
Methylcyclohexane	31.46	4.9	49	39.92	-17.3	77 - 127	32.11	2.04	30	S
Methylene chloride	29.8	9.8	49	0	60.8	70 - 130	26.44	12	30	S
o-Xylene	30.94	4.9	49	0	63.1	70 - 130	33.07	6.67	30	S
Styrene	30.19	4.9	49	0	61.6	70 - 130	30.62	1.41	30	S
Tetrachloroethene	33.79	4.9	49	0	69.0	70 - 130	32.79	2.99	30	S
Toluene	32.89	4.9	49	0	67.1	70 - 130	33.42	1.61	30	S
trans-1,2-Dichloroethene	29.18	4.9	49	0	59.6	70 - 130	27.23	6.91	30	S
trans-1,3-Dichloropropene	27.33	4.9	49	0	55.8	70 - 130	24.69	10.1	30	S
Trichloroethene	35.12	4.9	49	0	71.7	70 - 130	34.73	1.11	30	
Trichlorofluoromethane	30.63	4.9	49	0	62.5	70 - 130	31.48	2.73	30	S
Vinyl chloride	32.47	2.0	49	0	66.3	70 - 130	33.02	1.68	30	S
Xylenes, Total	94.9	4.9	147	4.746	61.3	70 - 130	104.1	9.25	30	S
Surr: 1,2-Dichloroethane-d4	*49.56*	*0*	*49*	*0*	*101*	*70 - 126*	*48.45*	*2.28*	*30*	
Surr: 4-Bromofluorobenzene	*49.83*	*0*	*49*	*0*	*102*	*70 - 130*	*50.32*	*0.98*	*30*	
Surr: Dibromofluoromethane	*47.3*	*0*	*49*	*0*	*96.5*	*70 - 130*	*46.04*	*2.69*	*30*	
Surr: Toluene-d8	*49.43*	*0*	*49*	*0*	*101*	*70 - 130*	*49.61*	*0.349*	*30*	

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173185 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **MBLK-173185** Units: **mg/Kg** Analysis Date: **04-Dec-2021 10:14**
Client ID: Run ID: **ICS-Integrion_397009** SeqNo: **6406540** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	U	1.00								

LCS Sample ID: **LCS-173185** Units: **mg/Kg** Analysis Date: **04-Dec-2021 10:22**
Client ID: Run ID: **ICS-Integrion_397009** SeqNo: **6406541** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	42.2	1.00	40	0	105	80 - 120				

MS Sample ID: **HS21120046-08MS** Units: **mg/Kg** Analysis Date: **04-Dec-2021 19:18**
Client ID: Run ID: **ICS-Integrion_397009** SeqNo: **6406554** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	25.86	0.995	19.89	0.7436	126	80 - 120				S

MSD Sample ID: **HS21120046-08MSD** Units: **mg/Kg** Analysis Date: **04-Dec-2021 19:25**
Client ID: Run ID: **ICS-Integrion_397009** SeqNo: **6406555** PrepDate: **03-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Nitrate (As N)	26.23	0.994	19.89	0.7436	128	80 - 120	25.86	1.4	20	S

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173274 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173274** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:20**
Client ID: Run ID: **UV-2450_397125** SeqNo: **6409273** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	2.00								

LCS Sample ID: **LCS-173274** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:20**
Client ID: Run ID: **UV-2450_397125** SeqNo: **6409272** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	11.9	2.00	12.5	0	95.2	80 - 120				

MS Sample ID: **HS21111398-01MS** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:20**
Client ID: Run ID: **UV-2450_397125** SeqNo: **6409270** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	11.97	2.00	12.47	0.2004	94.4	80 - 120				

MSD Sample ID: **HS21111398-01MSD** Units: **mg/Kg** Analysis Date: **07-Dec-2021 14:20**
Client ID: Run ID: **UV-2450_397125** SeqNo: **6409271** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	12.06	1.99	12.46	0.2004	95.2	80 - 120	11.97	0.74	20	

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: 173396 (0) **Instrument: TOC_03** **Method: TOTAL ORGANIC CARBON BY SW9060A**

MBLK Sample ID: **MBLK-173396** Units: **wt%-dry** Analysis Date: **10-Dec-2021 12:00**
Client ID: Run ID: **TOC_03_397434** SeqNo: **6416678** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	0.1046	0.997								J

LCS Sample ID: **LCS-173396** Units: **wt%-dry** Analysis Date: **10-Dec-2021 12:00**
Client ID: Run ID: **TOC_03_397434** SeqNo: **6416676** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.492	0.947	3.786	0	92.2	80 - 120				

LCSD Sample ID: **LCSD-173396** Units: **wt%-dry** Analysis Date: **10-Dec-2021 12:00**
Client ID: Run ID: **TOC_03_397434** SeqNo: **6416677** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.383	0.940	3.759	0	90.0	80 - 120	3.492	3.18	20	

MS Sample ID: **HS21111398-01MS** Units: **wt%-dry** Analysis Date: **10-Dec-2021 12:00**
Client ID: Run ID: **TOC_03_397434** SeqNo: **6416674** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	5.889	0.937	3.747	3.809	55.5	80 - 120				S

MSD Sample ID: **HS21111398-01MSD** Units: **wt%-dry** Analysis Date: **10-Dec-2021 12:00**
Client ID: Run ID: **TOC_03_397434** SeqNo: **6416675** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	6.245	0.946	3.784	3.809	64.4	80 - 120	5.889	5.86	20	S

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R396871 (0) **Instrument: WetChem_HS** **Method: PH SOIL BY SW9045D**

DUP Sample ID: **HS21111627-01DUP** Units: **pH Units** Analysis Date: **02-Dec-2021 17:00**
Client ID: Run ID: **WetChem_HS_396871** SeqNo: **6403793** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	7.73	0.100					7.78	0.645	10	
Temp Deg C @pH	22.5	0					22.5	0	10	

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R397100 (0) **Instrument:** WetChem_HS **Method:** SPECIFIC CONDUCTIVITY, SOIL 10X EXTRACT

MBLK Sample ID: **MBLK-R397100** Units: **umhos/cm** Analysis Date: **07-Dec-2021 11:03**
Client ID: Run ID: **WetChem_HS_397100** SeqNo: **6408691** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Conductance, Soil Extract	U	5.00								

LCS Sample ID: **LCS-R397100** Units: **umhos/cm** Analysis Date: **07-Dec-2021 11:03**
Client ID: Run ID: **WetChem_HS_397100** SeqNo: **6408690** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Conductance, Soil Extract	1458	5.00	1413	0	103	85 - 115				

DUP Sample ID: **HS21111620-03DUP** Units: **umhos/cm** Analysis Date: **07-Dec-2021 11:03**
Client ID: **Soil Pipe 02** Run ID: **WetChem_HS_397100** SeqNo: **6408692** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Conductance, Soil Extract	119	50.0					118.6	0.337	20	

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: HS21111620

QC BATCH REPORT

Batch ID: R397230 (0) **Instrument:** Balance1 **Method:** TOTAL SOLIDS BY SM2540G-2011

DUP Sample ID: **HS21111398-01DUP** Units: **wt%** Analysis Date: **08-Dec-2021 11:30**
Client ID: Run ID: **Balance1_397230** SeqNo: **6411988** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Solids	61.91	0.0100					60.39	2.49	20	

The following samples were analyzed in this batch: HS21111620-01 HS21111620-02 HS21111620-03

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
WorkOrder: **HS21111620**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
Date	

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Dept of Defense	PJLA L20-507-R2	22-Dec-2021
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

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Client: ERM
Project: Gas to Energy Environmental Impact Assessment Study
Work Order: HS21111620

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS21111620-01	Soil Pipe 04	Login	11/30/2021 2:06:05 PM	PMG	N068
HS21111620-01	Soil Pipe 04	Login	11/30/2021 2:06:05 PM	PMG	Sub
HS21111620-02	Soil Pipe 05	Login	11/30/2021 2:06:05 PM	PMG	N068
HS21111620-02	Soil Pipe 05	Login	11/30/2021 2:06:05 PM	PMG	Sub
HS21111620-03	Soil Pipe 02	Login	11/30/2021 2:06:05 PM	PMG	N068
HS21111620-03	Soil Pipe 02	Login	11/30/2021 2:06:05 PM	PMG	Sub

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Sample Receipt Checklist

Work Order ID: HS21111620 **Date/Time Received:** **30-Nov-2021 12:45**

Client Name: ERM Annapolis **Received by:** **Jared R. Makan**

Completed By: */S/ Paresh M. Giga* 30-Nov-2021 14:10 **Reviewed by:** */S/ Corey Grandits*

eSignature Date/Time eSignature

Matrices: **Regulated Soil** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☑	Not Present ☐
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	14.6C U/C	IR31	
Cooler(s)/Kit(s):	43078		
Date/Time sample(s) sent to storage:	11/30/2021 14:15		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes: PPQ Label No. 62 & Soil Permit received.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

HS21111620

ERM

Gas to Energy Environmental Impact Assessment S

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	Gas to Energy Environmental Impact Assesment Study
Work Order		Project Number	0590231
Company Name	ERM	Bill To Company	ERM
Send Report To	Herbert Pirela	Invoice Attn.	AP
Address	190 Admiral Cochrance Dr	Address	180 Admiral Cochrance Dr
City/State/Zip	Suite 400 MD 21401	City/State/Zip	Suite 400 MD 21401
Phone	(410) 972-4124	Phone	(410) 972-4124
Fax		Fax	
e-Mail Address	herbet.pirela@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

A	8270SIM_Soils (PAHs)
B	9056_Soil (Nitrate)
C	COND_Soil Mod (Conductivity)
D	ICP_Soil_Low (6020/7471 Metals-19)
E	P_Tsoil (Phosphorous)
F	PCB_Soil_Total (8082 PCBs)
G	pH_Soil (9045) & TS_S (total Solids)
H	TOC_Soil (Total Organic Carbon)
I	Volatile Organic Compunds (US EPA 8260)
J	Herbicides (US EPA 8151)

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Soil Pipe 04	17/11/2021	8:30 AM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
2	Soil Pipe 05	17/11/2021	12:23 PM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
3	Soil Pipe 02	20/11/2021	9:36 AM	Soil	8	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign
Delshah Hamid Delshah Hamid
Lalita Gopaul

Shipment Method:

Required Turnaround Time: ☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other

Results Due Date:

Relinquished by: Lalita Gopaul	Date: 22/11/2021	Time: 16:24	Received by:	Notes:
Relinquished by: DHL	Date: 11/30/21	Time: 12:45	Received by (Laboratory):	Cooler Temp. 14.6°C
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

QC Package: (Check Box Below)

x	Level II: Standard QC	TRRP-Checklist
	Level III: Std QC + Raw Data	TRRP Level IV
	Level IV: SW846 CLP-Like	
	Other:	

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

Cooler 4.1-17.8 1931 CF

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tancliff Rd., Suite 210
., Texas 77099
281 530 5656
+1 281 5 0 5887

43,078

CUSTODY SEAL

Date: 11/2021 Time: 16.00
Name: Le
Company: SA Consultants Inc

Seal Broken By: JMY
Date: 11/30/21

43078

NOV

LB1026 (6/11) OMN

EXPRESS WORLDWIDE WPX DHL

From: ALS GLOBAL LOGISTICS SUPPORT SERVICE
ATTN: COREY
Origin: GEO

To: ALS ABORATORY
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210

43078

77099 HOUSTON Texas
United States of America

US-IAH-HOU

C

Ref: 954831200

Part/Sh Weight Piece
46.0/99.0 lbs 1 / 2

25 X 15 X 15

WAYBILL 36 3591 6080

(2L)JS77099+48000001

(>) JD01 4600 0092 0367 5865

DHL

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Monday, December 13, 2021

Corey Grandits
ALS Environmental
10450 Stancliff Rd, Suite 210
Houston, TX 77099

Re: ALS Workorder: 2112033
Project Name:
Project Number: HS21111620

Dear Mr. Grandits:

Three soil samples were received from ALS Environmental, on 12/2/2021. The samples were scheduled for the following analysis:

Herbicides

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Janice Winn-Shilling
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
Arizona	AZ0828
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
Oklahoma	1301
PJLA (DoD ELAP/ISO 170250)	95377
PJLA (DOE-AP/ISO 17025)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280
Virginia	460305

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.

2112033

Herbicides:
The samples were analyzed using GC/ECD (electron capture detectors) according to the current revision of SOP 434 based on SW-846 Method 8151A.

All laboratory control sample and laboratory control sample duplicate criteria were met with the following exceptions:

Spiked Compound	QC Sample	Direction
Dichloroprop	LCS/LCSD	High
Dinoseb	LCS/LCSD	High

Because the sensitivity of the analytical system increased and no target compounds were present in the samples, no further action was taken. All reporting limits are supported.

All remaining acceptance criteria were met.

ADDRESS 225 Commerce Drive, Fort Collins Colorado 80524 USA | PHONE +1 970 490 1511 | FAX +1 970 490 1522

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 2112033
Client Name: ALS Environmental
Client Project Name:
Client Project Number: HS21111620
Client PO Number: HS21111620

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
Soil Pipe 04	2112033-1		SOIL	17-Nov-21	8:30
Soil Pipe 05	2112033-2		SOIL	17-Nov-21	12:23
Soil Pipe 02	2112033-3		SOIL	20-Nov-21	9:36

RIGHT SOLUTIONS | RIGHT PARTNER

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

22112033

Subcontract Chain of Custody

SAMPLING STATE: Maryland

COC ID: 17514

SUBCONTRACT TO:

ALS Environmental, Fort Collins
225 Commerce Drive
Fort Collins, CO 80524

Phone: +1 970 490 1511

CUSTOMER INFORMATION:

Company: ALS Houston
Contact: Corey Grandits
Address: 10450 Stancliff Rd, Ste 210
Phone: +1 281 530 5656
Email: Corey.Grandits@alsglobal.com
Alternate Contact:
Email:

INVOICE INFORMATION:

Company: ALS Houston
Contact: Accounts Payable
Address: 10450 Stancliff Rd, Ste 210
Phone: +1 281 530 5656
Reference: HS21111620
TSR: Houston House Acct

	LAB SAMPLE ID / ANALYSIS REQUESTED	CLIENT SAMPLE ID	MATRIX	COLLECT DATE / DUE DATE
1.	**HS21111620-01**	**Soil Pipe 04**	**Soil**	**17 Nov 2021 08:30**
	8151 Herbicide Full List			14 Dec 2021
2.	**HS21111620-02**	**Soil Pipe 05**	**Soil**	**17 Nov 2021 12:23**
	8151 Herbicide Full List			14 Dec 2021
3.	**HS21111620-03**	**Soil Pipe 02**	**Soil**	**20 Nov 2021 09:36**
	8151 Herbicide Full List			14 Dec 2021

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.
Regulated Soils Permit Attched

QC Level: STD (Laboratory Standard QC: method blank and LCS required)

Relinquished By: _____ Date/Time: 11/30/2021 1800.

Received By: _____ Date/Time: 12/02/2021 810

Cooler ID(s): _____ Temperature(s): _____

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ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS TX Workorder No: 2112033

Project Manager: JWS Initials: AXK Date: 12/02/2021

	N/A	YES	NO
1. Are airbills / shipping documents present and/or removable?		X	
Tracking number:			
2. Are custody seals on **shipping** containers intact?		X	
3. Are custody seals on **sample** containers intact?	X		
4. Is there a COC (chain-of-custody) present?		X	
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		X	
6. Are short-hold samples present?			X
7. Are all samples within holding times for the requested analyses?			X
8. Were all sample containers received intact? (not broken or leaking)		X	
9. Is there sufficient sample for the requested analyses?		X	
10. Are samples in proper containers for requested analyses? (form 250, *Sample Handling Guidelines*)		X	
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)	X		
12. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	X		
13. Were the samples shipped on ice?		X	
14. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #5	RAD ONLY	X	

Cooler #:	1						
Temperature (°C):	2.7						
# of custody seals on cooler:	2						
External µR/hr reading:	11						
Background µR/hr reading:	11						

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES** (If no, see Form 008.)

*** Please provide details here for NO responses to boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.**

samples 1 and 2 expired before receipt

Fedex delayed on delievery

Were unpreserved bottles pH checked? NA All client bottle ID's vs ALS lab ID's double-checked by: AK

If applicable, was the client contacted? **YES** Contact: Corey Grandits Date/Time: _12/2/21 1300

Project Manager Signature / Date: 12/02/21

Form 201r29.xls
(10/15/2019)

*IR Gun #3, VWR SN 170647571
*IR Gun #5, VWR SN 192272629

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Janice WinnShilling

From: Corey Grandits
Sent: Thursday, December 2, 2021 1:08 PM
To: Janice WinnShilling
Subject: RE: sample receipt ALS WO 2112033

Acknowledged, we can proceed with the extraction out of hold

Regards,

Corey Grandits
Project Manager, Environmental
Houston Laboratory

T +1 281 530 5656 **D** +1 281 575 2146
F +1 281 561 6125 **M** +1 281 761 5420
Corey.Grandits@alsglobal.com
10450 Stancliff Road Suite 210
Houston, Texas 77099

Right Solutions · Right Partner
alsglobal.com | How was your ALS experience?

From: Janice WinnShilling <janice.winnshilling@ALSGlobal.com>
Sent: Thursday, December 2, 2021 1:58 PM
To: Corey Grandits <Corey.Grandits@alsglobal.com>
Subject: sample receipt ALS WO 2112033

Sample 1 and 2 expired HT in transit

Janice Winn-Shilling
Project Manager, Environmental
Fort Collins, CO USA

T +1 970 490 1511 **D** +1 970 488 3058
F +1 970 490 1522
janice.winnshilling@alsglobal.com
225 Commerce Drive
Fort Collins, CO 80524

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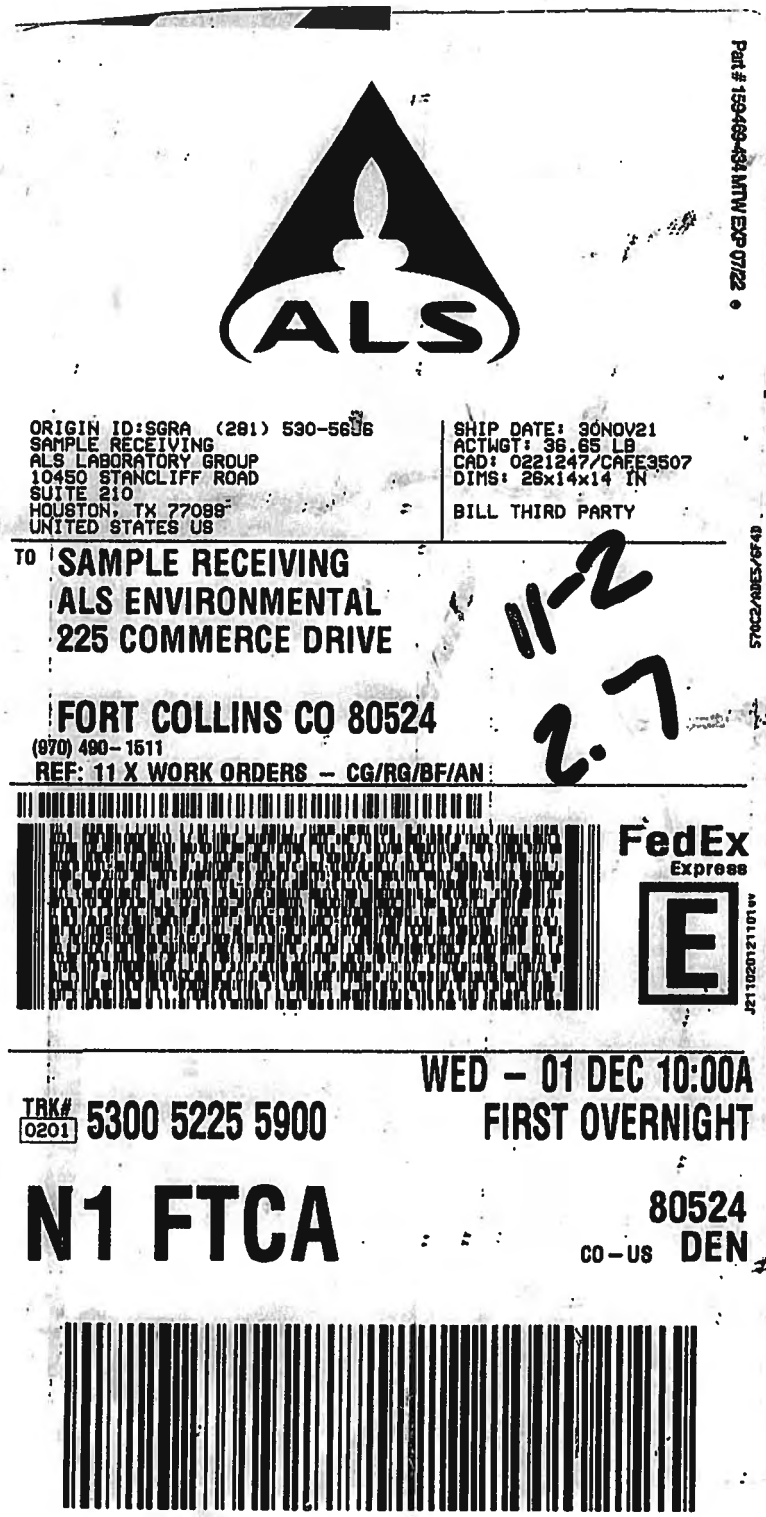
2112033



Part # 159469-434 MTW EXP 07/22

ORIGIN ID:SGRA (281) 530-5656
SAMPLE RECEIVING
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 30NOV21
ACTWGT: 36.65 LB
CAD: 0221247/CAFE3507
DIMS: 26x14x14 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING
ALS ENVIRONMENTAL
225 COMMERCE DRIVE

FORT COLLINS CO 80524
(970) 490-1511
REF: 11 X WORK ORDERS – CG/RG/BF/AN

11-2
2.7

FedEx Express

WED – 01 DEC 10:00A
FIRST OVERNIGHT

TRK# 0201 5300 5225 5900

N1 FTCA

80524
CO-US DEN

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Client:	ALS Environmental	**Date:**	*13-Dec-21*
Project:	HS21111620	**Work Order:**	2112033
Sample ID:	Soil Pipe 04	**Lab ID:**	2112033-1
Legal Location:		**Matrix:**	SOIL
Collection Date:	11/17/2021 08:30	**Percent Moisture:**	34.9

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	MDL	Date Analyzed
CHLORINATED HERBICIDES BY GC/ECD			**SW8151**		Prep Date: **12/2/2021**		PrepBy: **CPC**
DALAPON	ND		200	UG/KG	1	92	12/10/2021 14:29
DICAMBA	ND		9.3	UG/KG	1	4.8	12/10/2021 14:29
MCPP	ND		9900	UG/KG	1	4400	12/10/2021 14:29
MCPA	ND		9900	UG/KG	1	5400	12/10/2021 14:29
DICHLOROPROP	ND		77	UG/KG	1	30	12/10/2021 14:29
2,4-D	ND		130	UG/KG	1	21	12/10/2021 14:29
SILVEX	ND		4.6	UG/KG	1	2.6	12/10/2021 14:29
2,4,5-T	ND		7.7	UG/KG	1	2.9	12/10/2021 14:29
2,4-DB	ND		77	UG/KG	1	32	12/10/2021 14:29
DINOSEB	ND		46	UG/KG	1	21	12/10/2021 14:29
Surr: 2,4-DICHLOROPHENYLACETIC ACID	*82*		*10-160*	*%REC*	1		12/10/2021 14:29

Client:	ALS Environmental	**Date:**	*13-Dec-21*
Project:	HS21111620	**Work Order:**	2112033
Sample ID:	Soil Pipe 05	**Lab ID:**	2112033-2
Legal Location:		**Matrix:**	SOIL
Collection Date:	11/17/2021 12:23	**Percent Moisture:**	32.7

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	MDL	Date Analyzed
CHLORINATED HERBICIDES BY GC/ECD			**SW8151**		Prep Date: **12/2/2021**		PrepBy: **CPC**
DALAPON	ND		200	UG/KG	1	91	12/10/2021 14:52
DICAMBA	ND		9.2	UG/KG	1	4.8	12/10/2021 14:52
MCPP	ND		9800	UG/KG	1	4300	12/10/2021 14:52
MCPA	ND		9800	UG/KG	1	5300	12/10/2021 14:52
DICHLOROPROP	ND		76	UG/KG	1	30	12/10/2021 14:52
2,4-D	ND		130	UG/KG	1	21	12/10/2021 14:52
SILVEX	ND		4.6	UG/KG	1	2.5	12/10/2021 14:52
2,4,5-T	ND		7.6	UG/KG	1	2.8	12/10/2021 14:52
2,4-DB	ND		76	UG/KG	1	31	12/10/2021 14:52
DINOSEB	ND		46	UG/KG	1	21	12/10/2021 14:52
Surr: 2,4-DICHLOROPHENYLACETIC ACID	*23*		*10-160*	*%REC*	1		12/10/2021 14:52

Client:	ALS Environmental	**Date:**	*13-Dec-21*
Project:	HS21111620	**Work Order:**	2112033
Sample ID:	Soil Pipe 02	**Lab ID:**	2112033-3
Legal Location:		**Matrix:**	SOIL
Collection Date:	11/20/2021 09:36	**Percent Moisture:**	27.9

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	MDL	Date Analyzed
CHLORINATED HERBICIDES BY GC/ECD			**SW8151**		Prep Date: **12/2/2021**		PrepBy: **CPC**
DALAPON	ND		180	UG/KG	1	83	12/10/2021 15:15
DICAMBA	ND		8.4	UG/KG	1	4.4	12/10/2021 15:15
MCPP	ND		9000	UG/KG	1	4000	12/10/2021 15:15
MCPA	ND		9000	UG/KG	1	4900	12/10/2021 15:15
DICHLOROPROP	ND		70	UG/KG	1	27	12/10/2021 15:15
2,4-D	ND		120	UG/KG	1	19	12/10/2021 15:15
SILVEX	ND		4.2	UG/KG	1	2.3	12/10/2021 15:15
2,4,5-T	ND		7	UG/KG	1	2.6	12/10/2021 15:15
2,4-DB	ND		70	UG/KG	1	29	12/10/2021 15:15
DINOSEB	ND		42	UG/KG	1	19	12/10/2021 15:15
Surr: 2,4-DICHLOROPHENYLACETIC ACID	*82*		*10-160*	*%REC*	1		12/10/2021 15:15

Client:	ALS Environmental	**Date:**	*13-Dec-21*
Project:	HS21111620	**Work Order:**	2112033
Sample ID:	Soil Pipe 02	**Lab ID:**	2112033-3
Legal Location:		**Matrix:**	SOIL
Collection Date:	11/20/2021 09:36	**Percent Moisture:**	27.9

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	MDL	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC
U or ND - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
U or ND - Indicates that the compound was analyzed for but not detected.
E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
M - Duplicate injection precision was not met.
N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
* - Duplicate analysis (relative percent difference) not within control limits.
S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.
B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
E - Analyte concentration exceeds the upper level of the calibration range.
J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
A - A tentatively identified compound is a suspected aldol-condensation product.
X - The analyte was diluted below an accurate quantitation level.
* - The spike recovery is equal to or outside the control criteria used.
+ - The relative percent difference (RPD) equals or exceeds the control criteria.
G - A pattern resembling gasoline was detected in this sample.
D - A pattern resembling diesel was detected in this sample.
M - A pattern resembling motor oil was detected in this sample.
C - A pattern resembling crude oil was detected in this sample.
4 - A pattern resembling JP-4 was detected in this sample.
5 - A pattern resembling JP-5 was detected in this sample.
H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Batch ID: **EX211202-3-1** Instrument ID: **Herb-1** Method: **SW8151**

LCS Sample ID: **EX211202-3** Units: **UG/KG** Analysis Date: **12/10/2021 13:42**

Client ID: Run ID: **PT211210-10A** Prep Date: **12/2/2021** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
DALAPON	438	132	500		88	1-120				130	
DICAMBA	16.9	6.16	20		85	44-137				50	
MCPP	19100	6600	20000		96	46-120				50	
MCPA	19800	6600	20000		99	48-120				50	
DICHLOROPROP	246	51	200		123	52-120				50	*
2,4-D	215	88	200		107	42-125				50	
SILVEX	21.3	3.08	20		107	51-121				50	
2,4,5-T	18.6	5.1	20		93	50-120				50	
2,4-DB	147	51	200		73	55-122				50	
DINOSEB	164	30.8	100		164	1-120				170	*
Surr: 2,4-DICHLOROPHENYLACETIC ACID	186		160		116	10-160					

LCSD Sample ID: **EX211202-3** Units: **UG/KG** Analysis Date: **12/10/2021 14:05**

Client ID: Run ID: **PT211210-10A** Prep Date: **12/2/2021** DF: **1**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	RPD Ref Value	RPD	RPD Limit	Qual
DALAPON	430	132	500		86	1-120		438	2	130	
DICAMBA	17.6	6.16	20		88	44-137		16.9	4	50	
MCPP	19500	6600	20000		98	46-120		19100	2	50	
MCPA	20100	6600	20000		101	48-120		19800	2	50	
DICHLOROPROP	253	51	200		126	52-120		246	3	50	*
2,4-D	216	88	200		108	42-125		215	0	50	
SILVEX	21.6	3.08	20		108	51-121		21.3	1	50	
2,4,5-T	18.8	5.1	20		94	50-120		18.6	1	50	
2,4-DB	174	51	200		87	55-122		147	17	50	
DINOSEB	166	30.8	100		166	1-120		164	2	170	*
Surr: 2,4-DICHLOROPHENYLACETIC ACID	191		160		119	10-160			2		

Client: ALS Environmental
Work Order: 2112033
Project: HS21111620

QC BATCH REPORT

Batch ID: **EX211202-3-1** Instrument ID: **Herb-1** Method: **SW8151**

MB Sample ID: **EX211202-3** Units: **UG/KG** Analysis Date: **12/10/2021 13:19**
Client ID: Run ID: **PT211210-10A** Prep Date: **12/2/2021** DF: **1**

Analyte	Result	ReportLimit	MDL			Qual
DALAPON	ND	130	61			
DICAMBA	ND	6.2	3.2			
MCPP	ND	6600	2900			
MCPA	ND	6600	3600			
DICHLOROPROP	ND	51	20			
2,4-D	ND	88	14			
SILVEX	ND	3.1	1.7			
2,4,5-T	ND	5.1	1.9			
2,4-DB	ND	51	21			
DINOSEB	ND	31	14			
Surr: 2,4-DICHLOROPHENYLACETIC ACID	185			116	10-160	

The following samples were analyzed in this batch: 2112033-1 2112033-2 2112033-3

APPENDIX F

Environmental Baseline Survey:
Guyana Gas to Shore Pipeline Project

Resubmitted without changes

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Environmental Baseline Survey
Guyana Gas to Shore Pipeline Project

On Behalf of:
Esso Exploration and Production Guyana Ltd (EEPGL)

Project Reference:
021-1863

Revision:
REV01

Date
November2021

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Executive Summary

Overview

Earth & Marine Environmental Consultants was commissioned by Terrasond on behalf of Esso Exploration and Petroleum Guyana Limited EEPGL to undertake an Environmental Baseline Survey (EBS) of a section of the proposed pipeline corridor for the Gas to Shore Project. This project seeks to transmit associated gas from the off-shore oil fields to the former Guysuco Wales Sugar Estate on the West Bank of the Demerara River in Guyana, South America.

The work involved the collection of 23 sea-water samples (from 10 sampling stations) and 30 sediment samples from 15 sample stations (10 of which were co-incident with the water sampling stations). The collected samples were sent for chemical analysis (and in the case of 15 of the sediment samples benthic biodiversity analysis). The purpose of the survey was to establish the baseline chemical and biological conditions along the pipeline corridor from the nearshore zone to approximately 35km off-shore.

The baseline survey data indicates that the parameters assessed are within the expected range for this environment. The principal conclusions of the EBS works are:

- The coastal waters are shallow and indicate a gently sloping shelf with deeper water being many tens of kilometres off-shore (the 20m isobath being somewhere around 35km offshore);
- There is no particular trend or pattern in the water chemistry between stations or between the upper and lower water samples. This is not surprising given that this is such an active mixing zone with brackish and freshwater inflows from the river systems co-mixing with long-shore and wind-driven ocean currents;
- The chemical species observed and their respective concentrations are similarly within the ranges found in sea-water and do not indicate significant pollution of the coastal waters. This again is unsurprising given the general lack of development and lack of heavy industry in the Guyana coastal plain and hinterland feeding the rivers;
- The sediment particle size analysis is very consistent with all of the sediment samples being classified as almost entirely or entirely of fines below 0.063mm in diameter (fine silts and clays effectively). There was no significant sand or gravel component to any of the sediments encountered during the EBS and no notable visual or consistency variation from station to station (this is also true of the 5 additional geotechnical samples that were taken);

- The chemistry of the sediments was again reasonably consistent with no notable locations differing from the others with the range of concentrations of the analysed parameters are within the expected range for seabed sediments. Guyana has hardly any heavy industry so the opportunity for contaminant accretion in the sediments that flow out into the marine basin is limited. The one exception to this is that Guyana has an extensive gold mining industry that uses mercury in hundreds of artisanal sites, which can cause mercury accumulate in sediments, but no evidence of mercury contamination was discovered in the sampled sediments. The chemical characteristics therefore are representative of natural conditions; and

- The Benthic communities identified in the sediments were poor in terms of species diversity and population. There was little difference in the communities from station to station. The benthic infauna community in the survey area is considered to be relatively poor.

The overall summary of the EBS survey works is that the proposed pipeline corridor can be summarised as a physical and chemical environment reflective of natural processes with little evidence of anthropogenic disturbance. The conditions are characterized by well mixed shallow waters with a high suspended solid load and overlaying soft homogenous silt and clay sediments with very sparse and unremarkable benthic communities.

1 Introduction

1.1 Background

This document presents the Environmental Baseline Survey (EBS) Report for the Guyana Gas to Shore Pipeline Project ("the Project") which is being implemented by Esso Petroleum and Exploration Guyana Limited (EEPGL).

Terrasond has been contracted by EEPGL to undertake a Geophysical Survey of the pipeline route for the planned Liza FPSO Phase 1 gas export pipeline. Earth & Marine Environmental Consultants Ltd ("EAME – Guyana Inc.") was commissioned by Terrasond ("the Client") to undertake tasks referred to under "*Activity 4A: Environmental Baseline Survey*" outlined in the "*Guyana Gas to Power Pipeline Nearshore Geophysical Workscope*" document.

This report presents the field observations, sampling and testing results associated with EAME's work package and sets out the baseline conditions of the project area as determined from those studies.

The proposed gas import pipeline will be routed from the offshore Stabroek Oil Field to the West Bank Demerara headland and then on to the site of a proposed natural gas power plant located on the former (now moribund) Wales Sugar Estate. The geophysical survey program is designed to assess and characterize nearshore seabed conditions and hazards for the notional pipeline route that may affect design, installation, and operation. The survey corridor extends from the nearshore zone to approximately 35km off-shore (water depth less than 20m). In other words, the survey is limited to this near coastal zone and did not extend the full length of the pipeline corridor (some 150 nautical miles).

EAME is a multi-disciplinary environmental consultancy with extensive international experience (including pipeline EBS studies in shallow waters) and has a fully incorporated Guyanese company (EAME (Guyana) Inc.) that is registered with the Guyana Environmental Protection Agency (EPA) and has extensive project experience in Guyana, including coastal projects.

The EAME survey team comprised international and local staff with extensive collective experience of sampling, analysis and assessment of marine, riverine and terrestrial environments.

This report has been prepared by EAME and issued to Terrasond as part of its work package for EEPGL.

The survey work also involved the collection of bulk geotechnical samples that were handed over to Fugro on behalf of EEPGL. The assessment of these is not within the scope of this report.

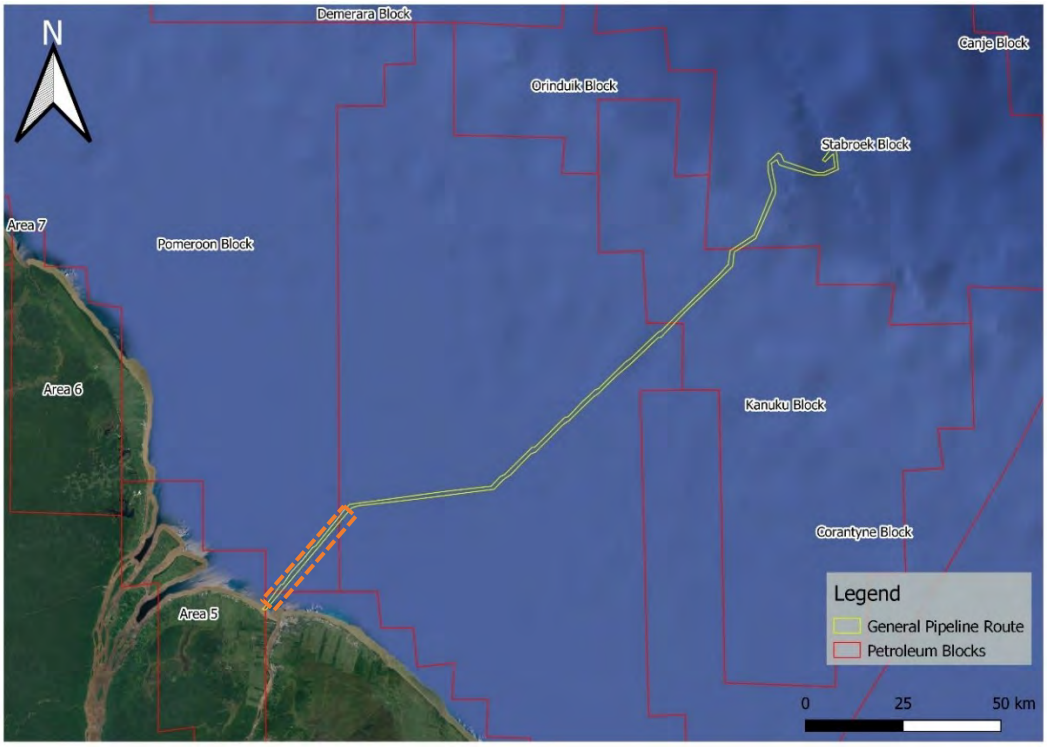


Figure 1.1: *Proposed Pipeline Route and EBS Survey Corridor (orange dashed area)*

1.2 Scope of Works

The general objective of the nearshore EBS survey (Activity 4 of the Scope of Work) was to conduct a robust EBS survey program that will be suitable for project permitting and project construction/operation.

For Activity 4, the Client required the following works:

- Conductivity/Temperature/Water Depth/Dissolved Oxygen/Turbidity vertical profiles over the range of water depths for the survey site;
- Discrete water column samples from 2 to 3 depths (including near surface and near-bottom) analysed for selected metals and hydrocarbons; and

- Sediment samples collected over the depth range and habitat type/s of the survey site and analysed for benthic infauna, selected metals, aliphatic/saturated hydrocarbons (SHC), polycyclic aromatic hydrocarbons (PAH), total organic carbon (TOC), particle size, and oxidation-reduction potential where suspected hypoxia conditions.

As a result, the assessment required CTD profiling and water sampling comprising 10 discrete CTD profiles, up to 30 water samples (3 per station), 15 sediment grab samples for chemical analysis and 15 sediment grab samples for benthic infauna.

In addition to the above works required by Activity 4, EAME was also requested to undertake the collection of 10 Geo-technical sediment samples at selected EBS sampling stations, to aid the undertaking of Activity 4B: Geotechnical Grab Sample Survey.

The general objective of Activity 4B (geotechnical) includes:

- Evaluating seabed conditions and hazards on the pipeline route that may impact design, construction, and operation;
- Acquire necessary data used to provide engineering parameters for design of the pipeline;
- Integrating high level geotechnical data (soil type, relative stiffness, etc) into the geophysical interpretation and reporting; and
- Assessing the burial feasibility of the pipeline.

After the initial survey works were completed, EAME was requested by EEPGL to collect a further 5 inshore sediment grab samples, but these were not related to the Terrasond work package.

EAME's responsibility regarding the geotechnical activity included only the collection of the grab samples and stewardship of the samples to the laboratory identified by the client (Fugro Guyana). As a result, the only discussion regarding these samples within this report will be in relation to the collection methodology, there will be no provision of or discussion of geotechnical results.

2 Baseline Survey Sampling Strategy

2.1 Introduction

The Environmental Baseline Survey field works were undertaken by three qualified EAME field scientists between the 22nd August 2021 and 30th August 2021.

In general, all survey methodologies were designed to satisfy the requirements outlined by Exxon Mobil *General Specification 82: Initial Environmental Survey Acquisition and Analytical Methods REV02 (GS82)* or equivalent methods agreed with the EEPGL project team.

All EBS samples were obtained from one of 15 Environmental Baseline Survey Stations defined by the client prior the commencement of sampling activities. As per the GS82 Document, environmental samples were obtained from within ±50m of the notional sampling location. The client requested that Geo-technical samples were obtained with a ±20m of the notional sampling location. The vessel location data was recorded by a Client supplied Qincy system installed on the survey vessel. Waypoints were input to the vessel GPS navigation system and used to guide the vessel to the general location and the Qincy system was then used to guide the vessel into the station sampling zone and subsequently used for station keeping during sampling activities. Sampling locations are shown in *Table **2.1*** and figuratively in *Figure **2.1***.

Table 2.1: *Environmental Baseline Survey Locations & Sampling Regime*

Environmental Baseline Station	X	Y	Sediment Samples	Water Samples	Geotechnical Samples
Station 1	387999.52	783773.32	Yes	Yes	Yes
Station 2	387609.13	783394.63	Yes	No	No
Station 3	385598.90	780677.30	Yes	Yes	Yes
Station 4	385523.57	780566.50	Yes	No	No
Station 5	383649.52	777995.61	Yes	Yes	Yes
Station 6	382329.91	776174.71	Yes	Yes	Yes
Station 7	381289.80	774728.31	Yes	No	No
Station 8	380675.71	773874.56	Yes	Yes	Yes
Station 9	380117.57	773130.14	Yes	No	No

Environmental Baseline Station	X	Y	Sediment Samples	Water Samples	Geotechnical Samples
Station 10	378533.10	770926.04	Yes	Yes	Yes
Station 11	378054.47	770251.11	Yes	No	No
Station 12	376899.46	768658.25	Yes	Yes	Yes
Station 13	374298.71	765084.25	Yes	Yes	Yes
Station 14	372653.66	762833.49	Yes	Yes	Yes
Station 15	369140.98	757988.79	Yes	Yes	Yes

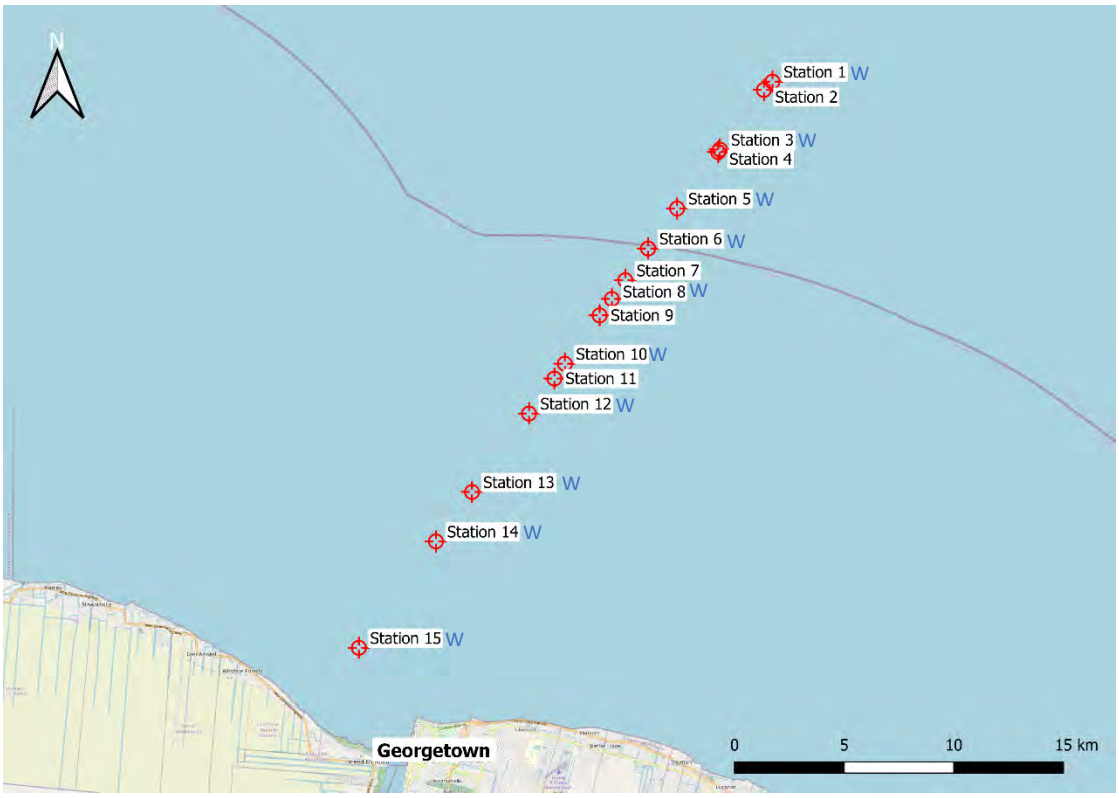


Figure 2.1: *Environmental Baseline Survey Locations (W=water sample station)*

Sampling was undertaken from the Wise Fox survey vessel provided by the client (Photograph ***2.1***). Adaptions were made where required to allow for safe and successful deployment and retrieval of sampling equipment (see Health and Safety Section).

Photograph 2.1: *Wise Fox Survey Vessel Used for EBS Sampling*

2.2 Health and Safety

A detailed project specific Health and Safety Plan (HSP) was prepared in advance of the commencement of the investigatory works. The project specific HSP was approved by the Project Director and was provided to all on-site EAME employees. For the avoidance of doubt, EAME staff as a minimum adhere to relevant legislation and UK best practice as defined within the Health & Safety at Work Act 1974 and related Codes of Practice and Guidance documents. This is a standard document prepared by EAME for all projects and is set out in accordance with EAME's Safety Management System (SMS).

In addition to this EAME's field team were also provided with the Terrasond Project Health and Safety Management Plan and attended the EEPGL/Terrasond Induction meeting prior to survey start.

At the start of each survey day a Job Safety Analysis (JSA) was undertaken focussing on the tasks being performed that day. These were recorded in hard-copy and added to the client Health and Safety file.

It was also necessary to make a number of adaptations to the vessel to create a safe working environment.

2.3 Sample Acquisition and On-Site Analysis

2.3.1 Introduction

Sampling activities were undertaken from the deck of the Wise Fox survey vessel. For each survey day a minimum of two EAME field scientist were on-board to undertake sampling activities.

The procedure followed on arrival at each station was as follows. With multiple scientists on board, some of these tasks were executed concurrently:

1. Preparation of sampling equipment (where relevant, the majority of this occurred during transit to the EBS station);
2. Completion of field log;
3. Deployment of CTD and download of profile data;
4. Water column sampling followed by sub-sampling;
5. Sediment Sampling (involving grabs and subsampling for chemical analysis, benthic infauna, and geotechnical analysis).

Each stage in this procedure is outlined in detail in the following sections.

The survey vessel was positioned on the sampling station by the captain using the engines. Due to operational safety considerations, however (lines deployed in the water at the stern), the skipper was unable to use the engines and propellers to maintain the vessel's location while sampling/survey equipment was deployed. As such some drift was inevitably experienced. On completion of each individual sampling sub-task, the vessel was returned to the station within the accuracy criteria required, before the next sampling/surveying task was implemented.

2.3.2 Pre-sampling preparation

EAME developed a Sample station record log to record station information and conditions (i.e. sea state and other meteorological conditions) and on-site measurement results (i.e. sample

temperature, depth). An example of the Station Log is included in *Annex A*. The summarised results of the Station Logs for each station are presented in *Table 3.1* in Chapter 3.

The sampling equipment that was being used at the upcoming station was also prepped and laid out on the deck working area ready for deployment, with each team member tasked with managing a particular instrument or piece of sampling equipment.

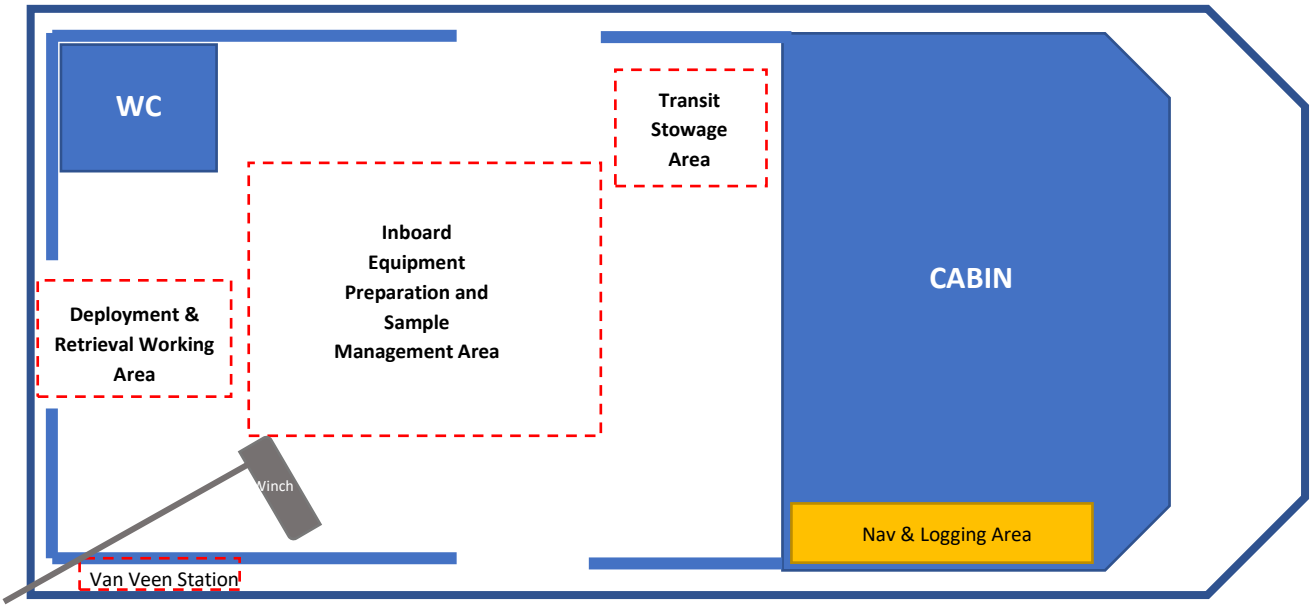
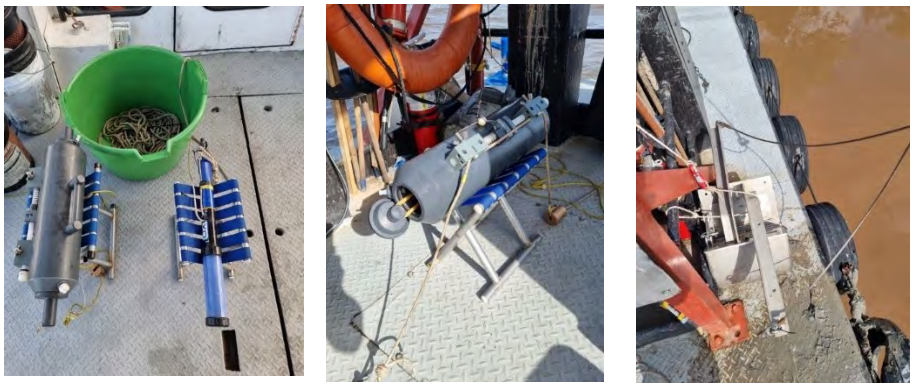


Figure 2.2: Vessel Organisation

Deck space was very limited on the Wise Fox so it was necessary to have designated working areas and clear zones allowing access to the Cabin, WC and the winching area (necessary for the Van Veen deployment). Due to the weight and shape of the Van Veen, it was stored and deployed outside the vessel rails and only brought inboard for sample retrieval.



Photograph 2.2: Niskin, CTD probe and Van Veen Prepared for Deployment

2.3.3 Conductivity, Temperature and Depth Profiling

On arrival at the relevant Environmental Baseline Stations the first task undertaken was the collection of CTD Water Profile Column data. In order to achieve this EAME deployed a YSI EXO1 Sonde. This device was fitted with sensors that provided profile data for Conductivity, Temperate and Depth, as well as Turbidity, pH, Dissolved Oxygen and Redox (Reduction – Oxidation) Potential.

The EX01 was set to collect data at a rate of 2 records per second (2 Hz). The sensor specifications are included in *Table **2.2***.

Table 2.2: *EXO1 Sensor Specifications*

Sensor	Range	Resolution	Accuracy
Conductivity	0 to 200 mS/cm	0.0001 to 0.01 mS/cm	±0.5% of reading or 0.001 mS/cm, w.i.g. (0-100 mS/cm) ±1% of reading (100-200 mS/cm)
Temperature	-5 to 50°C	0.001°C	±0.01°C (-5 to 35°C) ±0.05°C (35 to 50°C)
Depth	0 to 250m	0.001 m	±0.04% Full Scale
Dissolved Oxygen	0 to 500% air sat	0.1% air sat	±1% of reading or 1% sat., w.i.g., (0 to 200%) ±5% of reading (200 to 500%)
	0 to 50 mg/L	0.01 mg/L	±1% of reading or 0.1 mg/L, w.i.g., (0 to 20 mg/L) ±5% of reading (20 to 50 mg/L)
pH	0-14 pH units	0.01 pH unit	±0.1 within ±10°C of cal temp ±0.2 for all other temps
ORP	999 to 999 mV	0.1 mV	±20 mV

Sensor	Range	Resolution	Accuracy
Turbidity	0 to 4000 FNU	0.01 FNU to 0.1 FNU	0.3 FNU or ±3% of reading, (0 to 999 FNU) ±5% of reading (1000 to 4000 FNU)

Collected data was downloaded to a field laptop whilst at each station. It was interrogated to confirm the successful deployment and data collection and to obtain the observed water column depth. In order to protect the sensor heads against siltation, which could affect the accuracy of data collection, the Sonde was deployed to 1m above the seabed. This was determined using a weight mounted in-line but below the Sonde. As such, actual bottom depths are 1m deeper than that recorded by the Sonde.

EAME conducted a calibration test each day the Sonde was used. This was done by testing two solutions that were retained and re-used for each test to monitor for any significant shift in sensor precision. One calibration solution was de-ionised water and the other was a sample of sea water. The averaged results for each calibration check are shown in Table ***2.3***.

Table 2.3: *EXO1 Sensor Calibration Check Results*

Date	Solution	Conductivity µS/cm	ODO mg/L	ORP mV	Turbidity FNU	pH
21/08/2021	De-ionised Water	821.95	8.54	113.20	2.30	8.43
	Sea Water	48500.20	6.78	179.13	148.26	7.77
22/08/2021	De-ionised Water	484.24	8.10	64.85	1.71	8.20
	Sea Water	49102.45	6.44	149.24	150.00	7.77
23/08/2021	De-ionised Water	425.16	8.05	119.91	1.98	8.24
	Sea Water	50142.85	6.55	181.00	148.16	7.63
26/08/2021	De-ionised Water	789.55	8.00	95.32	2.06	8.37
	Sea Water	48344.73	6.83	163.82	148.59	7.77

It should also be noted that the EXO1 unit was also calibrated by the supplier with certified calibration solution prior to shipping and on return to the base.

In addition to the EXO1, EAME ensured there was a secondary CTD profiler available on the survey vessel at all times in the event of failure of the primary device, but its use was not necessary.

Photograph 2.3*: EXO1 After Retrieval*

Photograph 2.4: *On-Station EXO1 Data Download*

2.3.4 Water Sampling

Water Column Sample Retrieval

On completion of the CTD data collection, EAME personnel deployed a 5-litre Niskin sampler to retrieve discrete water samples from defined depths. The discrete samples were taken from between 0.5m and 1m below the water surface and 1m above the sea-bed in each relevant location and where the observed water depth was greater than 12m, an additional sample was retrieved from the middle depth in the water column. Samples were obtained through multiple deployments of the Niskin commencing with the surface sample and progressing down the water column, retrieving the bottom depth sample last.

The Niskin was rinsed with de-ionised water between each deployment and kept in the closed position during transit between stations.

Photograph 2.5: *Niskin Deployment*

Photograph 2.6: *Niskin Retrieval*

Sub Sampling for Water Chemistry Analysis

On successful retrieval of a discrete water column sample, the Niskin was recovered in-board to the work area of the sampling vessel. Here field scientists sub-sampled from the Niskin bottle to acquire the water samples that would be delivered to the relevant laboratory for chemical analysis. Field scientists, wearing clean nitrile gloves for each sub-sampling exercise, decanted sampled water from the sampling valve integrated in the design of the Niskin, into sample containers provided by the destination laboratory and appropriate for the analysis required. The sub-samples were duplicated in case of damage, appropriately stored, and labelled with sufficient nomenclature to distinguish between each sub-sample and to locate its origin (see *Section 2.4* for further information regarding sample integrity).

Photograph 2.7: *Water Sub-Sampling*

2.3.5 Sediment Sampling

Sediment sampling took place after the relevant water sampling was completed to prevent sediment intrusion into the water column from the impact of the van veen landing on the seabed.

Sediment samples were recovered using a single 25kg Van Veen with a grab size of 0.1m^2. These clamshell grabs are a simple and reliable means for collecting undisturbed sediment samples and provide an accurate representation of the top sediment layers.

Two sediment samples were collected at each sampling station, one for benthic fauna analysis and one for chemical and particle size analysis. On retrieval of a successful deployment (confirmed by opening the sampling hatch before bringing the Van Veen inboard), the full Van Veen was placed on a clean plastic sampling mat in the work area of the vessel in preparation for relevant sub-sampling.

The Van Veen was cleaned prior to each deployment using a stiff brush and a solution of seawater and Decon90.

Photograph 2.8: *Van Veen Retrieval*

Sub Sampling for Benthic Infauna Analysis

In order to recover Benthic Infauna samples, sub-sampling occurred from the Van Veen after first deployment to ensure that the infaunal communities were sampled rapidly.

Field scientists, wearing a clean pair of nitrile gloves, used a clean sample scoop to recover a sample from the centre of the closed grab (ca.2cm from the sides) to a depth of 8cm from the surface of the collected sediment sample. This sample was accessed via the top opening flaps of the grab.

The collected sediment sample was then rinsed through a 0.5mm sieve using filtered seawater to remove the fine sediment particles and leave the infauna species on the mesh.

Upon completion of sample rinsing (removal of all sediment particles), the benthic infauna samples were carefully placed into a clean sample container and fixed with a 10% solution of buffered formalin and seawater.

One benthic infauna sample was collected at each station (15 samples in total) and retained for shipping to the laboratory for analysis.

Photograph 2.9: Benthic Sample Immediately After Collection

Photograph 2.10: Successive Filtering and Collection of Infauna Samples

Sub Sampling for Chemical Analysis

Field scientists, wearing clean Nitrile gloves, opened the Van Veen to release the collected sediment on to sampling sheet. A clean trowel was then used to collect two samples (a main and a duplicate) which were placed in an appropriate container for chemical analysis. Sample containers were labelled with sufficient nomenclature to distinguish between each sub-sample and to locate its origin (see Section 2.4 for further information regarding sample integrity).

Photograph 2.11: Van Veen Samples For Chemical Analysis

Geotechnical Sediment Samples

Following the addition to the original scope of works, EAME collected geotechnical samples on behalf of Terrasond. These were collected from the Van Veen at the relevant sample stations. The collected materials were deposited into a clean rubble bag in full and appropriately labelled. These samples were delivered to Fugro representatives in Georgetown. The results of any testing of these samples are not presented in this report and are beyond the scope of the EBS study.

2.3.6 Meteorological Conditions

Meteorological conditions were observed by EAME field scientists on arrival at each survey station. Observations included sea state, cloud cover, temperature, and wind direction strength (observed using a handheld wind vane and hand bearing compass). Data was recorded onto the relevant station's Field Log sheet.

During the survey period the atmospheric conditions were fairly consistent – typically clear skies with intermittent cloud cover, ambient temperature of around 30'C and high relative humidity. Wind conditions varied from still to strong breeze.

Sea state conditions were quite variable during the sampling campaign, ranging from still to choppy with waves over 1m height (which according the safety parameters set by the survey leaders required abandonment of sampling). Unfavourable sea state (waves in excess of 1m height) caused several missed or shortened sampling days but did not affect the overall programme and sampling strategy of the EBS.

Photograph 2.12: Typical Sampling Conditions During Survey

2.4 Sample Integrity

Each sample had a unique reference number assigned to it which has stayed with it throughout the sampling, sample management and analysis.

All collected sediment and seawater samples were submitted to an MCERTS (Soils) and UKAS (ISO 17025) accredited laboratory (i2 Analytical) for chemical analysis in accordance with the Scope of Work. Discussions were held with the laboratory prior to the commencement of any works to determine the quantity of sample required and the correct containers to be used.

All samples obtained were placed in the appropriate container for the analysis to be carried out and were immediately put into a temperature regulated cool box with frozen cool packs.

After each day's sampling, the samples were stored in a dedicated refrigerator. Once collected all the samples were packaged for shipping along with a completed Chain of Custody (CoC) form for dispatch with the samples to the laboratory.

The samples were shipped via DHL to i2 Analytical. Similarly, formalin preserved Benthic Samples were shipped via DHL to Environmental Services Ltd (Trinidad) for species identification and characterisation.

Geotechnical bulk samples were double bagged and tagged with the station location, collection date and description and handed over to a Fugro representative at their Georgetown partner laboratories.

In terms of QA/QC the following provisions were made (in addition to the standard laboratory QA/QC protocols):

- A duplicate sample was collected for every water sample and the duplicate stored in case of an analysis problem or sample container damage;
- In the case of Sample EEBS202 the duplicate sample was submitted to the laboratory for analysis; and
- Each sample shipping box contained a trip blank to determine if the sample had suffered any contamination in transit.

The trip blank is mainly required to confirm if the samples may have been exposed to hydrocarbon contamination in transit. The results show no such contamination occurred.

All samples submitted for analytical analysis are outlined in *Table **2.4***

Table 2.4: Samples submitted for laboratory analysis

Station	Matrix	Analysis	Submitted Samples
EBS01	Water	Chemical	EEBS222-01 EEBS223-01 EEBS224-01
	Sediment	Chemical	EEBS129-01
		Benthic Infauna	EEBS015-01
		Particle Size Distribution	EEBS129-04
EBS02	Sediment	Chemical	EEBS127-01
		Benthic Infauna	EEBS014-01
		Particle Size Distribution	EEBS127-04
EBS03	Water	Chemical	EEBS219-01 EEBS220-01 EEBS221-01
	Sediment	Chemical	EEBS125-01
		Benthic Infauna	EEBS013-01
		Particle Size Distribution	EEBS125-04
EBS04	Sediment	Chemical	EEBS123-01
		Benthic Infauna	EEBS012-01
		Particle Size Distribution	EEBS123-04
EBS05	Water	Chemical	EEBS217-01 EEBS218-01
	Sediment	Chemical	EEBS121-01
		Benthic Infauna	EEBS011-01
		Particle Size Distribution	EEBS121-04

Station	Matrix	Analysis	Submitted Samples
EBS06	Water	Chemical	EEBS215-01 EEBS216-01
	Sediment	Chemical	EEBS119-01
		Benthic Infauna	EEBS010-01
		Particle Size Distribution	EEBS119-04
EBS07	Sediment	Chemical	EEBS117-01
		Benthic Infauna	EEBS009-01
		Particle Size Distribution	EEBS117-04
EBS08	Water	Chemical	EEBS213-01 EEBS214-01
	Sediment	Chemical	EEBS115-01
		Benthic Infauna	EEBS008-01
		Particle Size Distribution	EEBS115-04
EBS09	Sediment	Chemical	EEBS113-01 EEBS007-02
		Benthic Infauna	EEBS007-01
		Particle Size Distribution	EEBS113-04
EBS10	Water	Chemical	EEBS211-01 EEBS212-01
	Sediment	Chemical	EEBS111-01
		Benthic Infauna	EEBS006-01
		Particle Size Distribution	EEBS111-04
EBS11	Sediment	Chemical	EEBS109-01
		Benthic Infauna	EEBS005-01
		Particle Size Distribution	EEBS109-04

Station	Matrix	Analysis	Submitted Samples
EBS12	Water	Chemical	EEBS207-01 EEBS208-01
	Sediment	Chemical	EEBS107-01
		Benthic Infauna	EEBS004-01
		Particle Size Distribution	EEBS107-04
EBS13	Water	Chemical	EEBS205-01 EEBS206-01
	Sediment	Chemical	EEBS105-01
		Benthic Infauna	EEBS003-01
		Particle Size Distribution	EEBS105-04
EBS14	Water	Chemical	EEBS203-01 EEBS204-01
	Sediment	Chemical	EEBS103-01
		Benthic Infauna	EEBS002-01
		Particle Size Distribution	EEBS103-04
EBS15	Water	Chemical	EEBS201-01 EEBS202-01 EEBS202-02 (Duplicate)
	Sediment	Chemical	EEBS101-01
		Benthic Infauna	EEBS001-01
		Particle Size Distribution	EEBS101-04

The full analytical report is presented in *Annex B* to this report and the results are discussed in *Section 5*.

3 Field Observations Summary

3.1 Station Observations and Sampling conditions

Table 3.1: Field Observations

Station Name	Date	Time of Arrival	Time of Departure	Station Bottom (m)	Temp (°C)	Humidity (%)	Wind Direction (°) and strength (km/h)	Barometric Pressure (mb)	Cloud Cover	Sea State (m)	Samples Obtained
EBS01	26/08/2021	12:15	12:45	18.2	28.8	76	Still	1010	Overcast	0.5-1.25	S,W, CTD, G
EBS02	29/08/2021	14.45	15.11	17	32	68	115, 7.2	1011	Overcast	0.5–1.25	S,
EBS03	29/08/2021	13:55	14:21	15	29	76	200, 5	1010	Overcast	0.5-1.25	S, W, CTD, G
EBS04	29/08/21	12.27	13.05	14	32	72	108, 4.1	1011	Overcast	0.5-1.25	S,
EBS05	26/08/2021	10:16	11:14	11	29	76	90, 5	1010	Mostly Cloudy	0.5-1.25	S,W, CTD, G
EBS06	26/08/2021	09:51	10:06	9.1	29.2	76	45, 12.7	1010	Mostly Cloudy	0.2-0.5	S,W, CTD, G
EBS07	29/8/21	11.15	11.38	9.5	31	72	48, 9.7	1011	Overcast	0.5-1.25	S
EBS08	26/08/2021	09:25	09:35	9	28.5	76	35, 11	1010	Partially Cloudy	0.2-0.5	S, W, CTD, G
EBS09	26/08/2021	09:00	09:15	9.1	29.5	76	35, 10	1010	Partially Cloudy	0.2-0.5	S, CTD
EBS10	26/08/2021	08:34	08:50	8.3	29.5	76	35, 10.3	1010	Partially Cloudy	0.2-0.5	S, W, CTD, G

Station Name	Date	Time of Arrival	Time of Departure	Station Bottom (m)	Temp (°C)	Humidity	Wind Direction (°) and strength (km/h)	Barometer Pressure	Cloud Cover	Sea State	Samples Obtained
EBS11	23/08/2021	08:10	09:33	7	28.8	81	Still	1011	Overcast	0.5-1.25	S, CTD
EBS12	22/08/2021	12:10	13:55	6.8	29.4	76	125, 18	1012	Clear	0.5-1.25	S, W, CTD, G
EBS13	21/08/2021	15:12	17:20	6.4	32	84	60, 12.3	1012	Clear	0.2-0.5	S, W, CTD, G
EBS14	21/08/2021	13:20	14:53	4.6	32.2	84	130, 17.2	1012	Clear	0.2-0.5	S, W, CTD, G
EBS15	21/08/2021	08:53	12:40	1.4	31	84	Still	1012	Clear	0.2-0.5	S, W, CTD, G

S = Sediment
W = Water
CTD = CTD Depth Profile
G = Geotechnical

3.2 In-Situ Water Quality Profiles (CTD)

Introduction

Data collected by the EXO1 (Conductivity, dissolved oxygen, redox potential, turbidity, pH and temperature) utilises a range of parameters that, if measured through the full depth of the water column can indicate changes in water chemistry and stratification. The parameters are measured using a number of different units and each sonde has different scales of response. It would be difficult to represent all these different units and scales on a single chart that would enable effective comparison of the results to each other for the given depth profile at each station. Similarly if each individual parameter was presented on its own chart this would not be a very effective way of visualising changes in general physico-chemical conditions with depth on a station by station basis and would generate over 70 charts. The most effective way to visualise the results and enable comparison of how different parameters change with depth at each station is to normalise them all to a common arbitrary scale that shows relative change in value with depth. The results were normalised by representing each data point as a percentage change from the initial surface measurement. This was achieved using the following equation:

$Z_i = (X_i/Y)*100$

Where:

Z_i is the i^{th} normalised data

X_i is the i^{th} value of the data set

Y is the first collected value of the data set

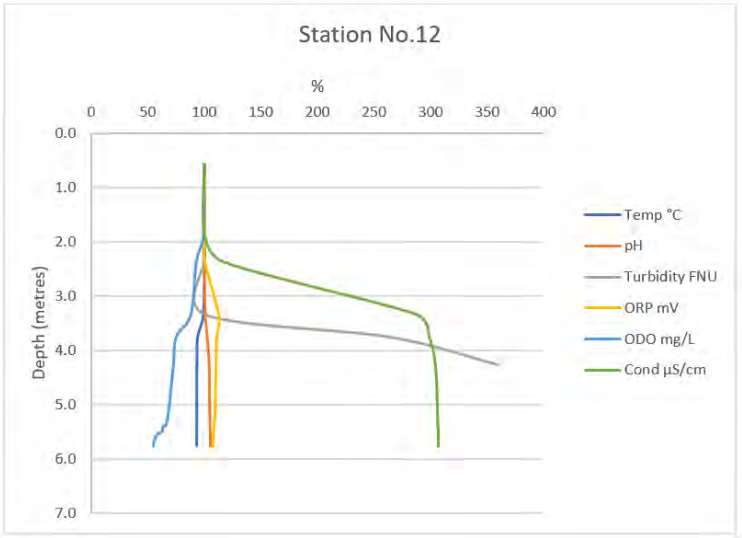
This allowed the data relating to each parameter to represented together on one line graph at each station and gives an immediate visual representation of increases and decreases in the values of each parameter with increasing depth. At all stations, turbidity increased so significantly in the lower sections of the profile that direct comparison with other parameters has not been possible.

It should be noted that turbidity data has still been normalised and presented on the line graphs with other data but in most cases, it extends above the highest value on the % axis. As a result, a second line graph is included for each EBS presenting the raw turbidity data only.

Although the scope of work only required CTD profiles at 10 stations, the survey team used the device at 12 stations – the results for all 12 sites are presented below. Stations 9 and 11 are the additional stations, where the opportunity was taken whilst on station to undertake a CTD profile.

The CTD sonde is connected via Bluetooth to the laptop. On retrieval the data is transferred to the laptop into a spreadsheet which is then converted to a chart.

			SENSOR SERIAL NUMBE	21A10121	13E10071	21A10121	12H10051	12H10051	12H10051	18B10421	13E10071	21A10121	21A10121	21A10121	21G10061	21G10061	18B10421	18B10421	21A10121	13E10071	13E10174	13E10174
Date (MM	Time (HH	mm:ss	Time (Fr	Site Name	Cond µS	Depth m	LF Cor	ODO % s	ODO % (	ODO mg	ORP mV	Pressure	Sal psu	SpCond	TDS mg	Turbidity	TSS mg/	pH	pH mV	Temp °C	Vertical I	Battery \	Cable Pw
22/09/2021	13:05:54		0	EBS 12	156.3	-0.096	141.1	99.2	100.3	7.49	141.2	-0.136	0.07	142.6	93	127.39	0	6.8	5.9	30.047	-0.095	2.54	1
22/09/2021	13:05:54		0.5	EBS 12	155.8	-0.096	140.6	99.1	100.3	7.49	141.3	-0.135	0.07	142.1	92	131.25	0	6.8	5.9	30.043	-0.095	2.54	1
22/09/2021	13:05:55		0	EBS 12	156.1	-0.096	140.9	99.1	100.3	7.49	141.4	-0.136	0.07	142.4	93	134.49	0	6.8	5.7	30.043	-0.096	2.54	1
22/09/2021	13:05:55		0.5	EBS 12	156.6	-0.095	141.3	99.1	100.3	7.49	141.5	-0.134	0.07	142.8	93	137.69	0	6.8	5.6	30.039	-0.095	2.54	1
22/09/2021	13:05:56		0	EBS 12	156.7	-0.095	141.4	99.2	100.4	7.49	141.7	-0.135	0.07	143	93	140.82	0	6.8	5.6	30.042	-0.096	2.54	1
22/09/2021	13:05:56		0.5	EBS 12	156.5	-0.096	141.3	99.3	100.4	7.5	141.7	-0.136	0.07	142.8	93	143.94	0	6.78	6.7	30.042	-0.096	2.54	1
22/09/2021	13:05:57		0	EBS 12	155.3	-0.095	140.2	99.2	100.4	7.49	141.8	-0.135	0.07	141.7	92	147.24	0	6.77	7.6	30.032	-0.095	2.54	1
22/09/2021	13:05:57		0.5	EBS 12	155	-0.096	140	99.2	100.4	7.49	141.8	-0.135	0.07	141.5	92	150.64	0	6.77	7.8	30.006	-0.095	2.54	1
22/09/2021	13:05:58		0	EBS 12	155	-0.095	140.1	99.1	100.2	7.49	142.1	-0.135	0.07	141.6	92	153.69	0	6.77	7.4	29.977	-0.095	2.54	1
22/09/2021	13:05:58		0.5	EBS 12	155.2	-0.095	140.2	99	100.1	7.49	142.3	-0.135	0.07	141.7	92	154.9	0	6.79	6.3	29.977	-0.096	2.54	1
22/09/2021	13:05:59		0	EBS 12	155.3	-0.096	140.3	99	100.2	7.49	142.8	-0.136	0.07	141.8	92	155.54	0	6.8	5.8	29.998	-0.097	2.54	1
22/09/2021	13:05:59		0.5	EBS 12	154.9	-0.097	139.8	99.2	100.3	7.49	143.4	-0.137	0.06	141.3	92	155.65	0	6.82	4.8	30.007	-0.098	2.54	1
22/09/2021	13:06:00		0	EBS 12	153.7	-0.097	138.8	99.2	100.3	7.49	143.6	-0.137	0.06	140.3	91	155.6	0	6.82	4.6	30.015	-0.097	2.54	1
22/09/2021	13:06:00		0.5	EBS 12	152.8	-0.096	137.9	99.3	100.4	7.5	143.3	-0.136	0.06	139.4	91	155.55	0	6.84	3.7	30.02	-0.095	2.54	1
22/09/2021	13:06:01		0	EBS 12	151.9	-0.095	137.1	99.3	100.4	7.5	143.1	-0.135	0.06	138.6	90	155.59	0	6.85	3	30.027	-0.095	2.54	1
22/09/2021	13:06:01		0.5	EBS 12	150	-0.095	135.4	99.1	100.2	7.49	143	-0.135	0.06	136.9	89	155.72	0	6.85	3	30.032	-0.096	2.54	1
22/09/2021	13:06:02		0	EBS 12	147.8	-0.095	133.4	99	100.1	7.48	143.1	-0.135	0.06	134.8	88	155.55	0	6.73	10	30.028	-0.096	2.54	1
22/09/2021	13:06:02		0.5	EBS 12	146.3	-0.095	132.1	98.8	99.9	7.46	143.3	-0.134	0.06	133.5	87	155.58	0	6.76	8.1	29.994	-0.095	2.54	1
22/09/2021	13:06:03		0	EBS 12	145.9	-0.095	131.8	98.7	99.8	7.46	143.4	-0.134	0.06	133.2	87	155.64	0	6.81	5.1	29.941	-0.094	2.54	1
22/09/2021	13:06:03		0.5	EBS 12	145.6	-0.094	131.7	98.7	99.8	7.47	143.7	-0.133	0.06	133.1	86	155.69	0	6.8	5.7	29.911	-0.093	2.54	1
22/09/2021	13:06:04		0	EBS 12	145.2	-0.094	131.4	98.7	99.8	7.47	143.9	-0.133	0.06	132.8	86	155.62	0	6.8	5.8	29.901	-0.094	2.54	1
22/09/2021	13:06:04		0.5	EBS 12	144.7	-0.094	130.9	98.7	99.8	7.47	144.2	-0.133	0.06	132.3	86	155.7	0	6.82	4.7	29.89	-0.095	2.54	1
22/09/2021	13:06:05		0	EBS 12	143.8	-0.094	130.2	98.7	99.8	7.47	144.3	-0.133	0.06	131.5	85	155.59	0	6.8	6	29.881	-0.095	2.54	1
22/09/2021	13:06:05		0.5	EBS 12	142.9	-0.095	129.4	98.7	99.8	7.46	144.5	-0.134	0.06	130.7	85	155.43	0	6.8	6	29.861	-0.094	2.54	1
22/09/2021	13:06:06		0	EBS 12	141.9	-0.094	128.5	103.4	104.6	7.83	144.6	-0.134	0.06	129.8	84	155.56	0	6.8	5.9	29.857	-0.093	2.54	1
22/09/2021	13:06:06		0.5	EBS 12	141.9	-0.094	128.5	101.5	102.7	7.69	130.4	-0.133	0.06	129.8	84	1573.2	0	7.84	-55.5	29.863	-0.093	2.54	1
22/09/2021	13:06:07		0	EBS 12	141.9	-0.093	128.2	99.7	100.8	7.55	130.3	-0.132	0.06	129.6	84	32.37	0	7.67	-45.4	30	-0.093	2.54	1
22/09/2021	13:06:07		0.5	EBS 12	17460	-0.093	15724	98	99.1	7.4	130.4	-0.132	9.23	15897	10333	29.5	0	7.63	-42.7	30.195	-0.094	2.54	1
22/09/2021	13:06:08		0	EBS 12	17242	-0.093	15468	96.8	97.7	6.92	131	-0.132	9.07	15646	10170	71.81	0	7.56	-38.9	30.339	-0.093	2.54	1
22/09/2021	13:06:08		0.5	EBS 12	17242	-0.093	15447	95.2	96.2	6.8	131	-0.132	9.05	15627	10159	27.37	0	7.52	-36.6	30.41	-0.091	2.54	1
22/09/2021	13:06:09		0	EBS 12	17242	-0.086	15444	94.3	95.3	6.73	131.1	-0.122	9.05	15624	10156	28.72	0	7.49	-34.5	30.423	0.035	2.54	1
22/09/2021	13:06:09		0.5	EBS 12	17455	0.071	15632	94.3	95.3	6.73	131.2	0.102	9.17	15815	10280	28.44	0	7.47	-33.6	30.43	0.309	2.54	1
22/09/2021	13:06:10		0	EBS 12	17441	0.266	15618	93.5	94.6	6.67	131.2	0.379	9.16	15801	10271	27.93	0	7.47	-33.6	30.434	0.412	2.54	1
22/09/2021	13:06:10		0.5	EBS 12	17439	0.456	15614	92.9	94	6.63	131.3	0.65	9.16	15797	10268	27.42	0	7.47	-33.4	30.438	0.441	2.54	1
22/09/2021	13:06:11		0	EBS 12	17441	0.454	15616	92.2	93.3	6.58	131.3	0.647	9.16	15799	10269	27.49	0	7.46	-32.8	30.441	0.34	2.54	1
22/09/2021	13:06:11		0.5	EBS 12	17439	0.378	15614	92.2	93.3	6.58	131.3	0.538	9.16	15798	10268	27.35	0	7.45	-32.3	30.442	0.245	2.54	1
22/09/2021	13:06:12		0	EBS 12	17439	0.226	15613	91.2	92.2	6.51	131.4	0.322	9.16	15797	10268	27.72	0	7.44	-31.8	30.442	0.182	2.54	1



The results of the CTD profile data logging for each of the sampled stations are presented in a series of charts below. It should be noted that at Station 15 (closest to the shoreline) the water depth was very shallow (just over 1m) so with the size of the CTD sonde and the line and ballast weight, the measured profile is very short.

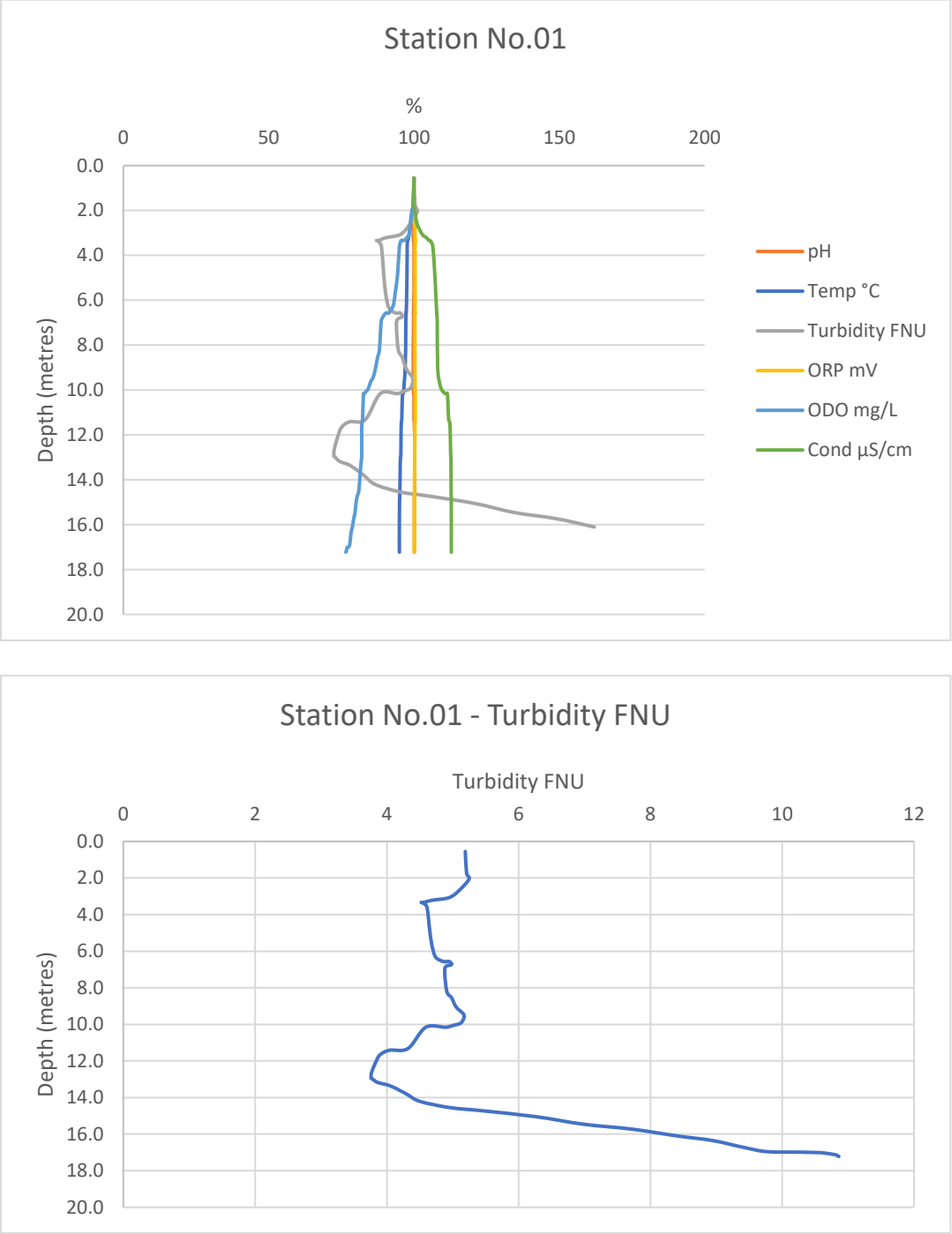


Figure 3.1: *Station 01 CTD Sonde Data*

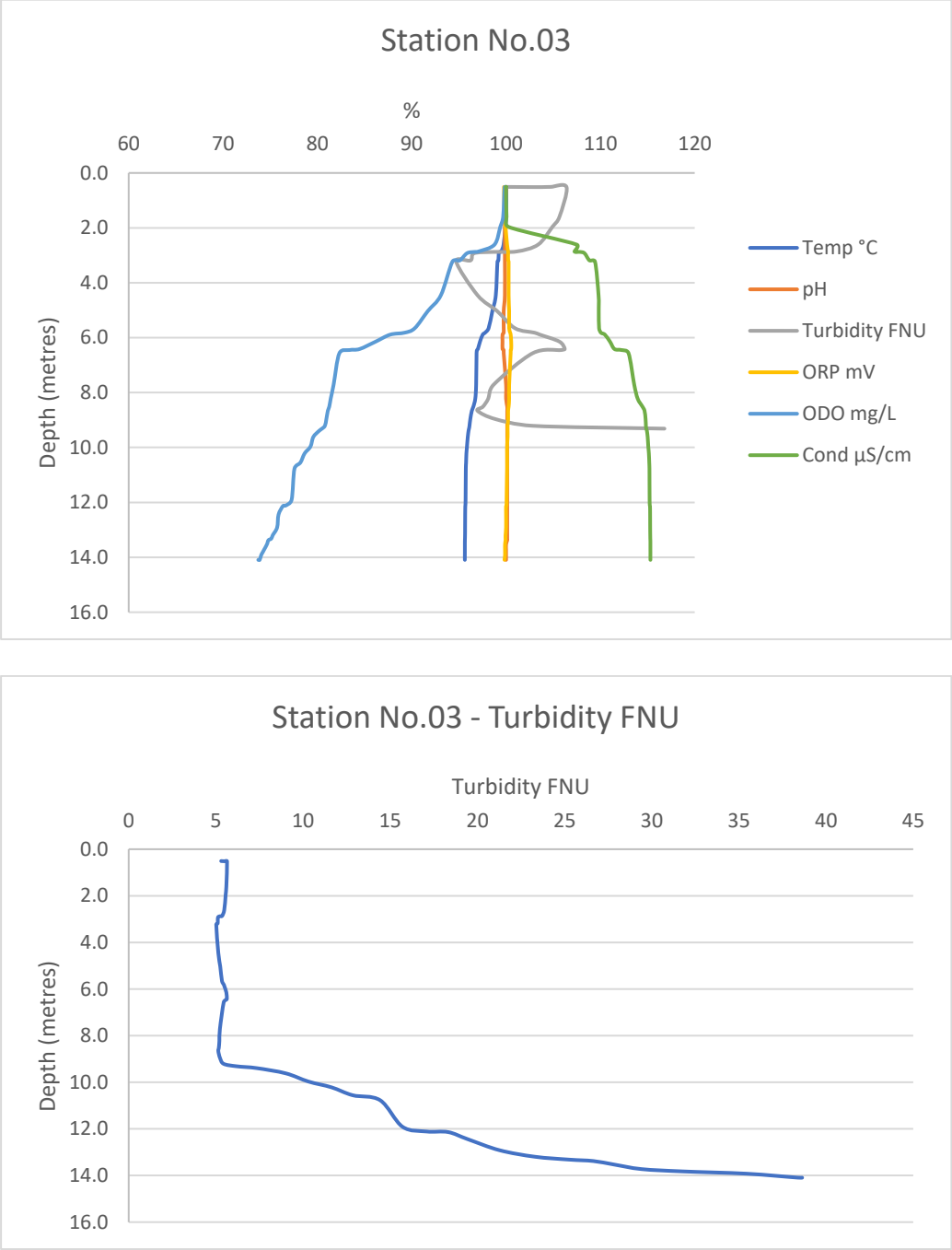
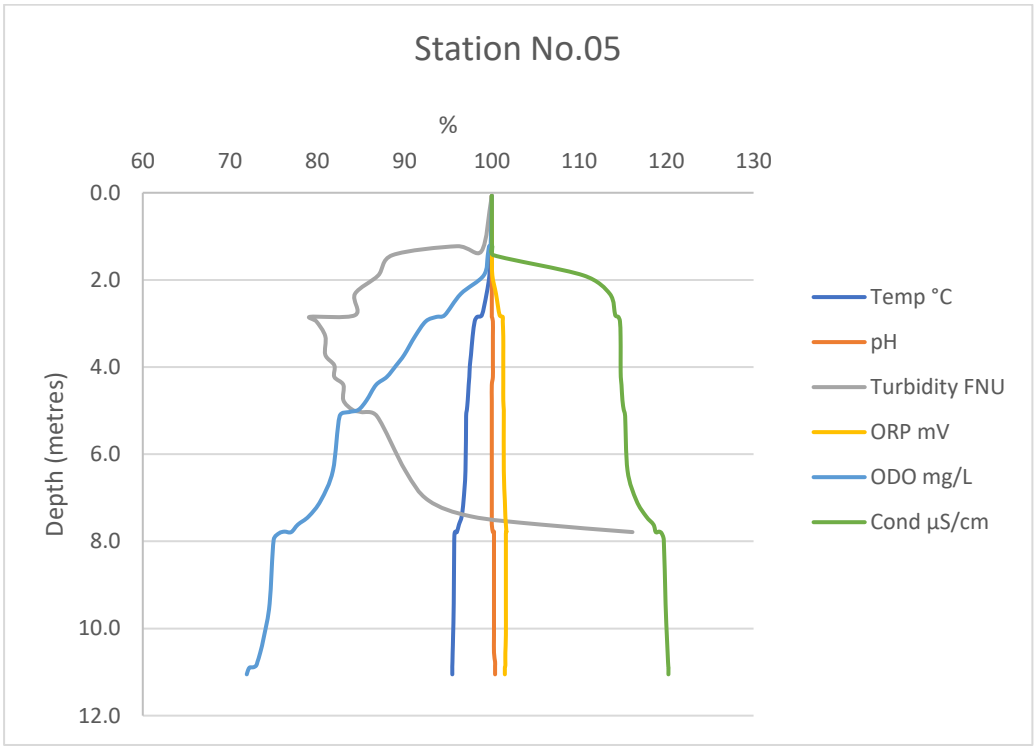


Figure 3.2: *Station 03 CTD Sonde Data*



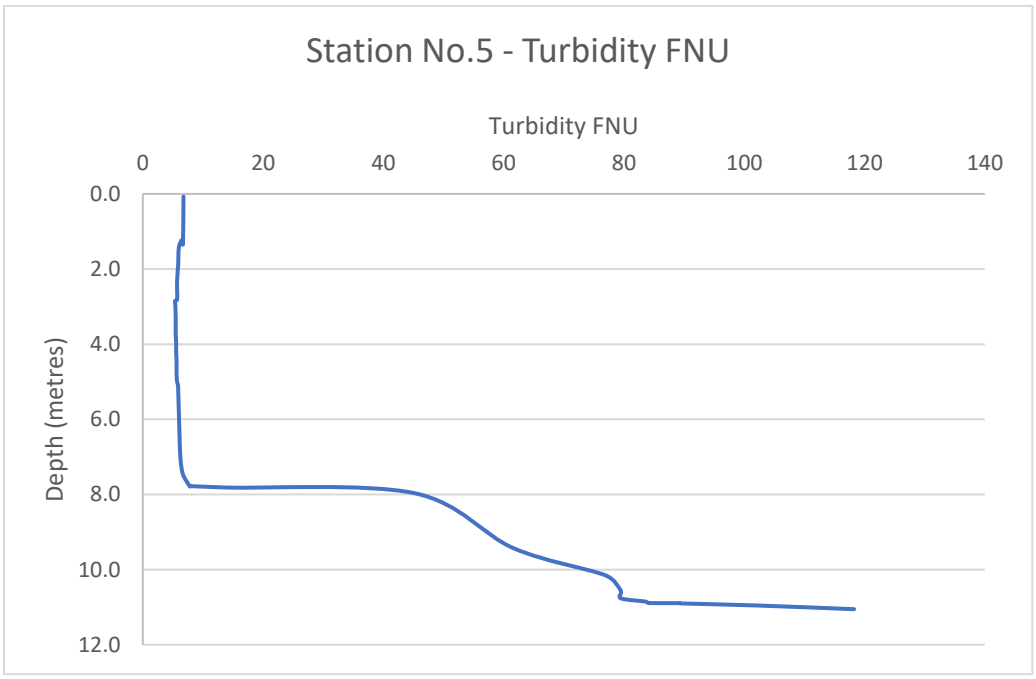


Figure 3.3: *Station 05 CTD Sonde Data*

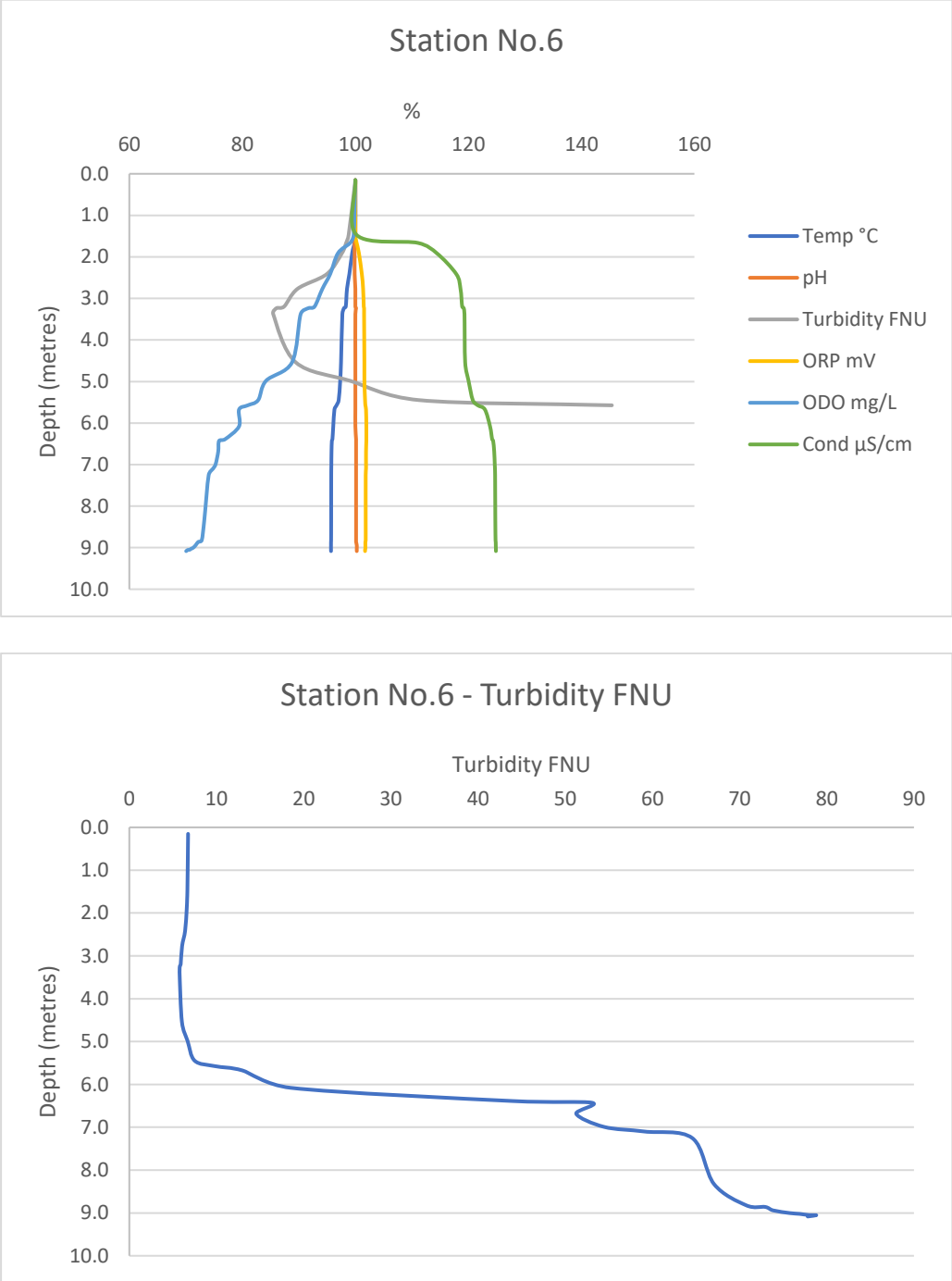


Figure 3.4: *Station 06 CTD Sonde Data*

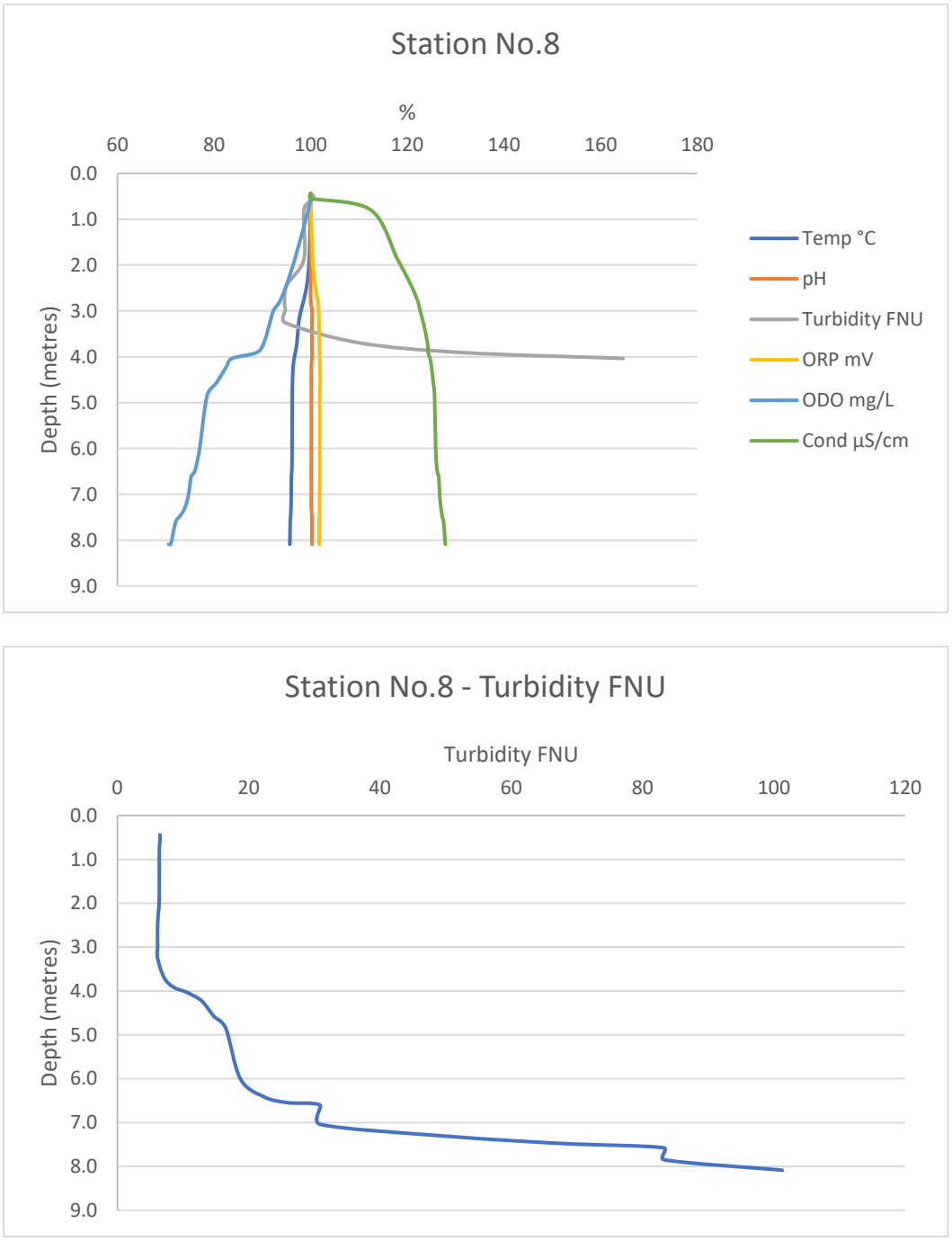
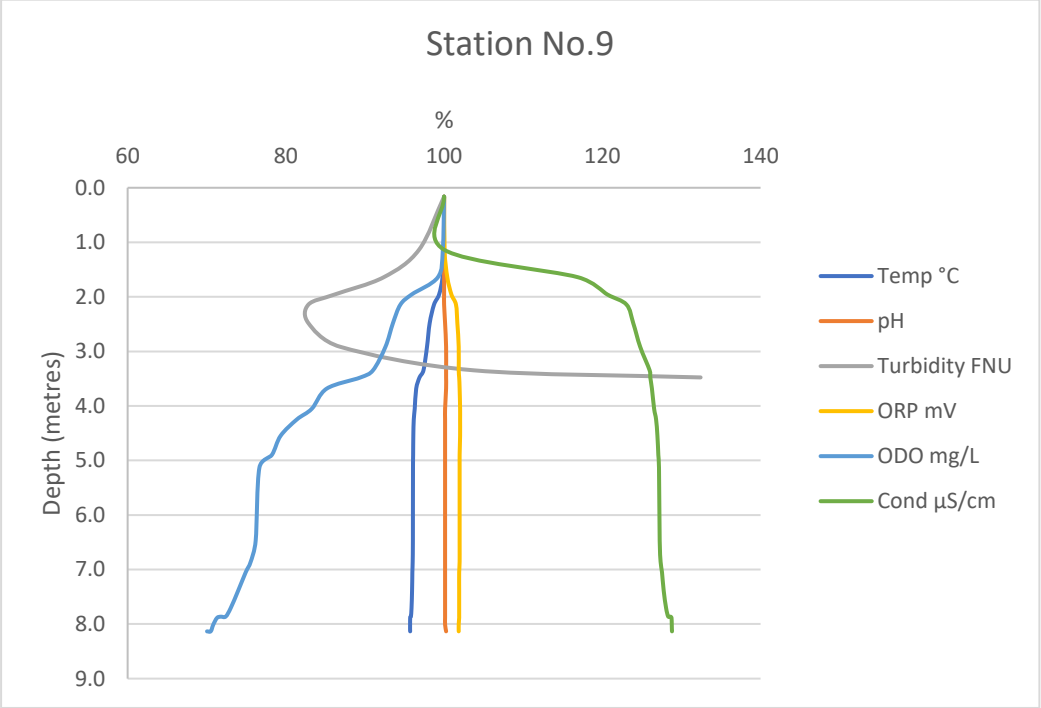


Figure 3.5: *Station 08 CTD Sonde Data*



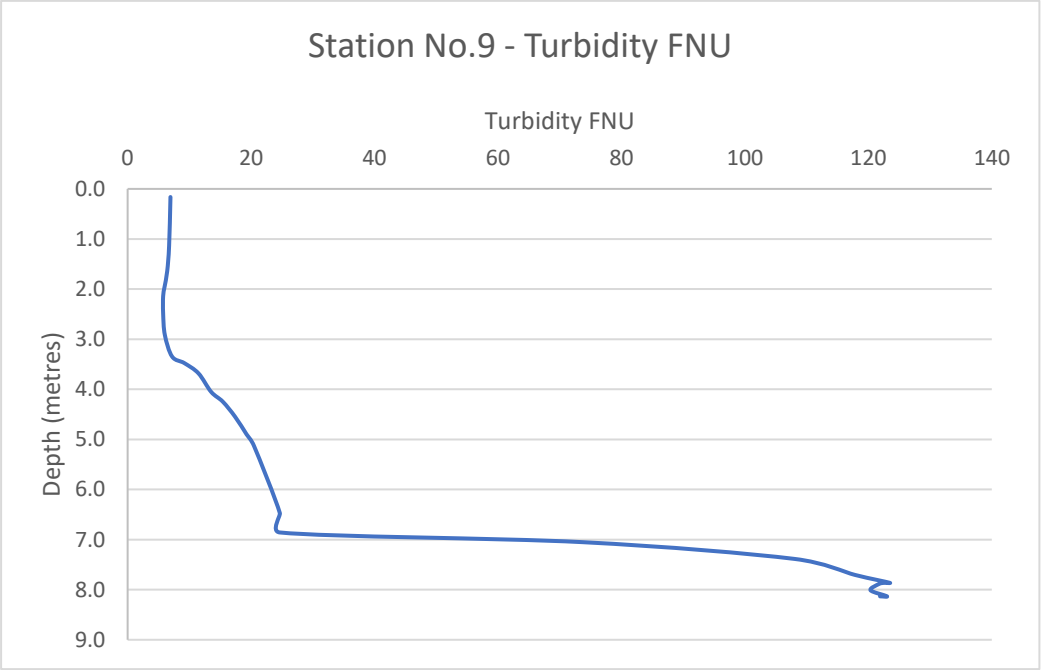


Figure 3.6: *Station 09 CTD Sonde Data*

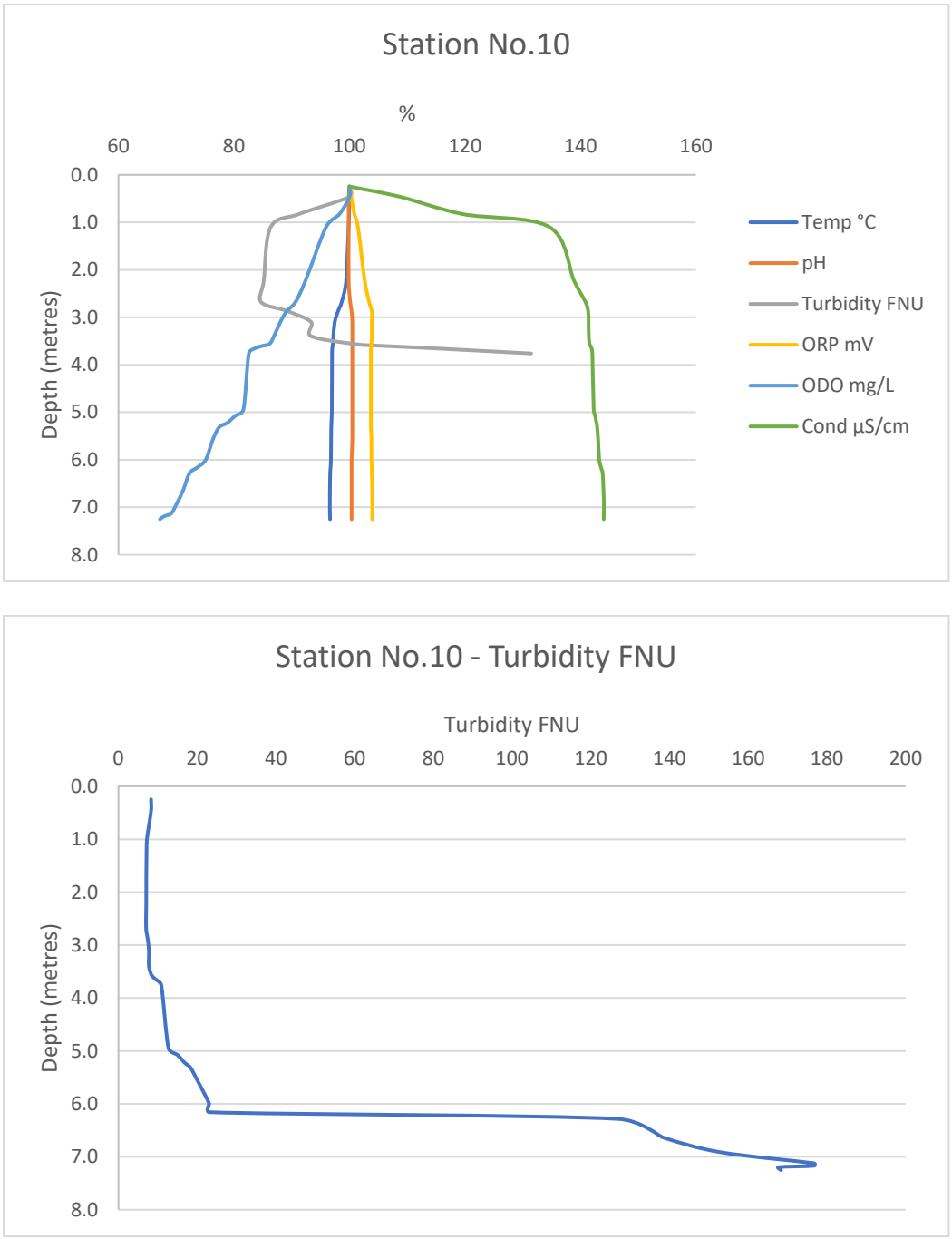
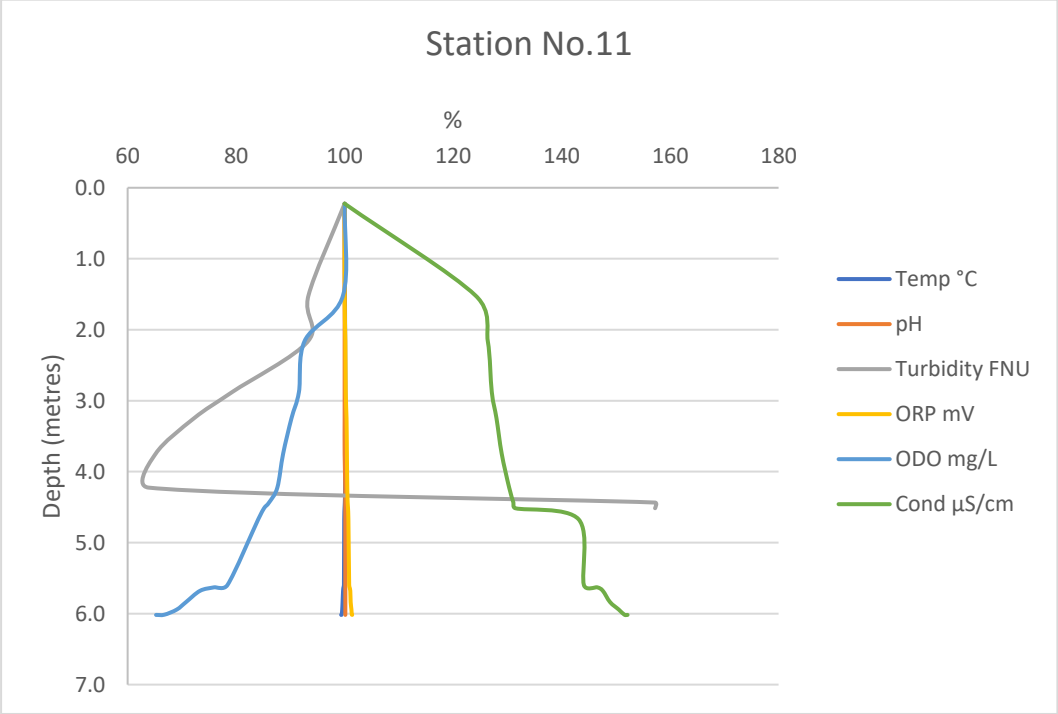


Figure 3.7: *Station 10 CTD Sonde Data*



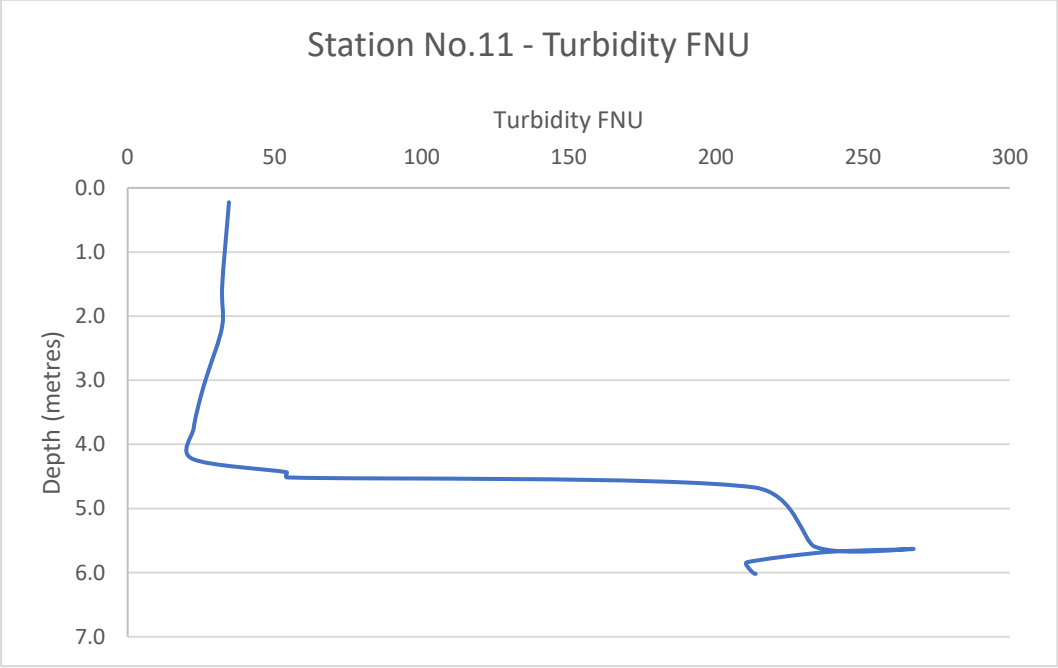
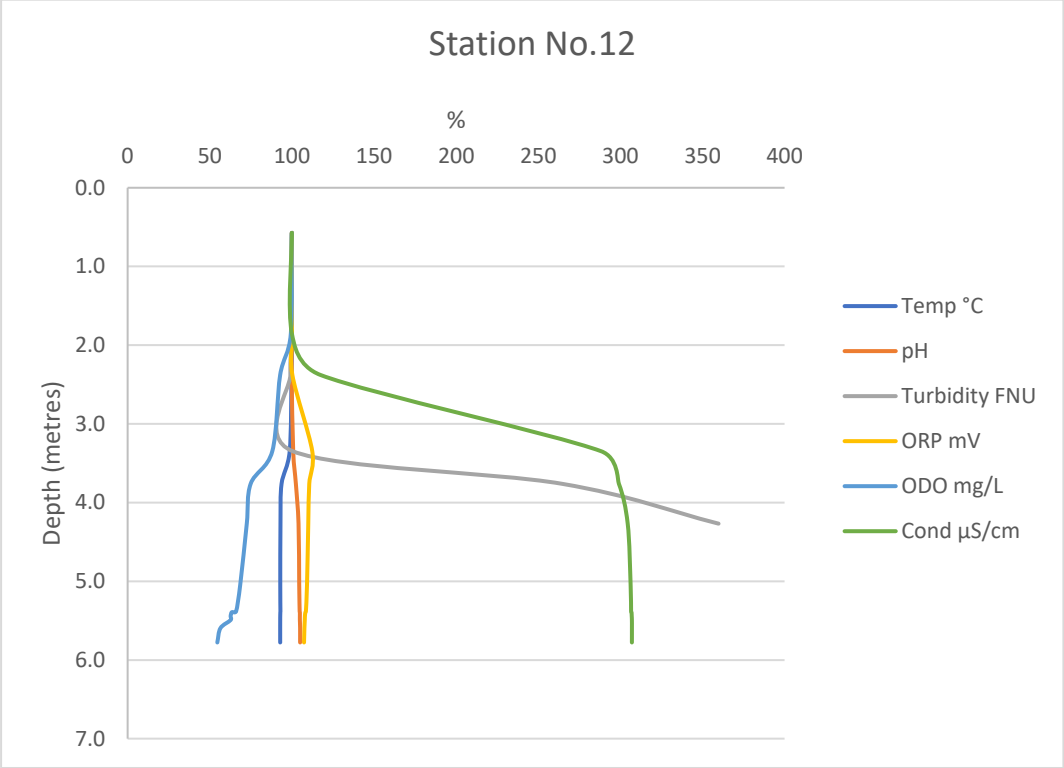


Figure 3.8: *Station 11 CTD Sonde Data*



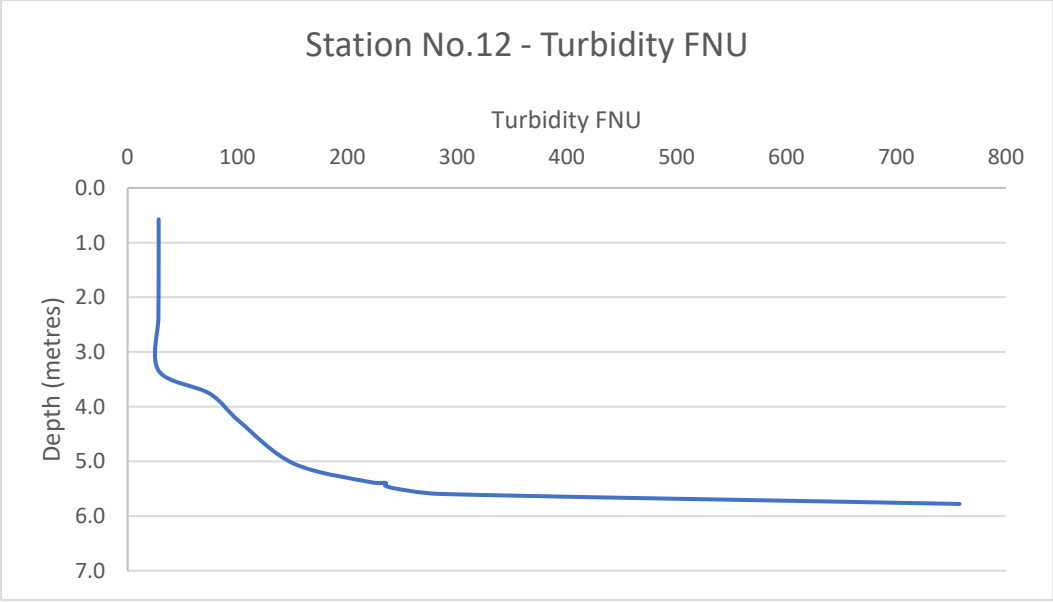
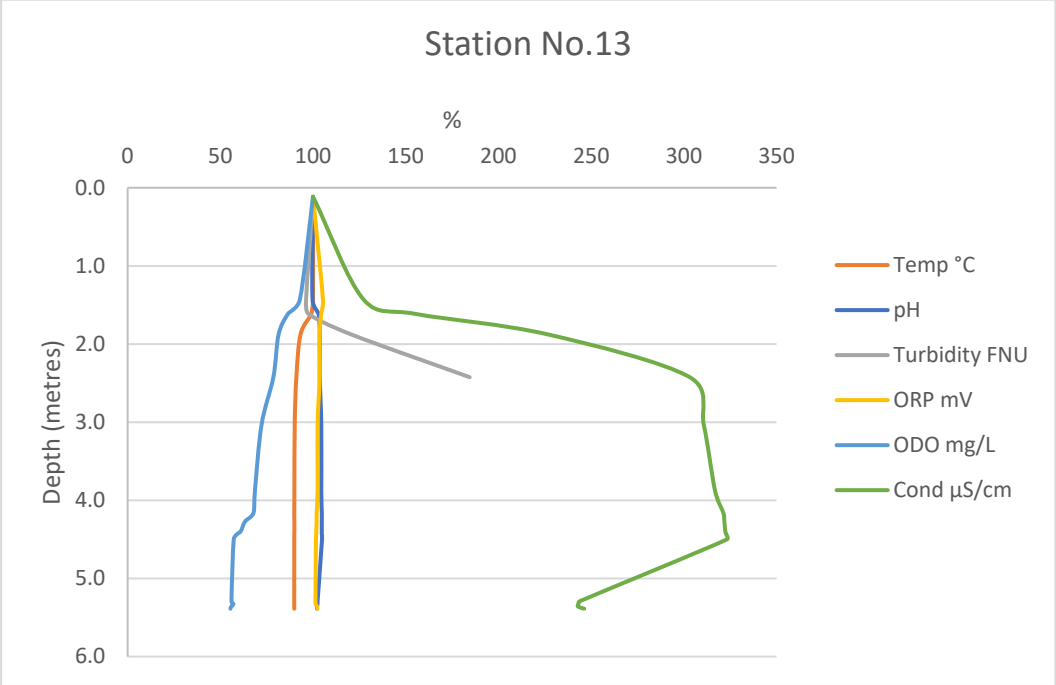


Figure 3.9: *Station 12 CTD Sonde Data*



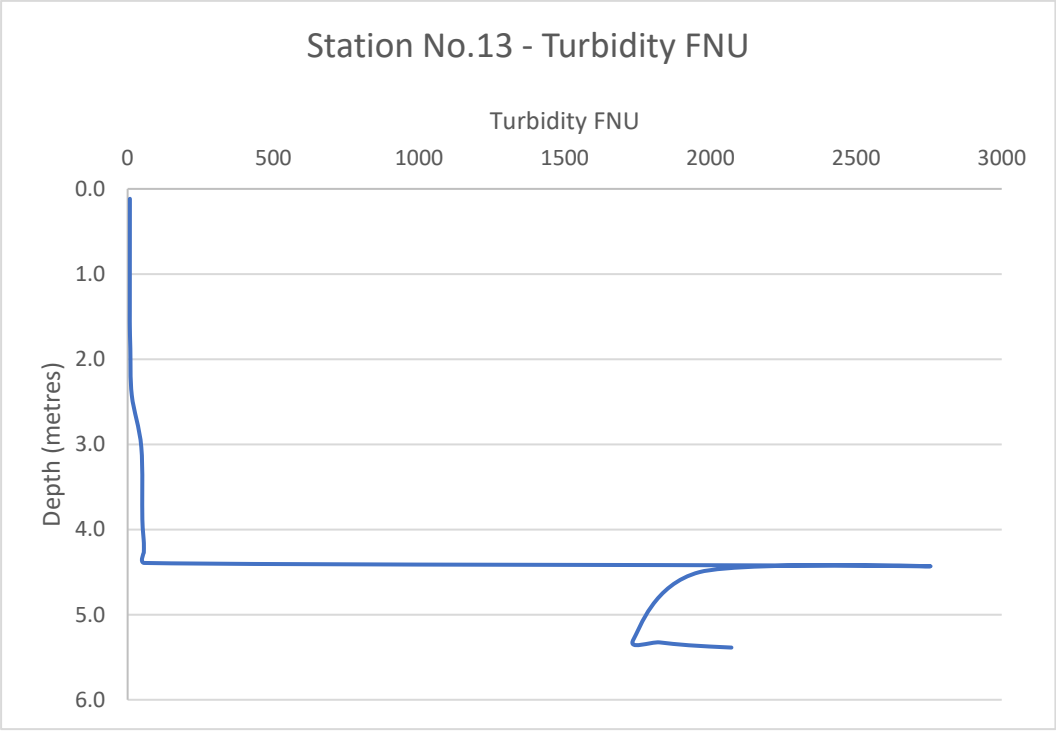


Figure 3.10: *Station 13 CTD Sonde Data*

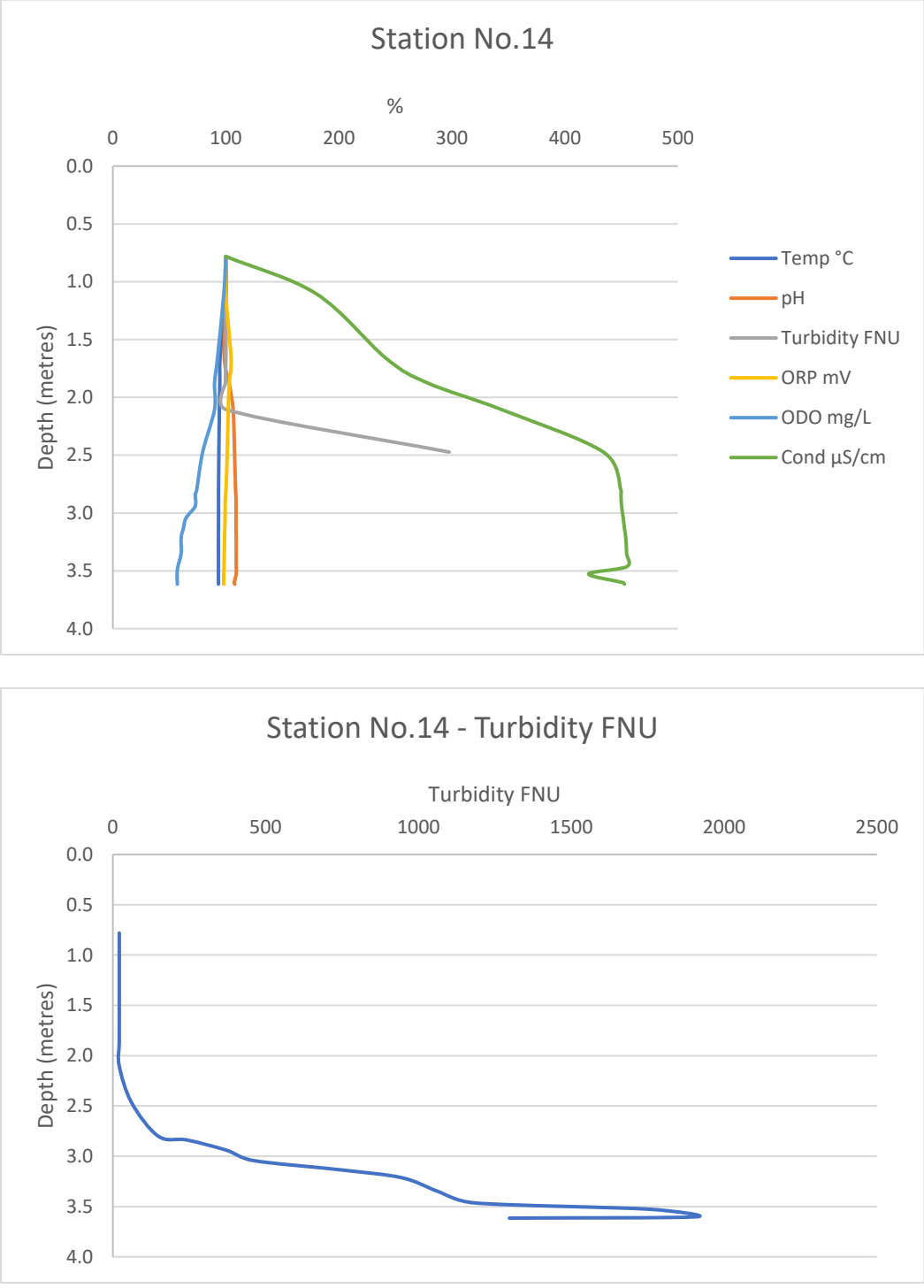


Figure 3.11: *Station 14 CTD Sonde Data*

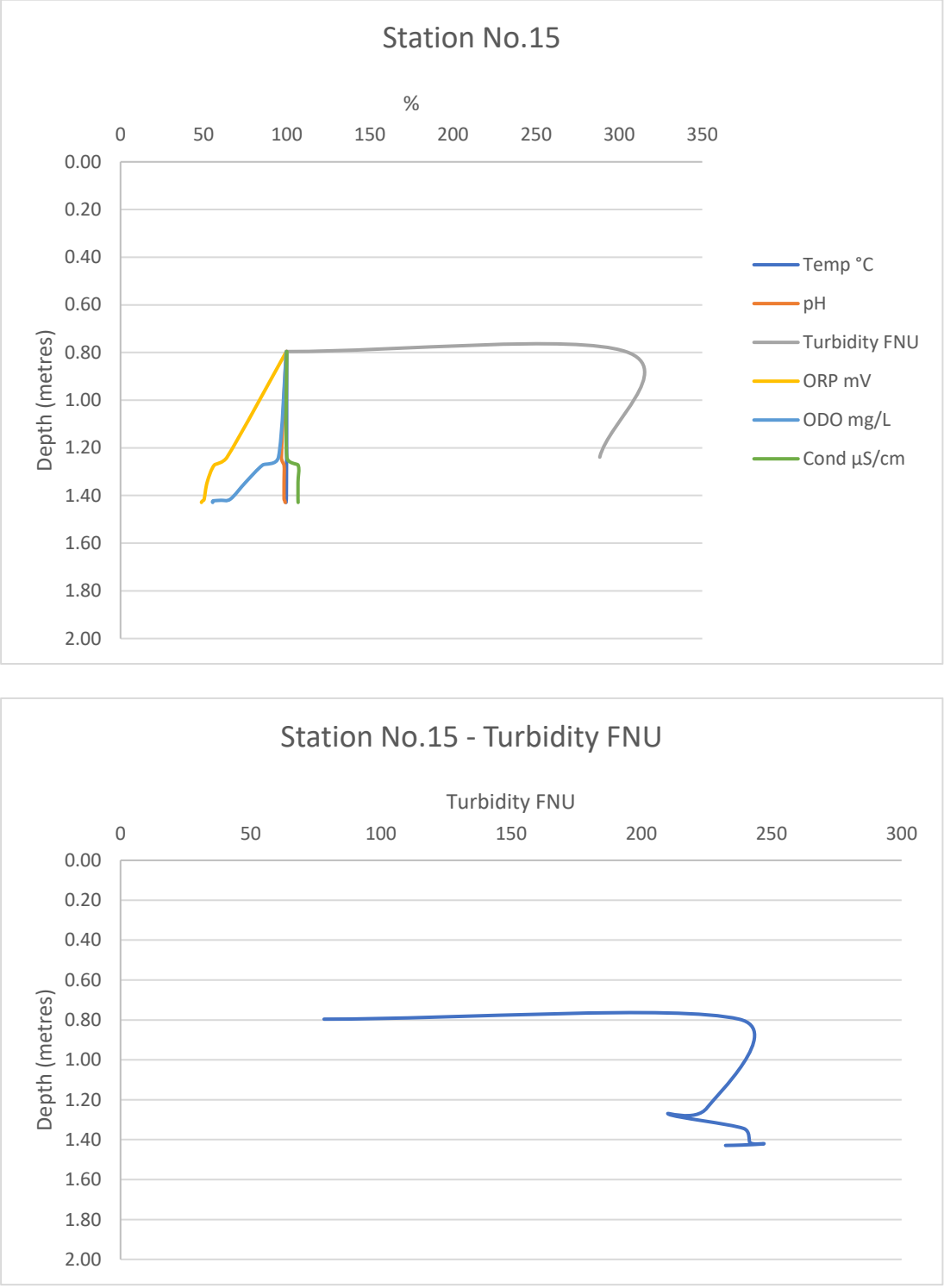


Figure 3.12: *Station 15 CTD Sonde Data*

4 Laboratory Analysis

4.1 Analytical Strategy

The analytical strategy was defined in the scope of work and set the number of samples for sediment (chemical), sediment (benthic) and waters, however, the number of water samples depended on the depth of water encountered at each station, with two samples required from every station and three samples from stations over 12m deep. *Table **4.1*** outlines the number of samples obtained for each analysis, the relevant sample matrix and the destination laboratory for each analysis.

Table 4.1: *Analytical Strategy*

Sample matrix	Analytical suite	Number of samples submitted	Destination Laboratory
Water	**Metals** (Aluminium, Arsenic, Barium, Copper, Cadmium, Chromium, Iron, Lead, Nickel, Selenium, Zinc, Barite, Mercury) **Hydrocarbons** (Aliphatic/Saturated Hydrocarbons, Polycyclic/Aromatic Hydrocarbons) **General Inorganics** (pH, Total Organic Carbon, Total Suspended Solids)	23	i2 Analytical

Sample matrix	Analytical suite	Number of samples submitted	Destination Laboratory
Sediment	**Metals** (Aluminium, Arsenic, Barium, Copper, Cadmium, Chromium, Iron, Lead, Nickel, Selenium, Zinc, Barite, Mercury) **Hydrocarbons** (Aliphatic/Saturated Hydrocarbons, Polycyclic/aromatic hydrocarbons) **General Inorganics** (Moisture Content, Redox Potential, Total Organic Carbon)	15	i2 Analytical
Sediment	**Benthic Infauna** (Identification to family or species level and enumeration for each major group)	15	Environmental Sciences Ltd

The results of the various analyses are discussed below.

4.2 Sediment Chemical Analysis

A total of 15 sediment samples were scheduled for laboratory analysis for chemical parameters. The first stage of assessment was to screen out those compounds that were not recorded above the laboratory analytical method detection limits (MDLs). These are listed below, and have thus not been considered further:

- Cadmium (MDL <0.2 mg/kg);
- Mercury (MDL <0.3 mg/kg);
- Selenium (MDL <1 mg/kg);

- All Monoaromatics (MDL <1 µg/kg); and
- All Petroleum Hydrocarbons (except TPH-CWG - Aromatic >EC12 - EC16 and >EC21 - EC35) (Variable MDLs)

The remaining determinants, detected above their respective laboratory MDLs, have been reported. The sediment analytical results are summarised in summary form Table ***4.2***. with the full analytical certificates presented in *Annex B.*

Table 4.2: Sediment Analytical Summary

Contaminant	Method Detection Limit (MDL)	Concentration Range	Sample With Max. Concentration	Location of Max. Concentration
General Inorganics				
Moisture Content (%)	0.01	44 - 62	EEBS127-01	EBS02
Redox Potential (mV)	-800	-133.1 - 208.7	EEBS109-01	EBS11
Total Organic Carbon (TOC) (%)	0.1	0.6 - 1.6	EEBS127-01	EBS02
Heavy Metals				
Aluminium (Aqua regia extractable) (mg/kg)	30	20000 - 30000	EEBS103-01	EBS14
Arsenic (Aqua regia extractable) (mg/kg)	1	14 - 27	EEBS119-01	EBS06
Barium (Aqua regia extractable) (mg/kg)	1	21 - 54	EEBS105-01	EBS13
Chromium (Aqua regia extractable) (mg/kg)	1	23 - 39	EEBS105-01	EBS13
Copper (Aqua regia extractable) (mg/kg)	1	8.1 - 21	EEBS105-01	EBS13
Iron (Aqua regia extractable) (mg/kg)	40	34000 - 66000	EEBS127-01	EBS02
Lead (Aqua regia extractable) (mg/kg)	1	14 - 34	EEBS105-01	EBS13

Contaminant	Method Detection Limit (MDL)	Concentration Range	Sample With Max. Concentration	Location of Max. Concentration
Nickel (Aqua regia extractable) (mg/kg)	1	16 - 26	EEBS105-01	EBS13
Zinc (Aqua regia extractable) (mg/kg)	1	69 - 130	EEBS105-01	EBS13
Petroleum Hydrocarbons				
TPH-CWG - Aromatic >EC12 - EC16 (mg/kg)	2	<MDL - 2.1	EEBS109-01	EBS11
TPH-CWG - Aromatic >EC21 - EC35 (mg/kg)	10	<MDL - 24	EEBS109-01	EBS11
TPH-CWG - Aromatic (EC5 - EC35) (mg/kg)	10	<MDL - 33	EEBS109-01	EBS11

4.3 Sediment Benthic Analysis

The 15 sediment benthic samples (one from each station) were sent via courier to Environmental Sciences Limited in Trinidad for analysis using their team of benthic biologists who have a great deal of experience of benthic infauna identification in the Guyana-Suriname Basin and Caribbean Sea.

The results of the species identification and abundance analysis are summarised in the table below:

Table 4.3: Benthic Sample Analysis Summary

Taxon (Family Level)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	SUM
Ampeliscidae								3								3
Ampharetidae			1													1
Amphiuridae	1															1
Acoetidae		1														1
Nuculidae							1						1			2
Onuphidae							1									1
Ophiolepididae						1										1
Total Per Station	**1**	**1**	**1**	**0**	**0**	**1**	**2**	**3**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**10**

Phylum	Class	Order	Family (Taxa)	Abundance	% Abundance (Phylum)	% Abundance (Taxa)

Annelida	Polychaeta	Eunicida	Onuphidae	1	3 (30%)	3 (43%)
		Phyllodocida	Acoetidae	1		
		Terebellida	Ampharetidae	1		
Arthropoda	Malacostraca	Amphipoda	Ampeliscidae	3	3 (30%)	1 (14%)
Echinodermata	Ophiuroidea	Amphilepidida	Amphiuridae	1	2 (20%)	2 (28%)
			Ophiolepididae	1		
Mollusca	Bivalvia	Nuculida	Nuculidae	2	2 (20%)	1 (14%)

The results are consistent with the field observations in that there was a notable paucity of infauna in the sediment samples with only 10 specimens and 7 taxa being observed across all sample stations and some sample stations having no benthic infauna present.

4.4 Sediment Particle Size Analysis

The 15 sediment samples collected for chemical analysis were also sent for Particle Size Analysis. The full Particle Size Distribution (PSD) results and PSD curves are presented in *Annex C*.

The analysis shows that all the samples are made up almost entirely or entirely of fines (silts and clays) with virtually no sand or gravel component.

This accords well with the field observations – every sample of sediment collected was a soft fluid brown or grey fine silty clay, with no noticeable texture or visible inclusions indicating coarser material.

4.5 Water Chemical Data

Twenty-three (23) water samples were recovered from 10 of the Environmental Baseline Survey Stations (two from every station, two mid depth samples from the two deepest stations (01 and 03) and a duplicate (as required by GS82 for sample populations greater than 20). All samples were scheduled for laboratory analysis at an ISO17025 certified laboratory (i2 Analytical). The first stage of assessment was to screen out those compounds that were not found above the respective laboratory MDLs. These are listed below and have not been considered further in the discussion:

- Mercury (MDL <0.5 µg/l);
- All Monoaromatics (MDL <1 µg/l); and
- All Petroleum Hydrocarbons (various MDLs).

The remaining determinants, detected above their respective laboratory MDLs, have been reported and analytical results are summarised in **Table *4.4*** with the full analytical certificates presented in *Annex B*.

Table 4.4: Water analytical Results Summary

Contaminant	Method Detection Limit (MDL)	Concentration Range	Sample(s) With Max. Concentration	Location and Depth of Max. Concentration
General Inorganics				
pH	N/A	6.7 - 7.8	Min: EEBS201-01 Max: EEBS221-01	EBS15; EBS03
Total Organic Carbon (TOC) (mg/l)	0.1	0.4 - 6.78	EEBS202-02	EBS15
Total Suspended Solids (mg/l)	2	37 - 510	EEBS208-01	EBS12
Heavy Metals				
Aluminium (dissolved) (mg/l)	0.012	0.02 - 0.88	EEBS202-01	EBS15
Arsenic (dissolved) (µg/l)	1	2.7 - 8.4	EEBS203-01	EBS14
Barium (dissolved) (µg/l)	0.05	10 - 99	EEBS222-01	EBS01
Cadmium (dissolved) (µg/l)	0.08	<MDL - 0.25	EEBS207-01	EBS12
Chromium (dissolved) (µg/l)	0.4	0.4 - 1.5	EEBS202-01	EBS15
Copper (dissolved) (µg/l)	0.7	<MDL - 6.5	EEBS222-01; EEBS202-01	EBS01; EBS15
Iron (dissolved) (mg/l)	0.004	0.015 - 0.88	EEBS202-01	EBS15
Lead (dissolved) (µg/l)	1	1.6 - 5.5	EEBS224-01	EBS01
Nickel (dissolved) (µg/l)	0.3	4.5 - 7	EEBS203-01	EBS14

Contaminant	Method Detection Limit (MDL)	Concentration Range	Sample(s) With Max. Concentration	Location and Depth of Max. Concentration
Selenium (dissolved) (µg/l)	4	<MDL - 19	EEBS211-01	EBS10
Zinc (dissolved) (µg/l)	0.4	6.4 - 72	EEBS202-01	EBS15

5 Baseline Conditions Assessment

5.1 General Conditions

The Guyanese coastline is characterised by shallow turbid waters and a very shallow and wide continental shelf. Typically the 14m water depth contour is around 20km off-shore, with water depths in the inshore waters being only 1 – 2m for several kilometres.

The EBS survey showed similar results with the water depths recorded at each station being relatively shallow – even some 30 or more kilometres from the shoreline.

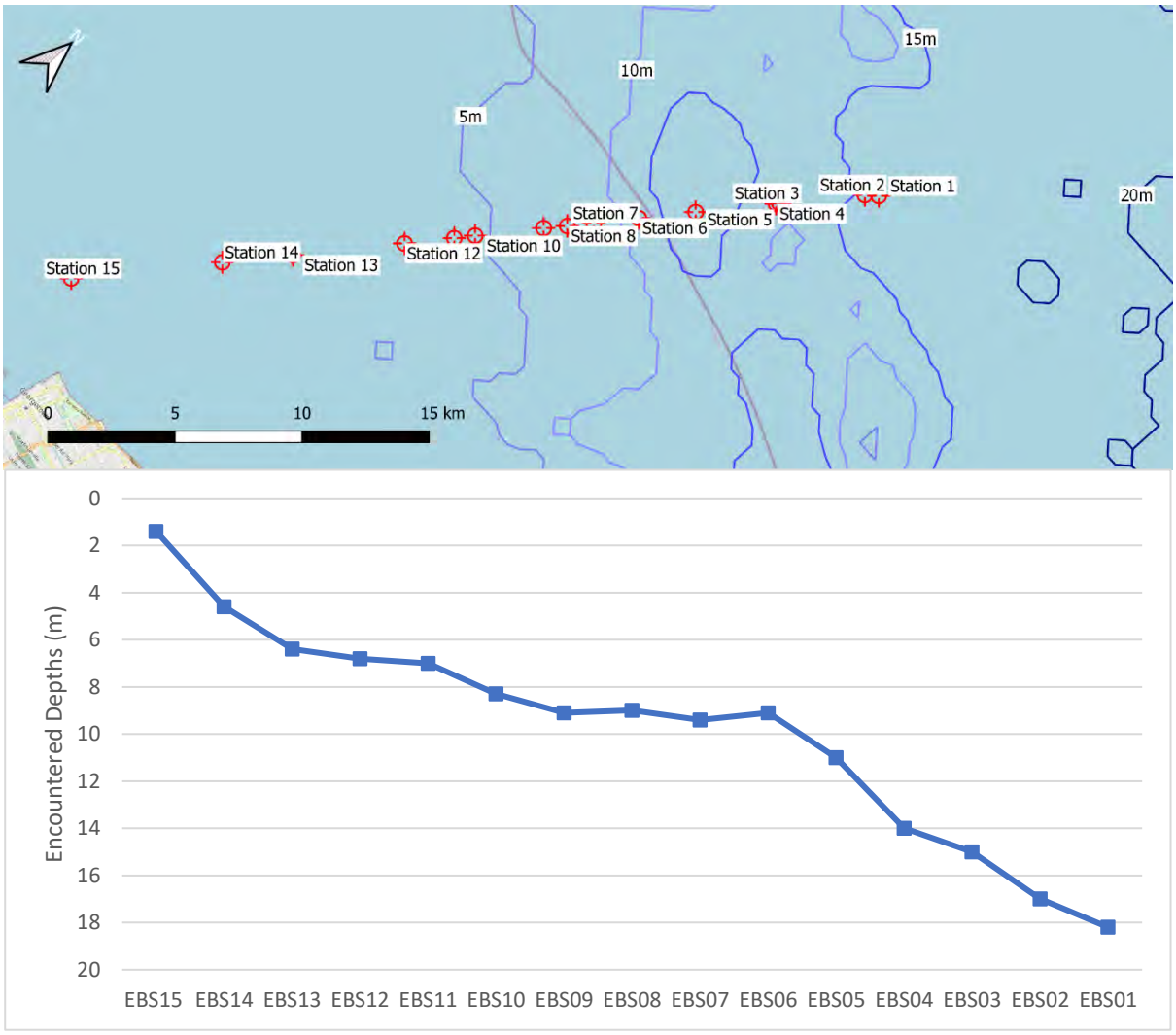


Figure 5.1: *Encountered Depths at each EBS in relation to Chart Datum*

This is consistent with other studies in the area and with a general rule of thumb used by the local fishing community which is a fathom increase in depth for every two miles travelled from the coastline. This would translate to an approximate water depth of around 20m at a distance of around 35km offshore, which is what was observed during the survey.

The reason for this is that the Guyana-Suriname Basin receives sediment rich waters from the three largest river systems in South America, namely The Amazon, Orinoco and Essequibo Rivers, but with a contribution also from the smaller, but still sediment laden Demerara and Corentyne Rivers. Furthermore, the loss of mangrove coastal forest over many decades has led to increased coastal erosion which is also contributing sediment load to the basin.

Photograph 5.1: *Sediment Rich Outflow From Demerara River (EAME 2019)*

The accretion of these huge volumes of sediment built up over millions of years has created this vast shallow shelf.

This has enabled the fishing communities to operate relatively simple fishing techniques such as fixing nets to wooden poles some considerable distance off-shore. These were observed many times during the survey.

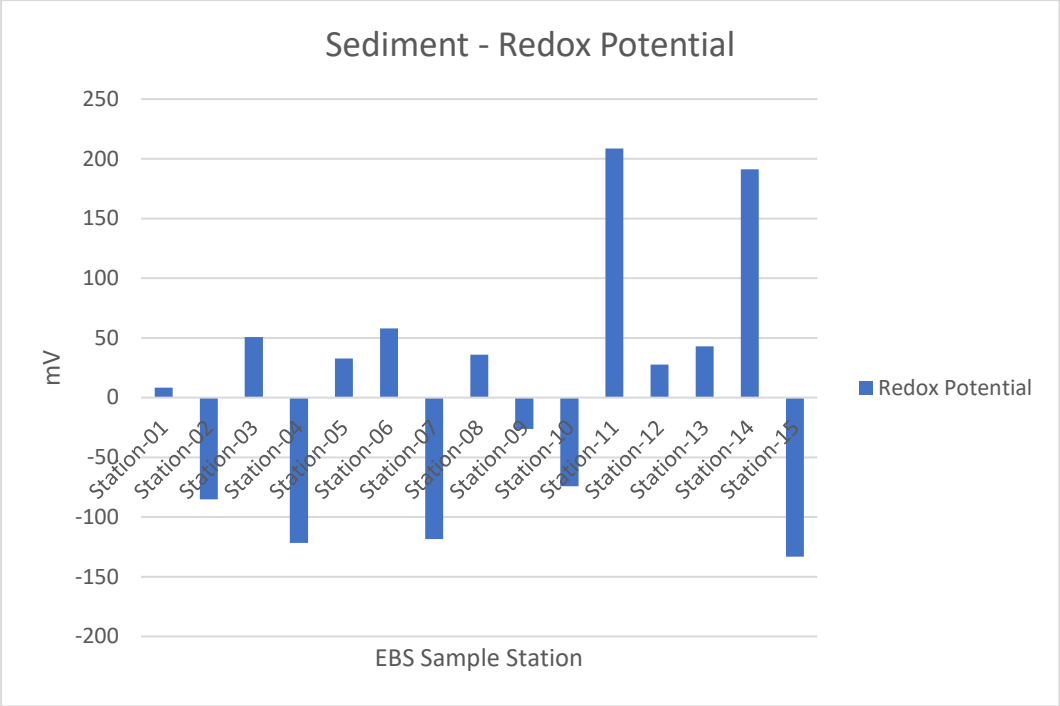
Photograph 5.2: *Fishing Poles in pipeline corridor (approx. 7km offshore)*

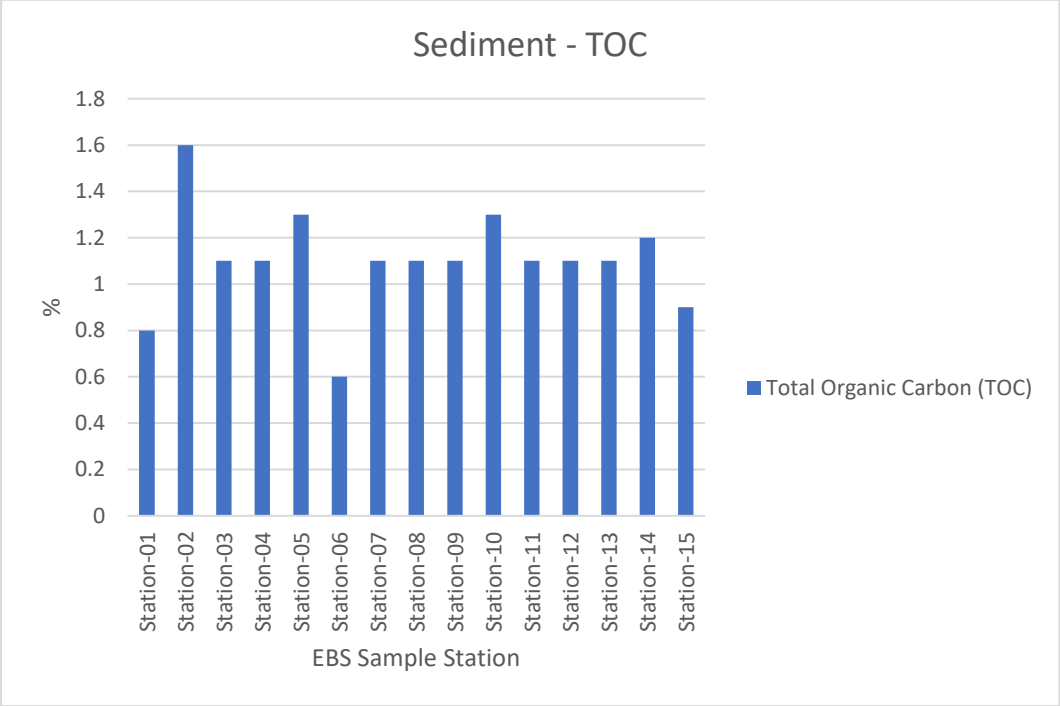
In terms of an important baseline conditions consideration, the co-incidence of pipelay activities and fishermen in the same area will need to be carefully managed. The study of how the pipeline construction and operation may affect fishing in this zone is not part of the scope of work for this project but should be considered in any ESIA undertaken for the project.

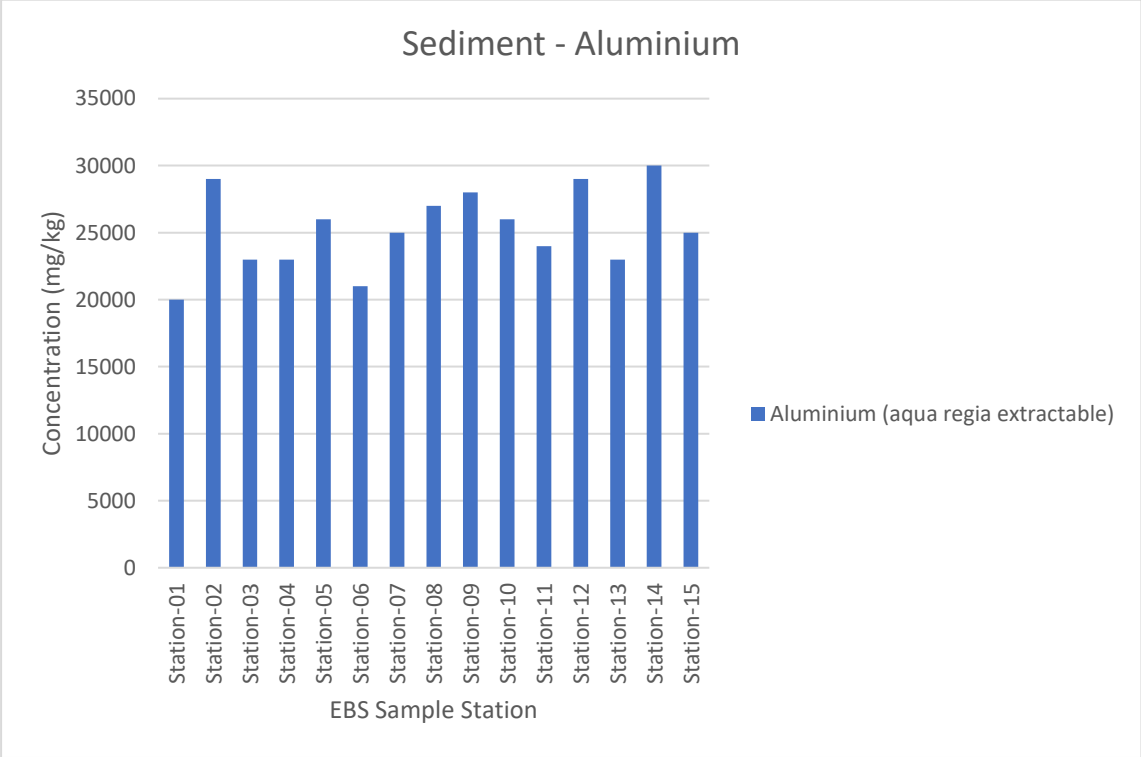
5.2 Sediment Conditions

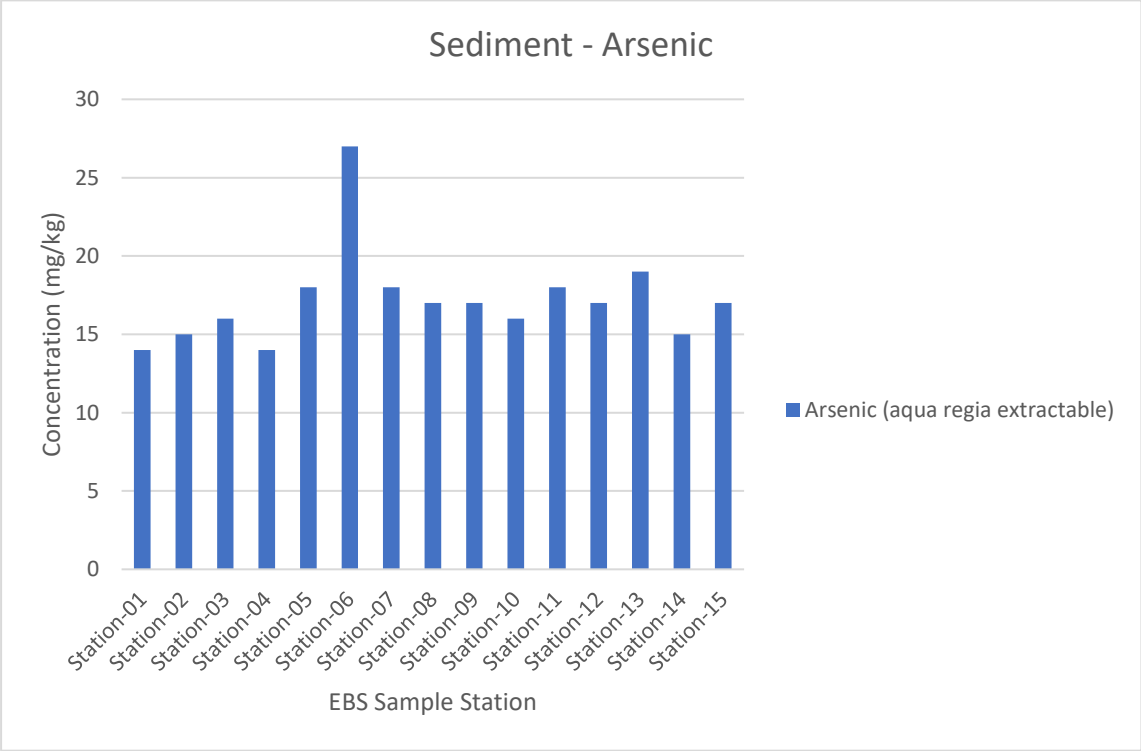
The sediments observed during the EBS are invariably soft silty clay in consistency, with no notable variation present between the sample stations. The softness of the sediment substrate was evidenced by the Van Veen sample recoveries. The Van Veen collected a full load of sediment on the first strike on every successful deployment. These observations are

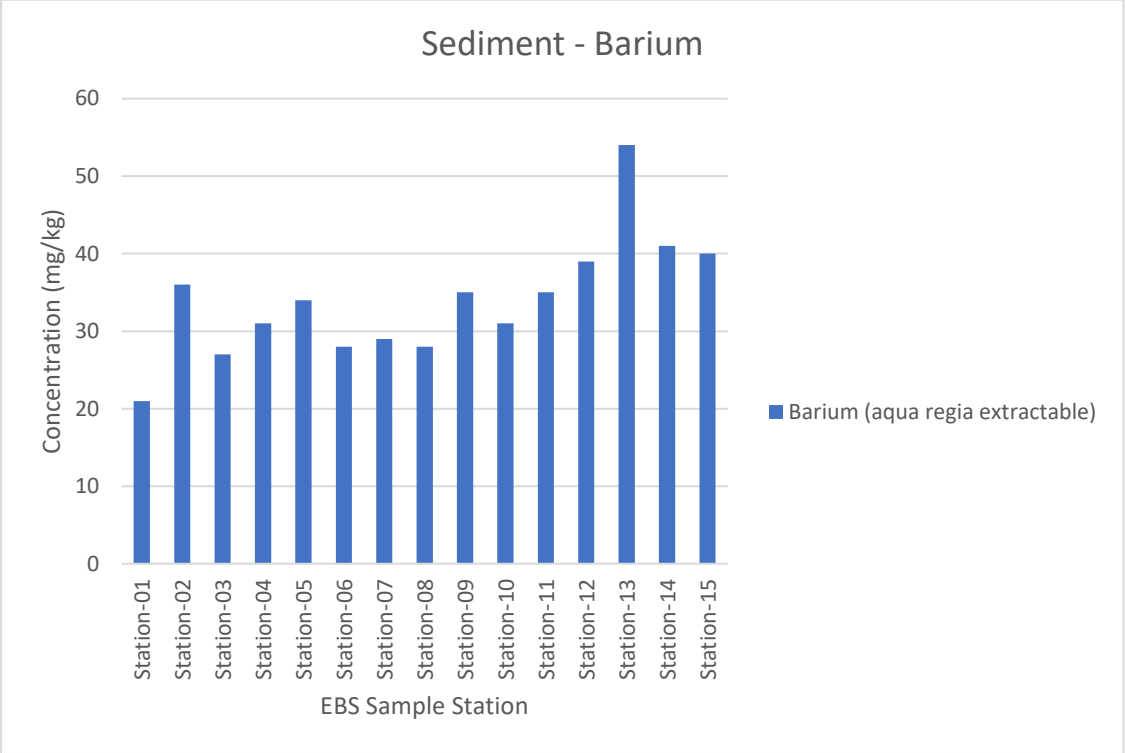
borne out by the PSD analytical results which show an absence of coarser sand and gravel fragments from almost all samples. The results are presented in the charts below.

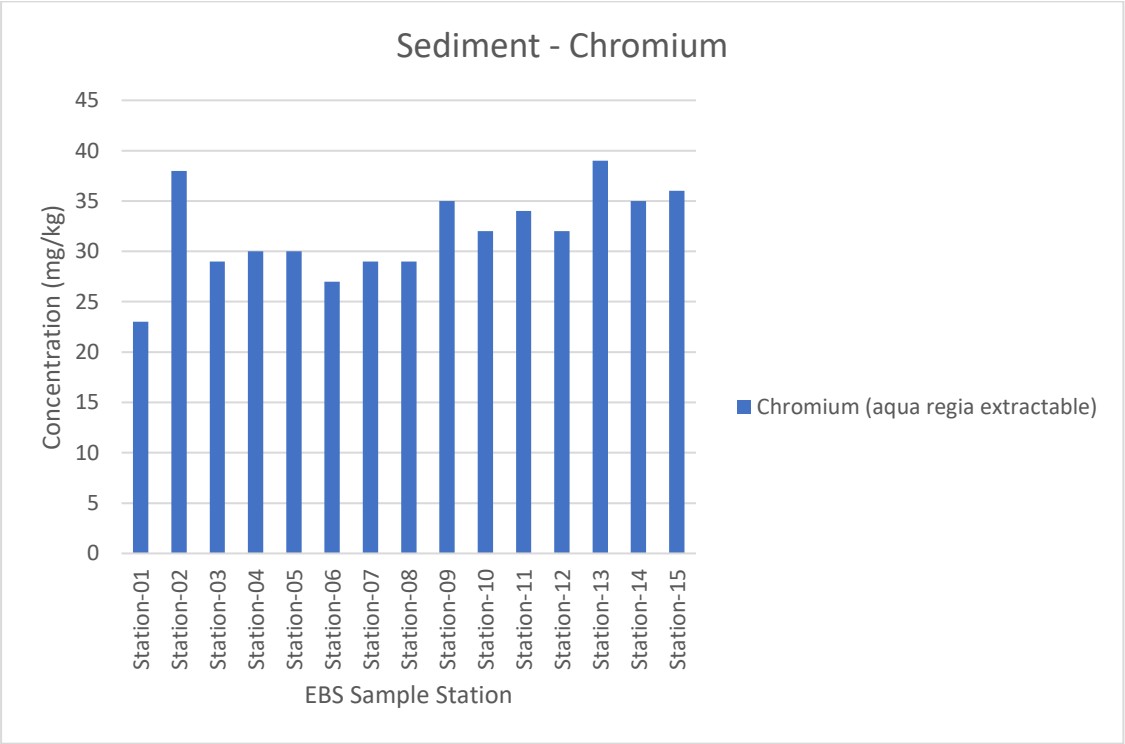


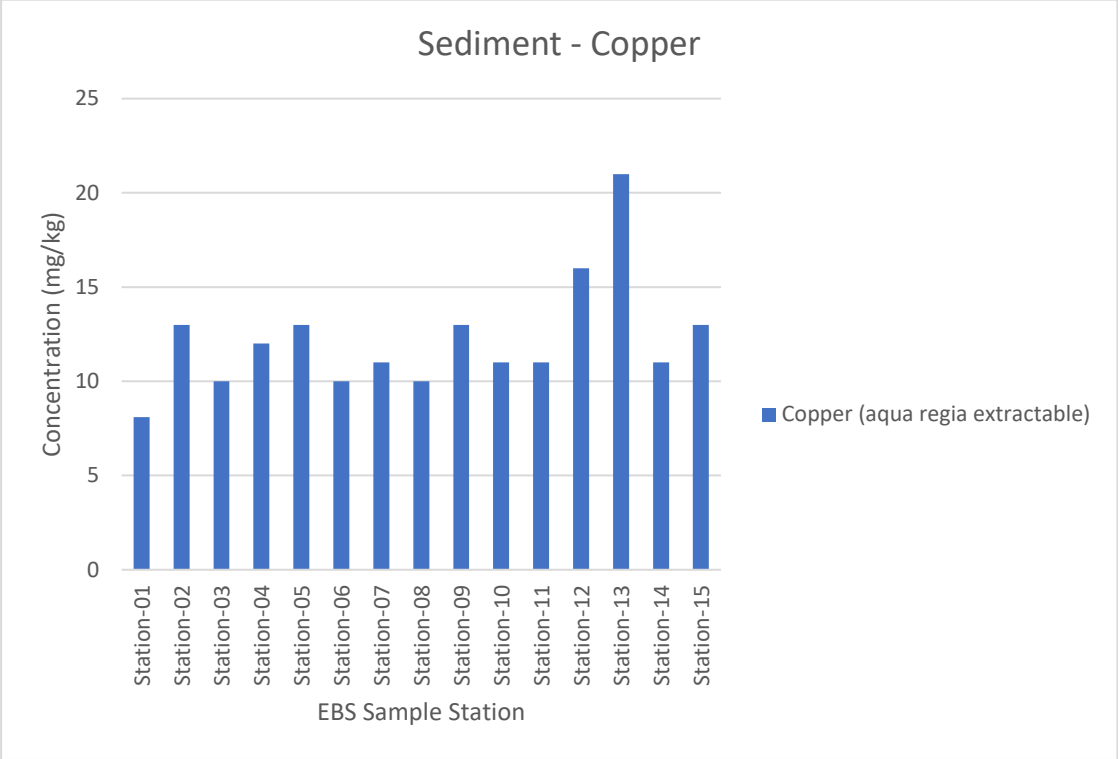


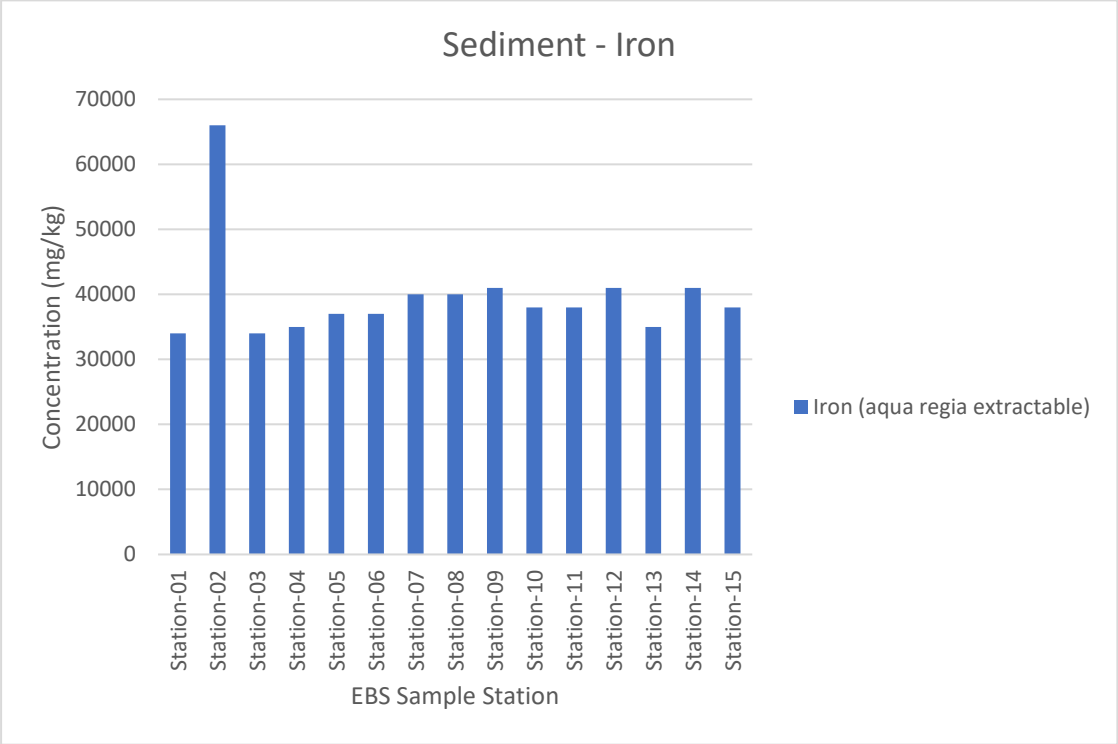

Sediment - Aluminium
35000
30000
25000
20000
15000
10000
5000
0
Concentration (mg/kg)
Station-01
Station-02
Station-03
Station-04
Station-05
Station-06
Station-07
Station-08
Station-09
Station-10
Station-11
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Aluminium (aqua regia extractable)

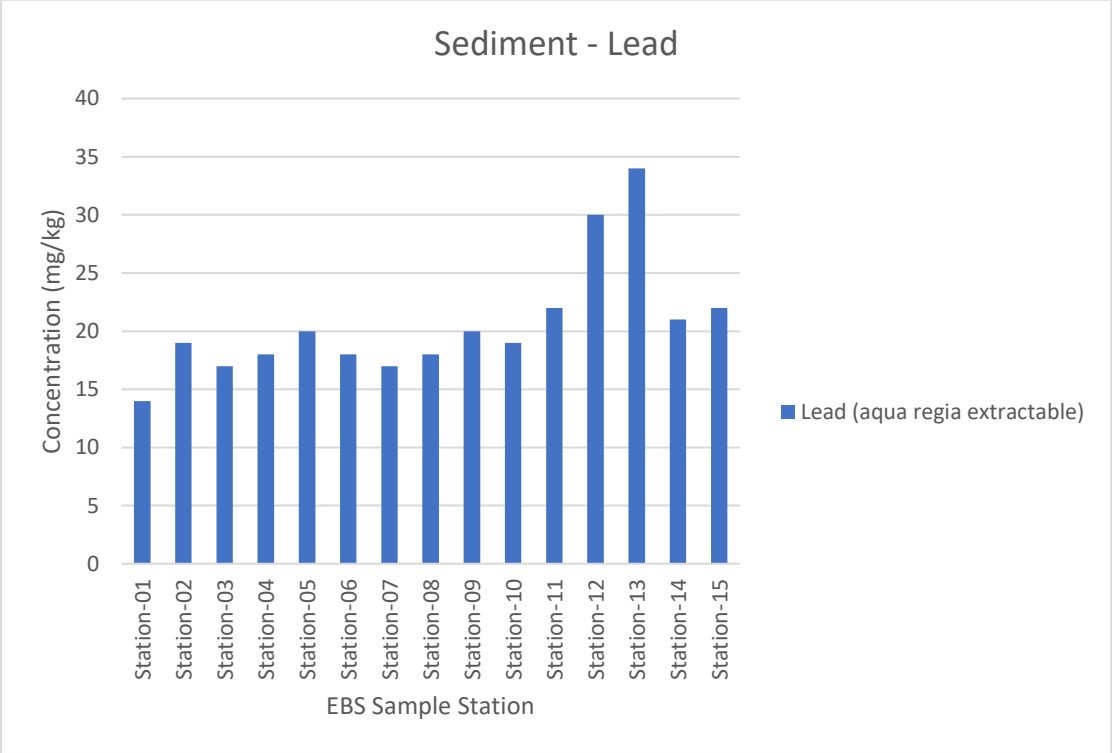

Sediment - Arsenic
30
25
20
15
10
5
0
Concentration (mg/kg)
Station-01
Station-02
Station-03
Station-04
Station-05
Station-06
Station-07
Station-08
Station-09
Station-10
Station-11
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Arsenic (aqua regia extractable)

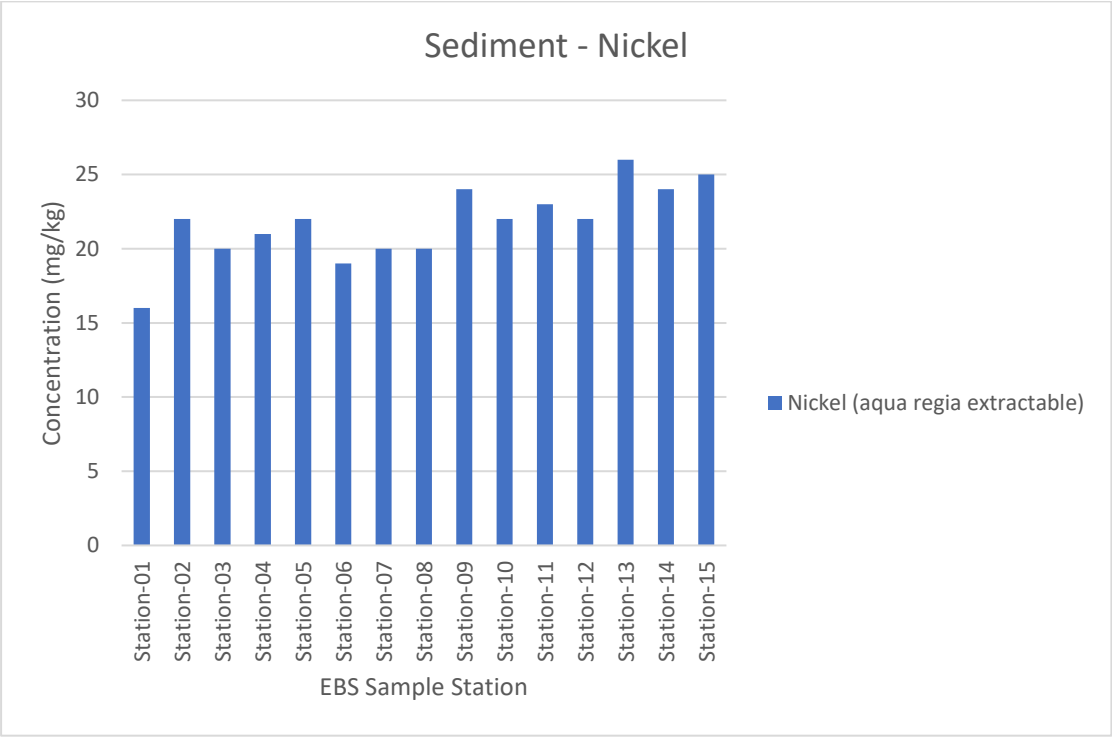

Sediment - Barium
Concentration (mg/kg)
60
50
40
30
20
10
0
Station-01
Station-02
Station-03
Station-04
Station-05
Station-06
Station-07
Station-08
Station-09
Station-10
Station-11
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Barium (aqua regia extractable)

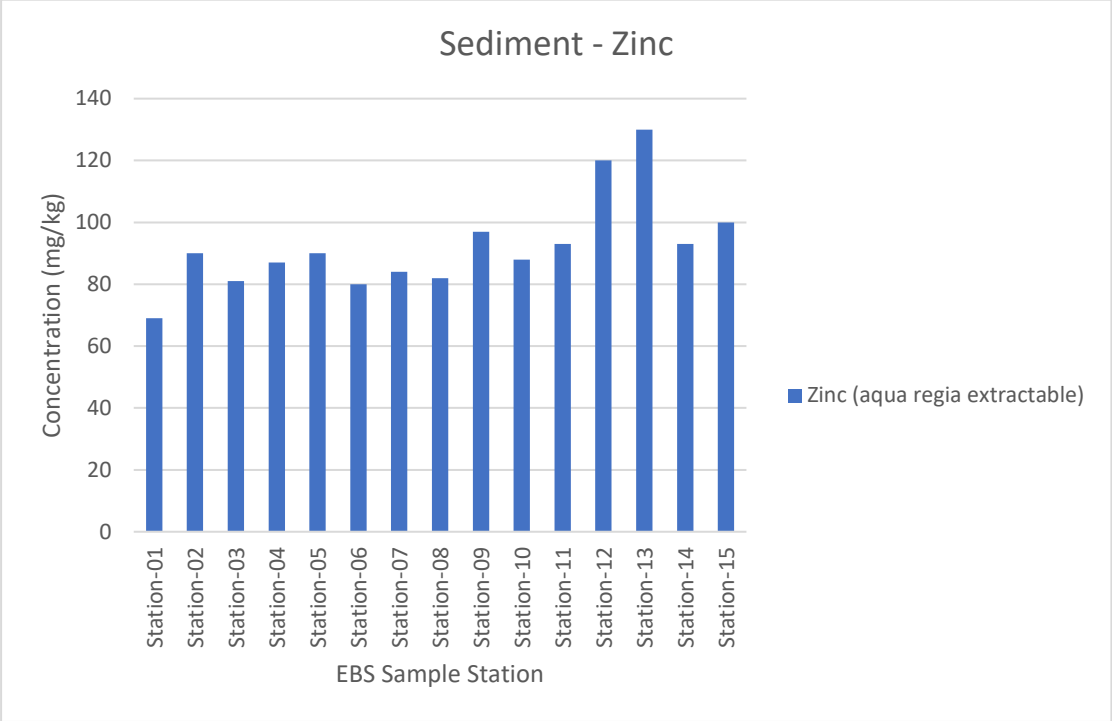

Sediment - Chromium
Concentration (mg/kg)
45
40
35
30
25
20
15
10
5
0
Station-01
Station-02
Station-03
Station-04
Station-05
Station-06
Station-07
Station-08
Station-09
Station-10
Station-11
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Chromium (aqua regia extractable)


Sediment - Copper
25
20
15
10
5
0
Concentration (mg/kg)
Station-01
Station-02
Station-03
Station-04
Station-05
Station-06
Station-07
Station-08
Station-09
Station-10
Station-11
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Copper (aqua regia extractable)


Sediment - Iron
70000
60000
50000
40000
30000
20000
10000
0
Concentration (mg/kg)
Station-01
Station-02
Station-03
Station-04
Station-05
Station-06
Station-07
Station-08
Station-09
Station-10
Station-11
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Iron (aqua regia extractable)


Sediment - Lead
Concentration (mg/kg)
40
35
30
25
20
15
10
5
0
Station-01
Station-02
Station-03
Station-04
Station-05
Station-06
Station-07
Station-08
Station-09
Station-10
Station-11
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Lead (aqua regia extractable)


Sediment - Nickel
Concentration (mg/kg)
30
25
20
15
10
5
0
Station-01
Station-02
Station-03
Station-04
Station-05
Station-06
Station-07
Station-08
Station-09
Station-10
Station-11
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Nickel (aqua regia extractable)



The main observation examining each of the results across the sample stations is that there is no particular station that stands out as having notably different chemical composition. Furthermore, there is no discernible rising or falling trend in concentration of analytes with distance from the shore.

This is not a surprising finding. The sediment in the Guyana – Suriname Basin is coming from three huge river systems (the Amazon, Orinoco and Essequibo rivers), but there are also contributions from the Corentyne and Demerara Rivers. All of these rivers carry high sediment loads from their hinterland catchments, but typically there is a lack of heavy industry in these catchments (which would normally be a significant contributor of contaminants to the sediments – especially heavy metals). On the whole, therefore, the sediment quality is reflective of the non-industrialised predominantly natural environment conditions of the river basins. Furthermore, there are large current systems at work in the basin and wider Atlantic, which with the shallow waters also being prone to wind driven movement, means there is substantial mixing of the sediments from these river systems with the longshore drift occurring along the coastline. This would lead to substantial mixing of the sediments and a diffused distribution of chemical characteristics throughout the basin.

5.3 Benthic Communities

Benthic community abundance, distribution and characteristics are affected by a myriad of factors including depositional regime, sediment type, sedimentation rate and intensity of disturbance. In areas of frequent and severe physical disturbances, for example, often have reduced numbers, diversity, sizes of benthic infauna, and a reduced number of sexually mature individuals. These areas are often dominated by surface dwelling pioneering species.

In areas immediately off the mouths of large rivers various factors can significantly reduce infaunal populations such as periodic erosional/depositional events, fluid muds and unstable seabeds. In areas with little disturbance, however, denser populations are seen.

The generally poor abundance and diversity of Infaunal organisms in the sediment samples collected suggests a disturbed environment, which would corroborate with the chemical results that imply an environment with substantial mixing of sediment loads.

The results of the benthic analysis would suggest a poorly developed ecosystem in the sediments of the pipeline corridor, with no significant species or habitat type.

5.4 Water Conditions

The assessment of water conditions comprised the CTD profiling and water sampling and chemical analysis.

The profiling of physico-chemical conditions showed a relatively consistent pattern at each location which can be summarised as follows:

- **pH:** tended to remain unchanged throughout the profile depth, which is what would be expected for a large active shallow water body;
- **ORP:** similarly did not vary significantly with depth, which is indicative of reasonably good mixing (i.e the water oxidation-reduction chemistry does not change significantly with depth);
- **TEMP:** the water temperature tended to reduce slightly with depth, which again is expected given that the effect of solar heating would reduce with depth and the sediment temperature would be relatively consistent and be a heat sink rather than emitter;

- **ODO:** Dissolved Oxygen also tended to reduce with increasing depth, which again is expected given that the distance from the air-water interface is increasing and microbial activity within the sediments would utilise some oxygen;

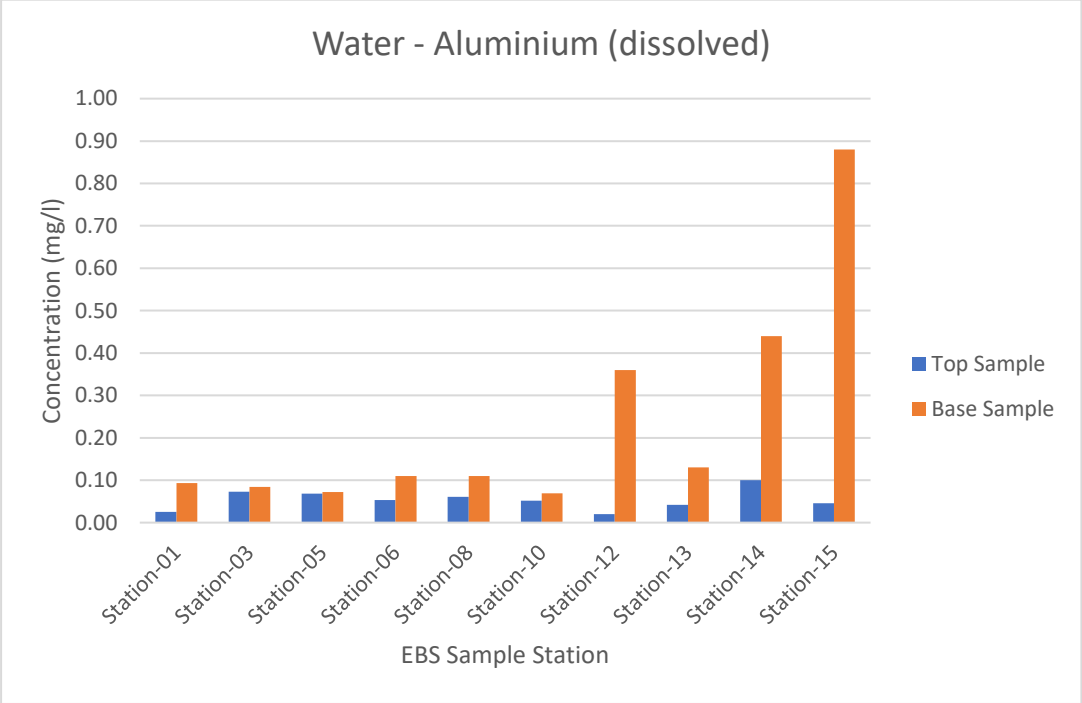
- **COND:** Conductivity tended to show a large increase with depth. This is probably associated with the similar increase in turbidity – with the increased suspended sediment load translating to increased conductivity. It may also be due to the fact that the survey zone is very close to the Demerara River mouth and freshwater (which typically has lower conductivity than salt-water) flowing out of the river, being less dense, sits above the salt water;

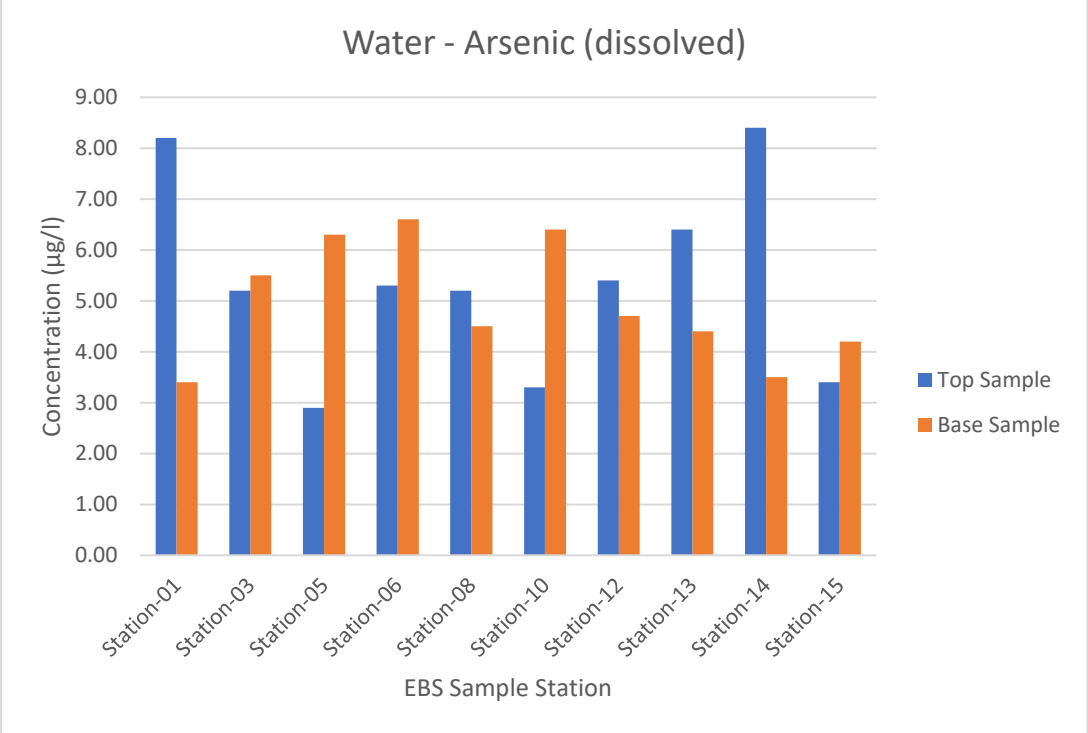
- **TURBIDITY:** Turbidity, which is an indication of suspended solids in the water column, increased rapidly with depth. The main reason for this is likely to be the nature of the sediment itself. The sediment is almost entirely comprised of fine particles which are easily suspended in the water column. At the water sediment interface the surface is disturbed by friction (currents) and sediment is mobilised to form what is sometimes referred to as a rolling bed. At the same time water flowing from the relatively fast flowing rivers in entering a large slower moving mass and the change in velocity will cause some of the suspended sediment load to settle out, so relatively speaking the suspended load in the upper layers will be less than in the lower layers at any given time.

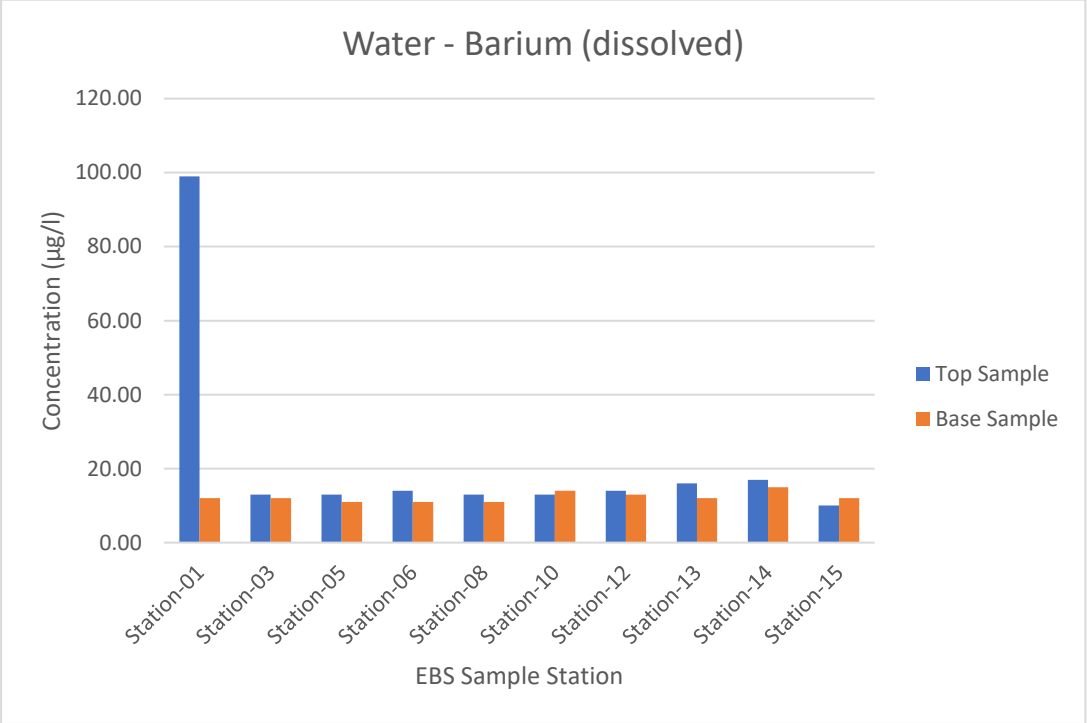
Water samples from all of the stations were analysed for Aluminium (dissolved), Arsenic (dissolved), Barium (dissolved), Cadmium (dissolved), Chromium (dissolved), Copper (dissolved), Iron (dissolved), Lead (dissolved), Mercury (dissolved), Nickel (dissolved), Selenium (dissolved), Zinc (dissolved), pH, Total Organic Carbon (TOC) and Total Suspended Solids.

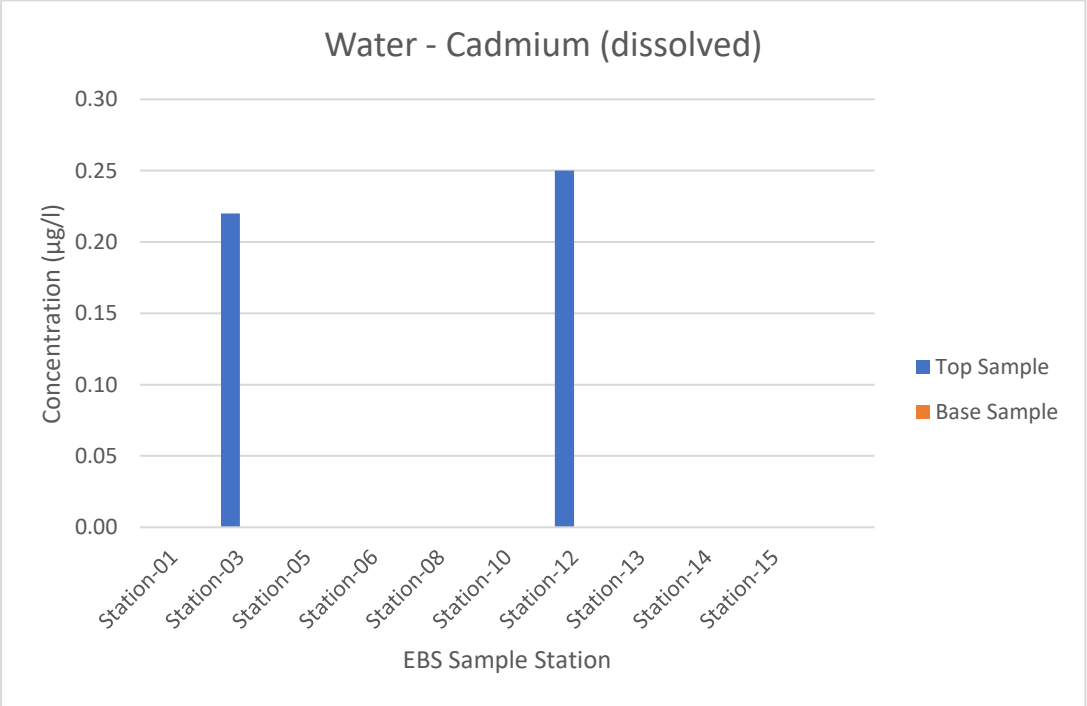
To enable comparison from station to station, the results for each parameter have been plotted on a chart with the analytical value on the Y-axis and the station numbers on the X-axis (from farthest off-shore to closest to shore reading from left to right). Where results were less than the laboratory limit of detection the result has been recorded as zero and not presented on the chart. Furthermore, we have omitted from the charts the mid-depth sample from the two outermost stations as there were only 2 mid-depth samples, which is an insufficient number of data points to interpret any trend from. In any event, the mid-depth sample results where withing the range of concentrations identified across the whole sample population and do not represent any outlier or anomalous result.

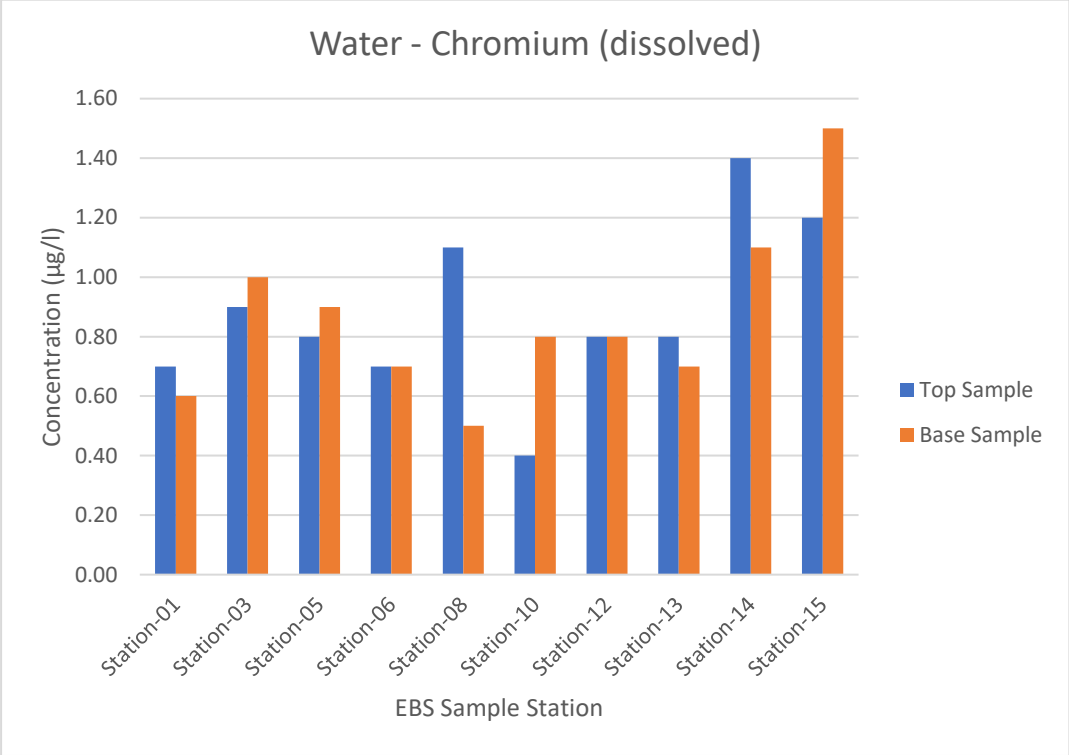
The figures are presented as top sample (collected within 1 metre of the water surface) and base sample (collected within 1 metre of the sea-bed). The chart plots are presented below.

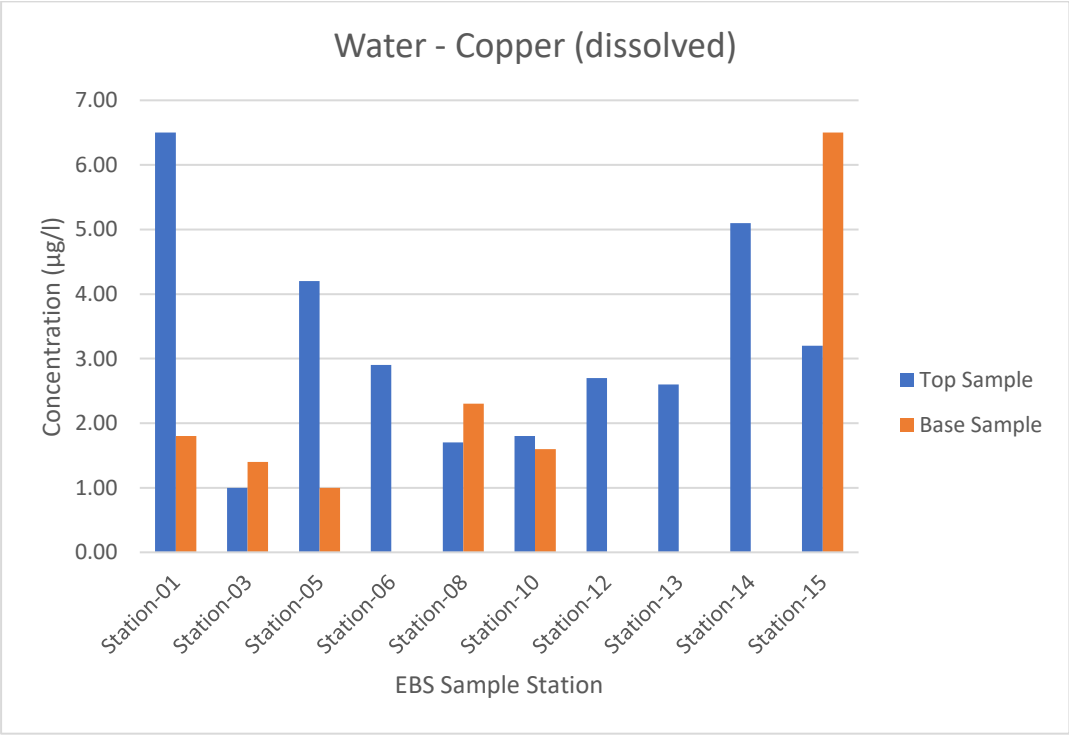

Water - Aluminium (dissolved)
Concentration (mg/l)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample

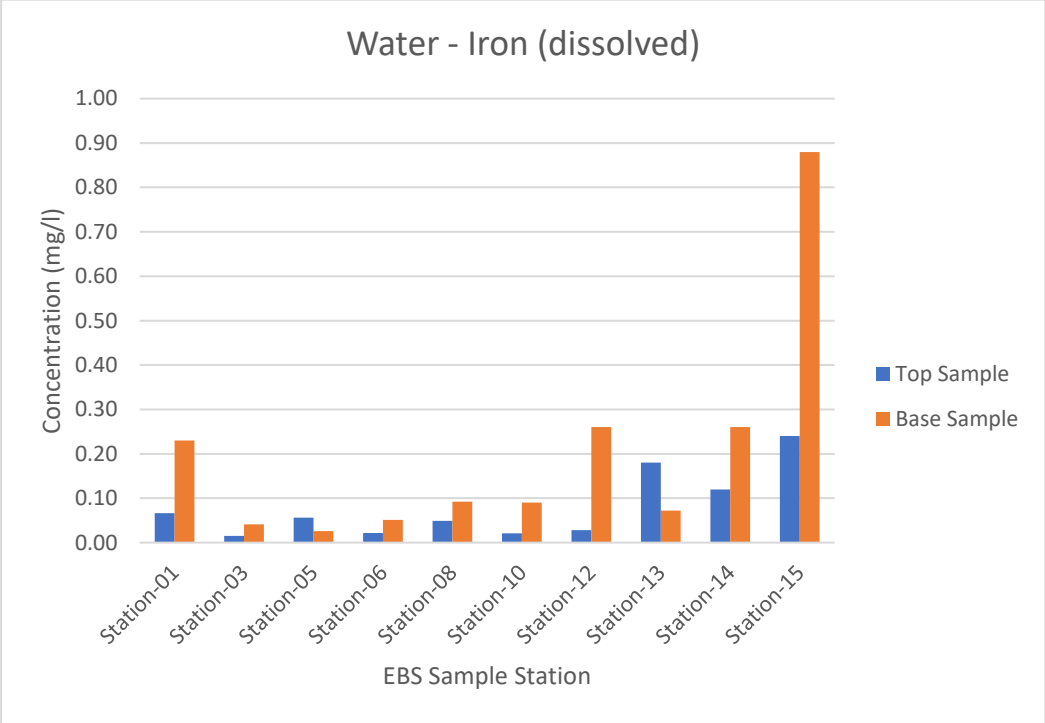

Water - Arsenic (dissolved)
Concentration (µg/l)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample

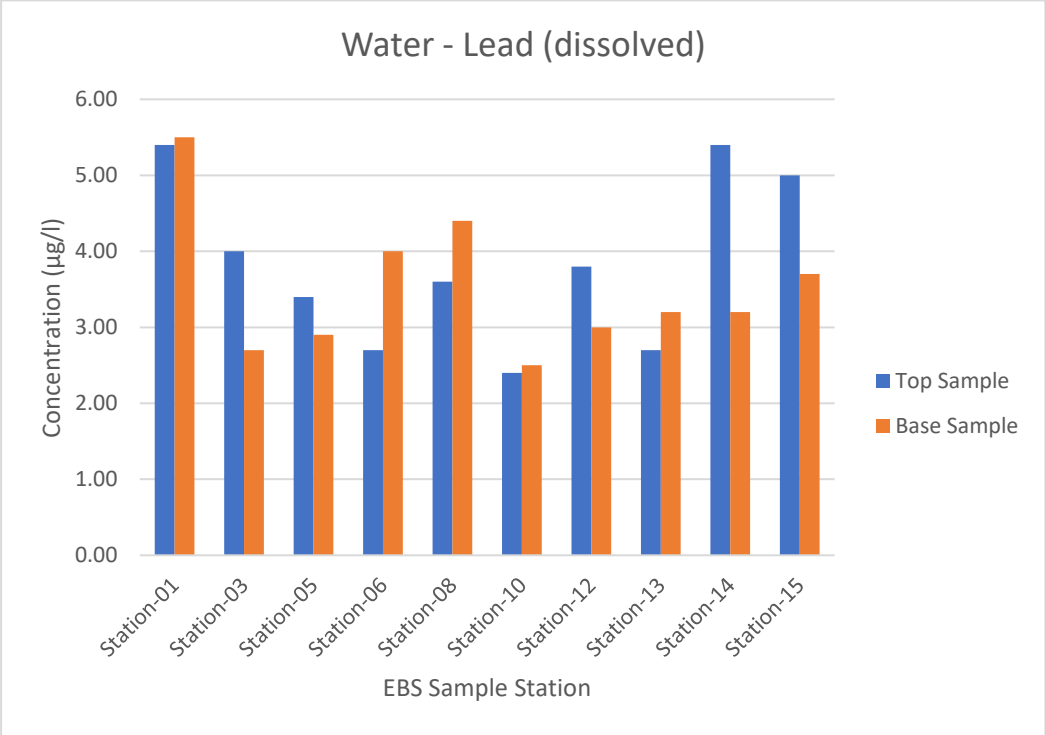

Water - Barium (dissolved)
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Concentration (µg/l)
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample

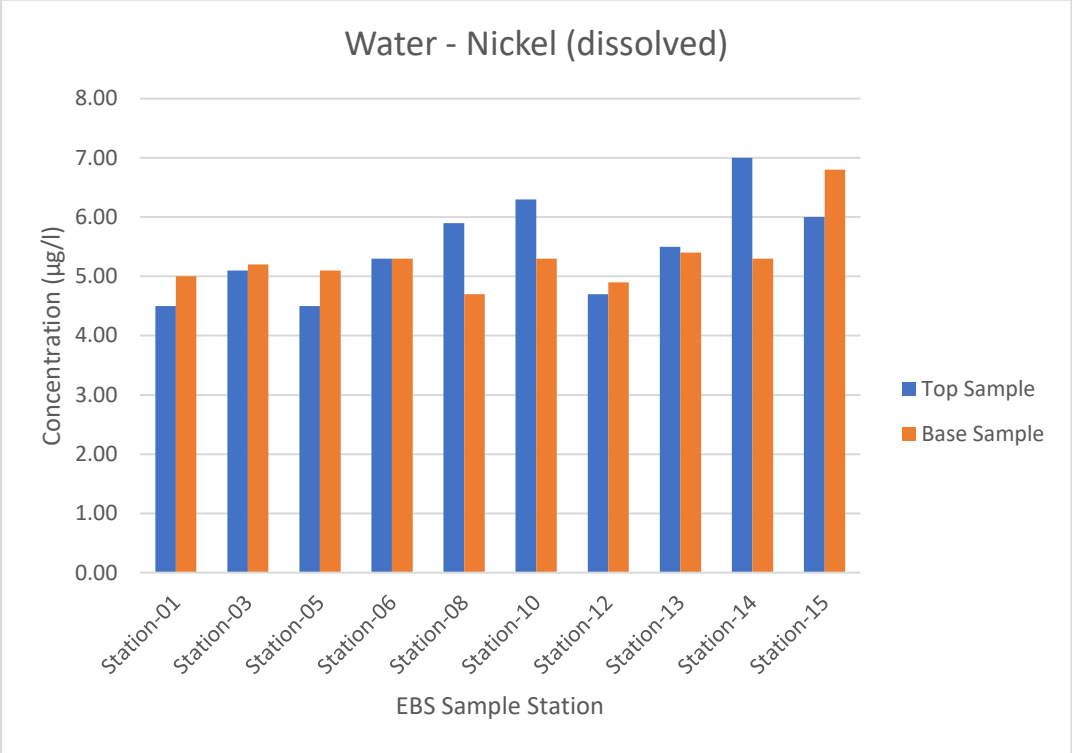

Water - Cadmium (dissolved)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Concentration (µg/l)
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample

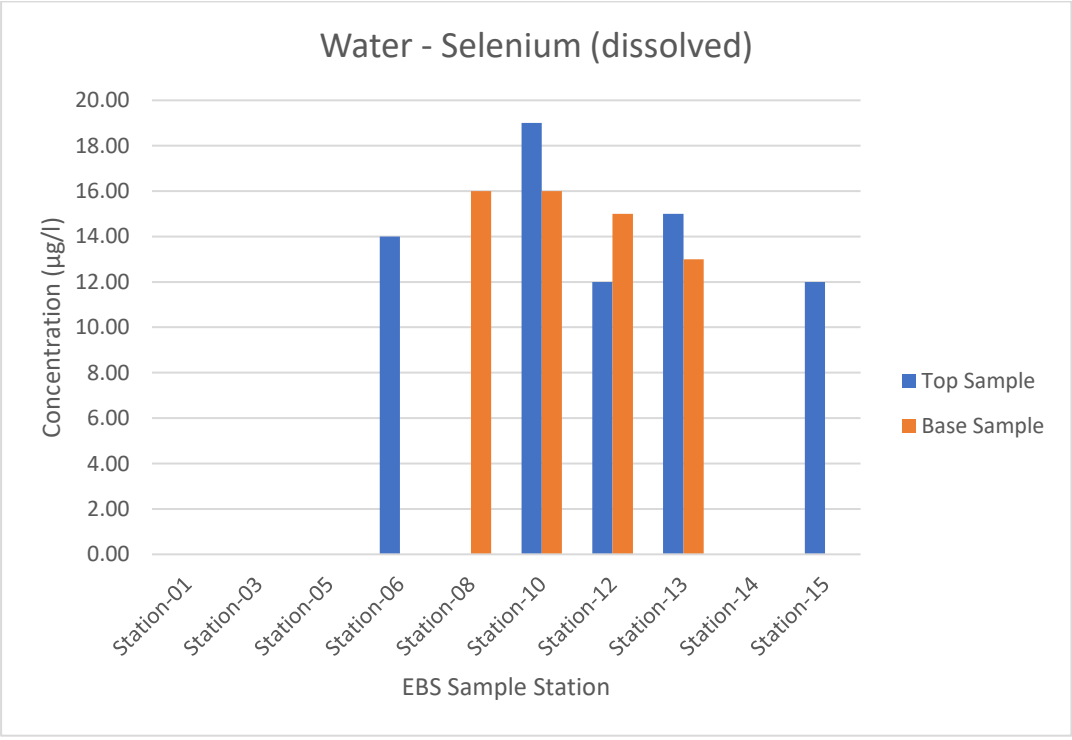

Water - Chromium (dissolved)
Concentration (µg/l)
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample

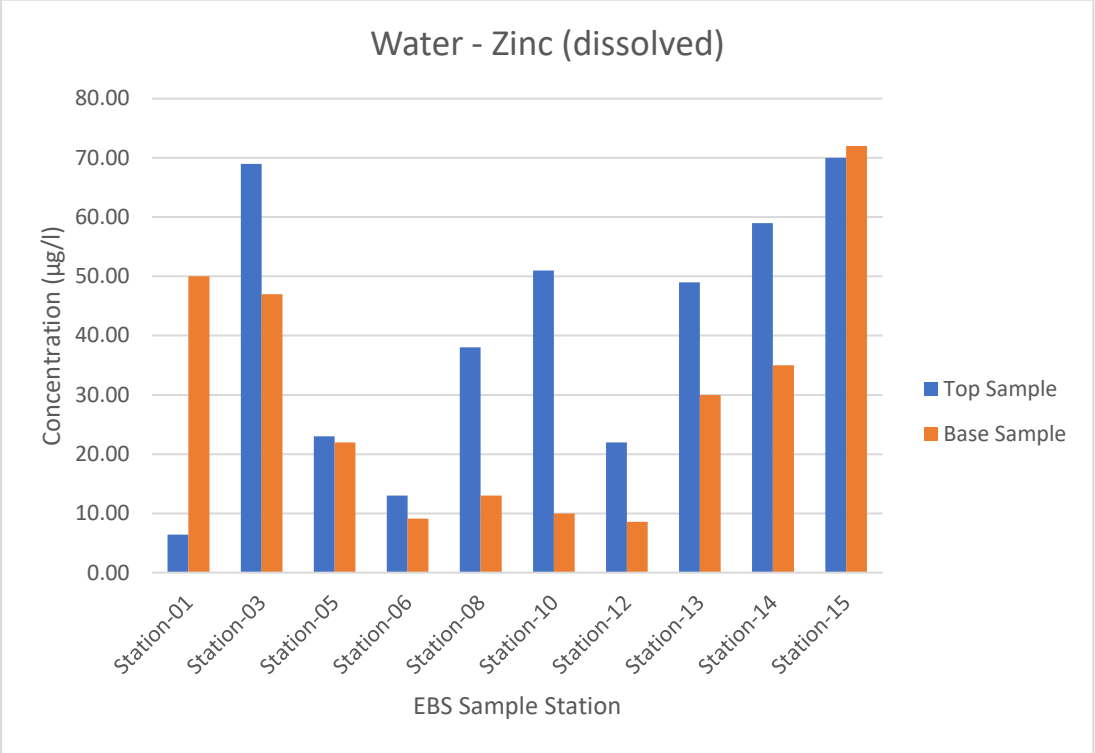

Water - Copper (dissolved)
Concentration (µg/l)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample

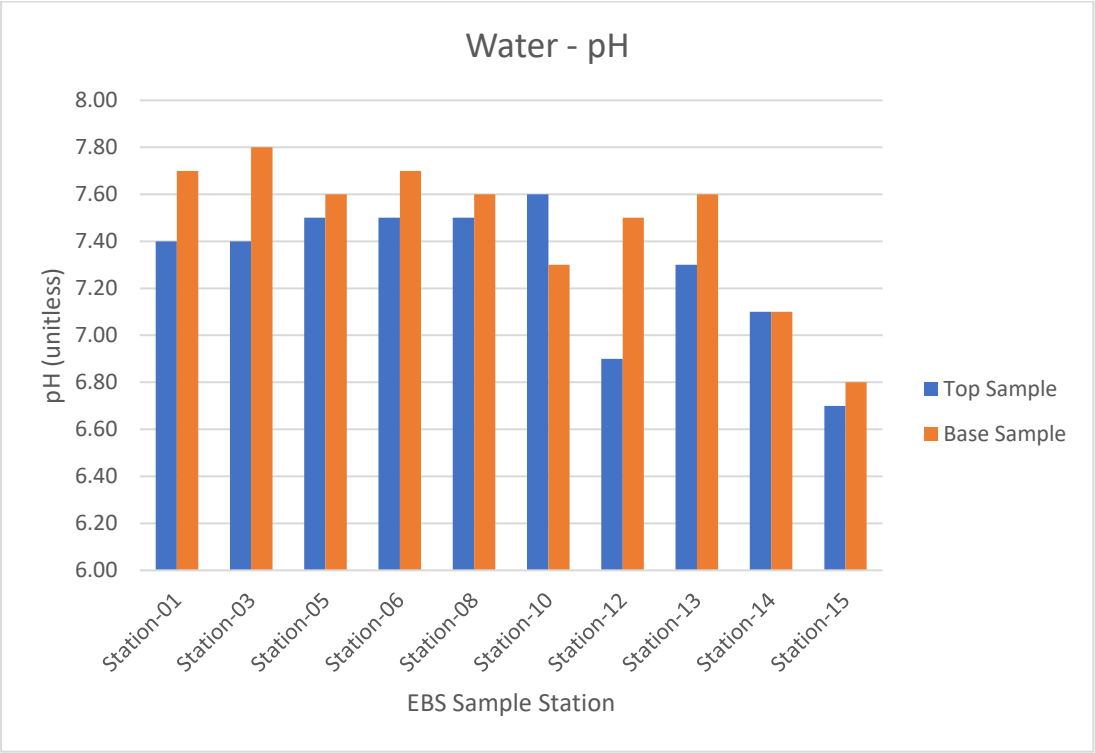

Water - Iron (dissolved)
Concentration (mg/l)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample

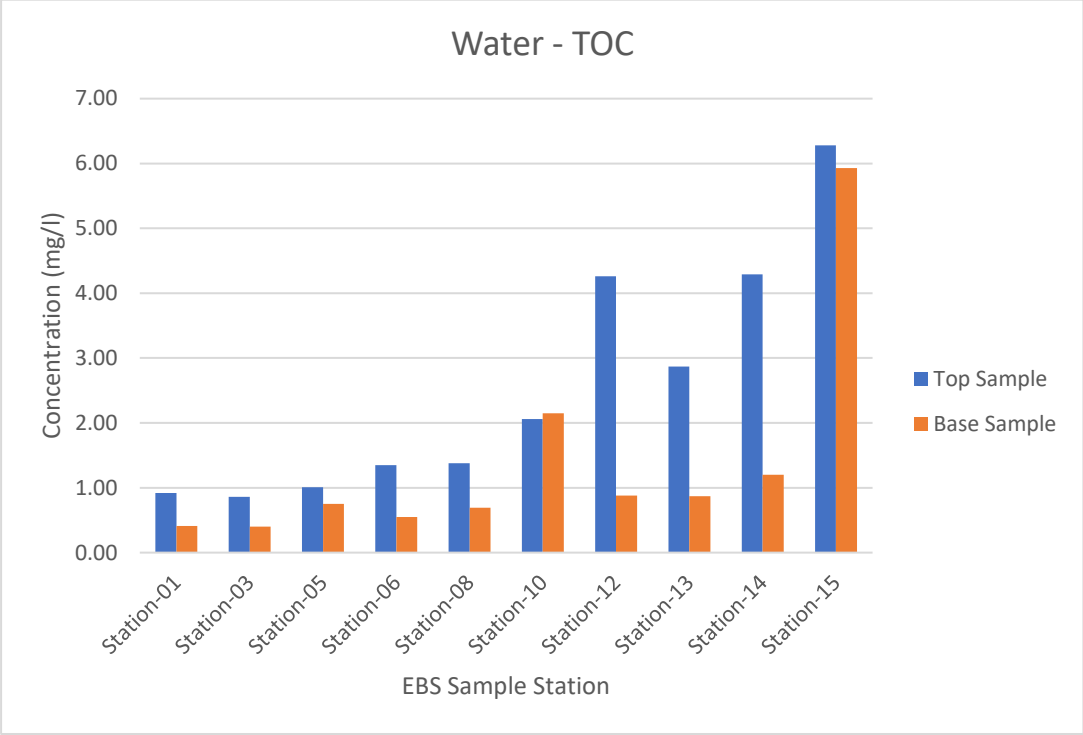

Water - Lead (dissolved)
Concentration (µg/l)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample

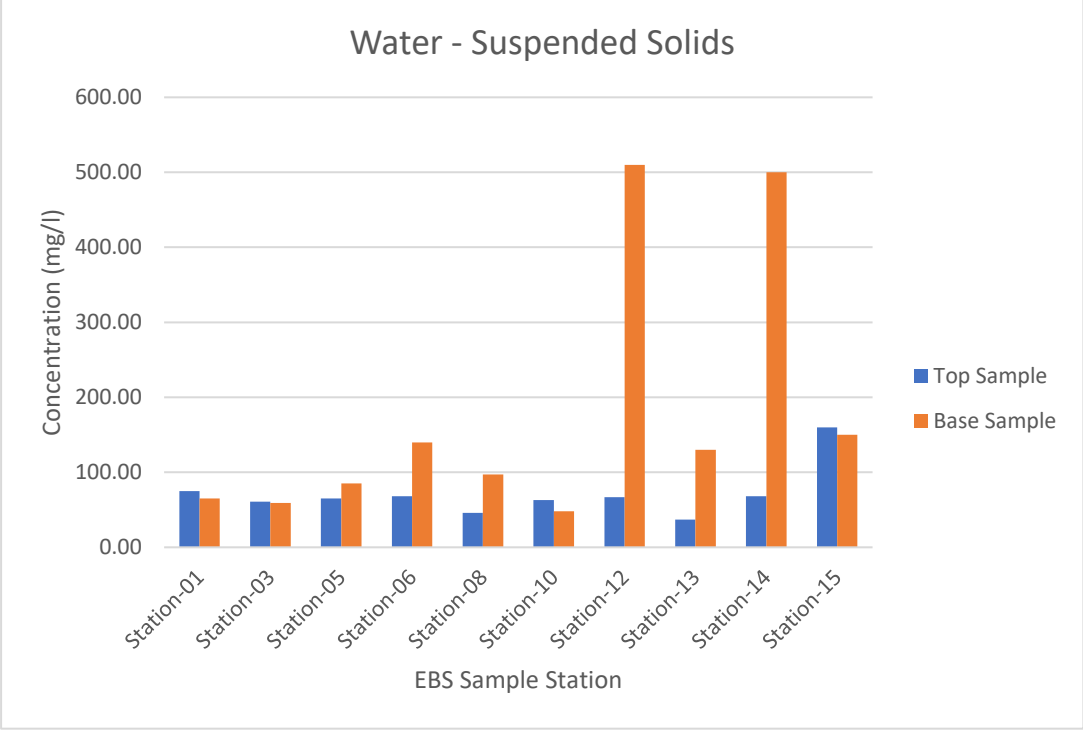

Water - Nickel (dissolved)
Concentration (µg/l)
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample


Water - Selenium (dissolved)
Concentration (µg/l)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample


Water - Zinc (dissolved)
Concentration (µg/l)
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample


Water - pH
pH (unitless)
8.00
7.80
7.60
7.40
7.20
7.00
6.80
6.60
6.40
6.20
6.00
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample


Water - TOC
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Concentration (mg/l)
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample


Water - Suspended Solids
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Concentration (mg/l)
Station-01
Station-03
Station-05
Station-06
Station-08
Station-10
Station-12
Station-13
Station-14
Station-15
EBS Sample Station
Top Sample
Base Sample

The analytical results for the sea-water samples, with the exception of Total Organic Carbon (TOC) do not show any particular trend or pattern in terms of changes with depth or distance from the shore. The TOC does seem to show a gradual increase from EBS01 (farthest from the shore) to EBS15 (closest to the shore). This may be a reflection of run off and drainage from the Guyana coastal communities into the near-shore zone.

In terms of metals the concentrations observed are within the range that could be expected to occur naturally and none of the results imply that there is any significant anthropogenic influence on the water chemistry. One area of potential concern that might be envisaged for Guyana is the dominant use of mercury by hundreds of artisanal gold-miners. This could be expected to manifest itself in the sediments or water column, but given that all the mercury levels were below the laboratory method detection limit, this does not appear to be the case.

5.5 Conclusions

The baseline survey data indicates that the parameters assessed are within the expected range for this environment. The principal conclusions of the EBS works are:

- The coastal waters are shallow and indicate a gently sloping shelf with deeper water being many tens of kilometres off-shore (the 20m isobath being somewhere around 40km offshore);
- There is no particular trend or pattern in the water chemistry between stations or between the upper and lower water samples. This is not surprising given that this is such an active mixing zone with brackish and freshwater inflows from the river systems co-mixing with long-shore and wind-driven ocean currents;
- The chemical species observed and their respective concentrations are similarly within the ranges found in sea-water and do not indicate significant pollution of the coastal waters. This again is unsurprising given the general lack of development and lack of heavy industry in the Guyana coastal plain and hinterland feeding the rivers;
- The sediment particle size analysis is very consistent with all of the sediment samples being classified as almost entirely or entirely of fines below 0.063mm in diameter (fine silts and clays effectively). There was no significant sand or gravel component to any of the sediments encountered during the EBS and no notable visual or consistency variation from station to station (this is also true of the 5 additional geotechnical samples that were taken);

- The chemistry of the sediments was again reasonably consistent with no notable locations differing from the others with the range of concentrations of the analysed parameters are within the expected range for seabed sediments. Guyana has hardly any heavy industry so the opportunity for contaminant accretion in the sediments that flow out into the marine basin is limited. The one exception to this is that Guyana has an extensive gold mining industry that uses mercury in hundreds of artisanal sites, which can cause mercury build in sediments, but no evidence of mercury contamination was discovered in the sampled sediments. The chemical characteristics therefore are representative of natural conditions; and

- The Benthic communities identified in the sediments were poor in terms of species diversity and population. There was little difference in the communities from station to station. The benthic infauna community in the survey area is considered to be relatively poor.

The overall conclusion of the EBS survey works is that the proposed pipeline corridor can be summarised as a physical and chemical environment reflective of natural processes with little evidence of anthropogenic disturbance. The conditions are characterized by well mixed shallow waters with a high suspended solid load and overlaying soft homogenous silt and clay sediments with very sparse and unremarkable benthic communities.

Annex A: Station Log Sheet

Station Information				
Station Name:	Date:	Time of Arrival:	Time of Departure:	Station Bottom Depth:
Temperature:	Humidity:	Wind Direction:	Wind Velocity:	Barometric Pressure:
Cloud cover:	Initials of shift leader:	Sea State: 0.2-0.5m ☐ 0.5-1.25m ☐ 1.25-2.5m ☐ 2.5m-4.0m ☐	Location of First Successful gear deployment (official Sample Location) (Lat/Long):	
Types of samples obtained:	Sediment ☐	Benthic infauna ☐	Water ☐	CTD Profile ☐
Comments (including, unsuccessful deployments (time and reason); problems encountered; applicable photos; other commentary):				

EAME
Earth & Marine Environmental Consultants

Field Sample Log

Sample ID	Station ID	Sample Matrix	Time Sample Taken	Analysis	Preservative & approx. storage temp	Destination Lab	Depth Sample Taken	Sampler Initials
Comments:								
Comments:								
Comments:								
Comments:								
Comments:								

Date:

Annex B: Analytical Reports

Toby Nash
Earth&Marine Environmental Ltd
7th Floor
Forth Banks
NE1 3PA

i2 Analytical Ltd.
ul.Pionierów 39,
41-711 Ruda Slaska,
Poland
NR BDO: 000039239

t: 004832 3426011
f: 004832 3426012
e: contact@i2analytical.com

Analytical Report Number : 21-99398

Project / Site name:	Terrasond EBS Guyana	Samples received on:	13/09/2021
Your job number:	021-1863	Sample instructed on/ Analysis started on:	15/09/2021
Your order number:		Analysis completed by:	20/09/2021
Report Issue Number:	1	Report issued on:	21.09.2021
Samples Analysed:	15 soil samples - 24 water samples		

i2 Analytical Limited Sp. z o.o.
Oddział w Polsce
ul. Pionierów 39
41-711 Ruda Śląska
NIP 2050000782

Agnieszka Czerwińska
Młodszy Specjalista Działu Analiz Raportów

Signed:

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Other office located at: 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS UK

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Sampling and delivery by client.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010930	2010931	2010935	2010936
Sample Reference				EEBS129-01	EEBS127-01	EEBS125-01	EEBS123-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				29/08/2021	29/08/2021	29/08/2021	29/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Moisture Content	%	0.01	NONE	44	62	57	58
General Inorganics							
Redox Potential	mV	-800	NONE	8.4	-85.1	50.7	-121.7
Total Organic Carbon (TOC)	%	0.1	NONE	0.8	1.6	1.1	1.1
Heavy Metals / Metalloids							
Aluminium (aqua regia extractable)	mg/kg	30	NONE	20000	29000	23000	23000
Arsenic (aqua regia extractable)	mg/kg	1	NONE	14	15	16	14
Barium (aqua regia extractable)	mg/kg	1	NONE	21	36	27	31
Cadmium (aqua regia extractable)	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	NONE	23	38	29	30
Copper (aqua regia extractable)	mg/kg	1	NONE	8.1	13	10	12
Iron (aqua regia extractable)	mg/kg	40	NONE	34000	66000	34000	35000
Lead (aqua regia extractable)	mg/kg	1	NONE	14	19	17	18
Mercury (aqua regia extractable)	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	NONE	16	22	20	21
Selenium (aqua regia extractable)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	NONE	69	90	81	87
Monoaromatics							
Benzene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010930	2010931	2010935	2010936
Sample Reference				EEBS129-01	EEBS127-01	EEBS125-01	EEBS123-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				29/08/2021	29/08/2021	29/08/2021	29/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Petroleum Hydrocarbons							
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010939	2010942	2010943	2010946
Sample Reference				EEBS121-01	EEBS119-01	EEBS117-01	EEBS115-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				29/08/2021	29/08/2021	29/08/2021	29/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Moisture Content	%	0.01	NONE	57	54	56	55
General Inorganics							
Redox Potential	mV	-800	NONE	32.7	57.9	-118.5	36
Total Organic Carbon (TOC)	%	0.1	NONE	1.3	0.6	1.1	1.1
Heavy Metals / Metalloids							
Aluminium (aqua regia extractable)	mg/kg	30	NONE	26000	21000	25000	27000
Arsenic (aqua regia extractable)	mg/kg	1	NONE	18	27	18	17
Barium (aqua regia extractable)	mg/kg	1	NONE	34	28	29	28
Cadmium (aqua regia extractable)	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	NONE	30	27	29	29
Copper (aqua regia extractable)	mg/kg	1	NONE	13	10	11	10
Iron (aqua regia extractable)	mg/kg	40	NONE	37000	37000	40000	40000
Lead (aqua regia extractable)	mg/kg	1	NONE	20	18	17	18
Mercury (aqua regia extractable)	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	NONE	22	19	20	20
Selenium (aqua regia extractable)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	NONE	90	80	84	82
Monoaromatics							
Benzene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010939	2010942	2010943	2010946
Sample Reference				EEBS121-01	EEBS119-01	EEBS117-01	EEBS115-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				29/08/2021	29/08/2021	29/08/2021	29/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Petroleum Hydrocarbons							
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010947	2010950	2010951	2010954
Sample Reference				EEBS113-01	EEBS111-01	EEBS109-01	EEBS107-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	7.00
Date Sampled				29/08/2021	29/08/2021	29/08/2021	22/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	1215
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Moisture Content	%	0.01	NONE	60	59	54	57
General Inorganics							
Redox Potential	mV	-800	NONE	-26.2	-74.3	208.7	27.6
Total Organic Carbon (TOC)	%	0.1	NONE	1.1	1.3	1.1	1.1
Heavy Metals / Metalloids							
Aluminium (aqua regia extractable)	mg/kg	30	NONE	28000	26000	24000	29000
Arsenic (aqua regia extractable)	mg/kg	1	NONE	17	16	18	17
Barium (aqua regia extractable)	mg/kg	1	NONE	35	31	35	39
Cadmium (aqua regia extractable)	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	NONE	35	32	34	32
Copper (aqua regia extractable)	mg/kg	1	NONE	13	11	11	16
Iron (aqua regia extractable)	mg/kg	40	NONE	41000	38000	38000	41000
Lead (aqua regia extractable)	mg/kg	1	NONE	20	19	22	30
Mercury (aqua regia extractable)	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	NONE	24	22	23	22
Selenium (aqua regia extractable)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	NONE	97	88	93	120
Monoaromatics							
Benzene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010947	2010950	2010951	2010954
Sample Reference				EEBS113-01	EEBS111-01	EEBS109-01	EEBS107-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	7.00
Date Sampled				29/08/2021	29/08/2021	29/08/2021	22/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	1215
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Petroleum Hydrocarbons							
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	NONE	< 2.0	< 2.0	2.1	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	NONE	< 10	< 10	24	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	33	< 10

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010957	2010960	2010963
Sample Reference				EEBS105-01	EEBS103-01	EEBS101-01
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				6.00	4.90	1.50
Date Sampled				21/08/2021	21/08/2021	21/08/2021
Time Taken				1635	1415	1100
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Moisture Content	%	0.01	NONE	56	59	56
General Inorganics						
Redox Potential	mV	-800	NONE	42.8	191.1	-133.1
Total Organic Carbon (TOC)	%	0.1	NONE	1.1	1.2	0.9
Heavy Metals / Metalloids						
Aluminium (aqua regia extractable)	mg/kg	30	NONE	23000	30000	25000
Arsenic (aqua regia extractable)	mg/kg	1	NONE	19	15	17
Barium (aqua regia extractable)	mg/kg	1	NONE	54	41	40
Cadmium (aqua regia extractable)	mg/kg	0.2	NONE	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	NONE	39	35	36
Copper (aqua regia extractable)	mg/kg	1	NONE	21	11	13
Iron (aqua regia extractable)	mg/kg	40	NONE	35000	41000	38000
Lead (aqua regia extractable)	mg/kg	1	NONE	34	21	22
Mercury (aqua regia extractable)	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	NONE	26	24	25
Selenium (aqua regia extractable)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	NONE	130	93	100
Monoaromatics						
Benzene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010957	2010960	2010963
Sample Reference				EEBS105-01	EEBS103-01	EEBS101-01
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				6.00	4.90	1.50
Date Sampled				21/08/2021	21/08/2021	21/08/2021
Time Taken				1635	1415	1100
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Petroleum Hydrocarbons						
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	NONE	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	< 10

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010927	2010928	2010929	2010932	2010933	2010934
Sample Reference				EEBS222-01	EEBS223-01	EEBS224-01	EEBS219-01	EEBS220-01	EEBS221-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	8.00	17.00	1.00	6.00	14.00
Date Sampled				26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021
Time Taken				1220	1236	1245	1130	1140	1149
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
General Inorganics									
pH	pH Units	N/A	ISO 17025	7.4	7.5	7.7	7.4	7.6	7.8
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	0.92	0.75	0.41	0.86	0.5	0.4
Total Suspended Solids	mg/l	2	ISO 17025	75	47	65	61	70	59
Heavy Metals / Metalloids									
Aluminium (dissolved)	mg/l	0.012	ISO 17025	0.025	0.072	0.093	0.073	0.083	0.084
Arsenic (dissolved)	µg/l	1	ISO 17025	8.2	6.5	3.4	5.2	2.7	5.5
Barium (dissolved)	µg/l	0.05	ISO 17025	99	12	12	13	14	12
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	0.22	< 0.08	< 0.08
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.7	0.7	0.6	0.9	0.7	1
Copper (dissolved)	µg/l	0.7	ISO 17025	6.5	0.7	1.8	1	2.3	1.4
Iron (dissolved)	mg/l	0.004	ISO 17025	0.066	0.04	0.23	0.015	0.27	0.041
Lead (dissolved)	µg/l	1	ISO 17025	5.4	1.6	5.5	4	3.4	2.7
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	4.5	6	5	5.1	5.8	5.2
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	17	< 4.0	< 4.0	< 4.0	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.4	29	50	69	55	47
Monoaromatics									
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010927	2010928	2010929	2010932	2010933	2010934
Sample Reference				EEBS222-01	EEBS223-01	EEBS224-01	EEBS219-01	EEBS220-01	EEBS221-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	8.00	17.00	1.00	6.00	14.00
Date Sampled				26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021
Time Taken				1220	1236	1245	1130	1140	1149
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
Petroleum Hydrocarbons									
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010927	2010928	2010929	2010932	2010933	2010934
Sample Reference				EEBS222-01	EEBS223-01	EEBS224-01	EEBS219-01	EEBS220-01	EEBS221-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	8.00	17.00	1.00	6.00	14.00
Date Sampled				26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021
Time Taken				1220	1236	1245	1130	1140	1149
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
SVOCs									
Aniline	µg/l	0.05	NONE	-	-	-	-	-	-
Phenol	µg/l	0.05	NONE	-	-	-	-	-	-
2-Chlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	-	-	-	-	-	-
2-Methylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
Hexachloroethane	µg/l	0.05	NONE	-	-	-	-	-	-
Nitrobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
4-Methylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
Isophorone	µg/l	0.05	NONE	-	-	-	-	-	-
2-Nitrophenol	µg/l	0.05	NONE	-	-	-	-	-	-
4-Nitrophenol	µg/l	0.05	ISO 17025	-	-	-	-	-	-
2,4-Dimethylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Naphthalene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
2,4-Dichlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
4-Chloroaniline	µg/l	0.05	NONE	-	-	-	-	-	-
Hexachlorobutadiene	µg/l	0.05	NONE	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
2-Methylnaphthalene	µg/l	0.05	NONE	-	-	-	-	-	-
2-Chloronaphthalene	µg/l	0.05	NONE	-	-	-	-	-	-
Dimethylphthalate	µg/l	0.05	NONE	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/l	0.05	NONE	-	-	-	-	-	-
Acenaphthylene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Acenaphthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/l	0.05	NONE	-	-	-	-	-	-
Dibenzofuran	µg/l	0.05	NONE	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	-	-	-	-	-	-
Diethyl phthalate	µg/l	0.05	NONE	-	-	-	-	-	-
4-Nitroaniline	µg/l	0.05	NONE	-	-	-	-	-	-
Fluorene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Azobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Bromophenyl phenyl ether	µg/l	0.05	NONE	-	-	-	-	-	-
Hexachlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Phenanthrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Anthracene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Carbazole	µg/l	0.05	NONE	-	-	-	-	-	-
Dibutyl phthalate	µg/l	0.05	NONE	-	-	-	-	-	-
Anthraquinone	µg/l	0.05	NONE	-	-	-	-	-	-

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010927	2010928	2010929	2010932	2010933	2010934
Sample Reference				EEBS222-01	EEBS223-01	EEBS224-01	EEBS219-01	EEBS220-01	EEBS221-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	8.00	17.00	1.00	6.00	14.00
Date Sampled				26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021
Time Taken				1220	1236	1245	1130	1140	1149
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
Fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Pyrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Butyl benzyl phthalate	µg/l	0.05	NONE	-	-	-	-	-	-
Benzo(a)anthracene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Chrysene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(a)pyrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	-	-	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010937	2010938	2010940	2010941	2010944	2010945
Sample Reference				EEBS217-01	EEBS218-01	EEBS215-01	EEBS216-01	EEBS213-01	EEBS214-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	11.00	1.00	8.00	1.00	11.00
Date Sampled				26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021
Time Taken				1031	1110	0955	1004	0925	0930
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
General Inorganics									
pH	pH Units	N/A	ISO 17025	7.5	7.6	7.5	7.7	7.5	7.6
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.01	0.75	1.35	0.55	1.38	0.69
Total Suspended Solids	mg/l	2	ISO 17025	65	85	68	140	46	97
Heavy Metals / Metalloids									
Aluminium (dissolved)	mg/l	0.012	ISO 17025	0.068	0.072	0.053	0.11	0.061	0.11
Arsenic (dissolved)	µg/l	1	ISO 17025	2.9	6.3	5.3	6.6	5.2	4.5
Barium (dissolved)	µg/l	0.05	ISO 17025	13	11	14	11	13	11
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.8	0.9	0.7	0.7	1.1	0.5
Copper (dissolved)	µg/l	0.7	ISO 17025	4.2	1	2.9	< 0.7	1.7	2.3
Iron (dissolved)	mg/l	0.004	ISO 17025	0.056	0.026	0.022	0.051	0.049	0.092
Lead (dissolved)	µg/l	1	ISO 17025	3.4	2.9	2.7	4	3.6	4.4
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	4.5	5.1	5.3	5.3	5.9	4.7
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	14	< 4.0	< 4.0	16
Zinc (dissolved)	µg/l	0.4	ISO 17025	23	22	13	9.1	38	13
Monoaromatics									
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010937	2010938	2010940	2010941	2010944	2010945
Sample Reference				EEBS217-01	EEBS218-01	EEBS215-01	EEBS216-01	EEBS213-01	EEBS214-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	11.00	1.00	8.00	1.00	11.00
Date Sampled				26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021
Time Taken				1031	1110	0955	1004	0925	0930
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
Petroleum Hydrocarbons									
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010937	2010938	2010940	2010941	2010944	2010945
Sample Reference				EEBS217-01	EEBS218-01	EEBS215-01	EEBS216-01	EEBS213-01	EEBS214-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	11.00	1.00	8.00	1.00	11.00
Date Sampled				26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021
Time Taken				1031	1110	0955	1004	0925	0930
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
SVOCs									
Aniline	µg/l	0.05	NONE	-	-	-	-	-	-
Phenol	µg/l	0.05	NONE	-	-	-	-	-	-
2-Chlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	-	-	-	-	-	-
2-Methylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
Hexachloroethane	µg/l	0.05	NONE	-	-	-	-	-	-
Nitrobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
4-Methylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
Isophorone	µg/l	0.05	NONE	-	-	-	-	-	-
2-Nitrophenol	µg/l	0.05	NONE	-	-	-	-	-	-
4-Nitrophenol	µg/l	0.05	ISO 17025	-	-	-	-	-	-
2,4-Dimethylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Naphthalene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
2,4-Dichlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
4-Chloroaniline	µg/l	0.05	NONE	-	-	-	-	-	-
Hexachlorobutadiene	µg/l	0.05	NONE	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
2-Methylnaphthalene	µg/l	0.05	NONE	-	-	-	-	-	-
2-Chloronaphthalene	µg/l	0.05	NONE	-	-	-	-	-	-
Dimethylphthalate	µg/l	0.05	NONE	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/l	0.05	NONE	-	-	-	-	-	-
Acenaphthylene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Acenaphthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/l	0.05	NONE	-	-	-	-	-	-
Dibenzofuran	µg/l	0.05	NONE	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	-	-	-	-	-	-
Diethyl phthalate	µg/l	0.05	NONE	-	-	-	-	-	-
4-Nitroaniline	µg/l	0.05	NONE	-	-	-	-	-	-
Fluorene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Azobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Bromophenyl phenyl ether	µg/l	0.05	NONE	-	-	-	-	-	-
Hexachlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Phenanthrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Anthracene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Carbazole	µg/l	0.05	NONE	-	-	-	-	-	-
Dibutyl phthalate	µg/l	0.05	NONE	-	-	-	-	-	-
Anthraquinone	µg/l	0.05	NONE	-	-	-	-	-	-

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010937	2010938	2010940	2010941	2010944	2010945
Sample Reference				EEBS217-01	EEBS218-01	EEBS215-01	EEBS216-01	EEBS213-01	EEBS214-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	11.00	1.00	8.00	1.00	11.00
Date Sampled				26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021	26/08/2021
Time Taken				1031	1110	0955	1004	0925	0930
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
Fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Pyrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Butyl benzyl phthalate	µg/l	0.05	NONE	-	-	-	-	-	-
Benzo(a)anthracene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Chrysene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(a)pyrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	-	-	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010948	2010949	2010952	2010953	2010955	2010956
Sample Reference				EEBS211-01	EEBS212-01	EEBS207-01	EEBS208-01	EEBS205-01	EEBS206-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	7.00	0.50	5.90	1.00	5.00
Date Sampled				26/08/2021	26/08/2021	22/08/2021	22/08/2021	21/08/2021	21/08/2021
Time Taken				0840	0852	1313	1345	1545	1620
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
General Inorganics									
pH	pH Units	N/A	ISO 17025	7.6	7.3	6.9	7.5	7.3	7.6
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	2.06	2.15	4.26	0.88	2.87	0.87
Total Suspended Solids	mg/l	2	ISO 17025	63	48	67	510	37	130
Heavy Metals / Metalloids									
Aluminium (dissolved)	mg/l	0.012	ISO 17025	0.052	0.069	0.02	0.36	0.042	0.13
Arsenic (dissolved)	µg/l	1	ISO 17025	3.3	6.4	5.4	4.7	6.4	4.4
Barium (dissolved)	µg/l	0.05	ISO 17025	13	14	14	13	16	12
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	0.25	< 0.08	< 0.08	< 0.08
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.4	0.8	0.8	0.8	0.8	0.7
Copper (dissolved)	µg/l	0.7	ISO 17025	1.8	1.6	2.7	< 0.7	2.6	< 0.7
Iron (dissolved)	mg/l	0.004	ISO 17025	0.021	0.09	0.028	0.26	0.18	0.072
Lead (dissolved)	µg/l	1	ISO 17025	2.4	2.5	3.8	3	2.7	3.2
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	6.3	5.3	4.7	4.9	5.5	5.4
Selenium (dissolved)	µg/l	4	ISO 17025	19	16	12	15	15	13
Zinc (dissolved)	µg/l	0.4	ISO 17025	51	10	22	8.6	49	30
Monoaromatics									
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010948	2010949	2010952	2010953	2010955	2010956
Sample Reference				EEBS211-01	EEBS212-01	EEBS207-01	EEBS208-01	EEBS205-01	EEBS206-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	7.00	0.50	5.90	1.00	5.00
Date Sampled				26/08/2021	26/08/2021	22/08/2021	22/08/2021	21/08/2021	21/08/2021
Time Taken				0840	0852	1313	1345	1545	1620
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
Petroleum Hydrocarbons									
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010948	2010949	2010952	2010953	2010955	2010956
Sample Reference				EEBS211-01	EEBS212-01	EEBS207-01	EEBS208-01	EEBS205-01	EEBS206-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	7.00	0.50	5.90	1.00	5.00
Date Sampled				26/08/2021	26/08/2021	22/08/2021	22/08/2021	21/08/2021	21/08/2021
Time Taken				0840	0852	1313	1345	1545	1620
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
SVOCs									
Aniline	µg/l	0.05	NONE	-	-	-	-	-	-
Phenol	µg/l	0.05	NONE	-	-	-	-	-	-
2-Chlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	-	-	-	-	-	-
2-Methylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
Hexachloroethane	µg/l	0.05	NONE	-	-	-	-	-	-
Nitrobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
4-Methylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
Isophorone	µg/l	0.05	NONE	-	-	-	-	-	-
2-Nitrophenol	µg/l	0.05	NONE	-	-	-	-	-	-
4-Nitrophenol	µg/l	0.05	ISO 17025	-	-	-	-	-	-
2,4-Dimethylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Naphthalene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
2,4-Dichlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
4-Chloroaniline	µg/l	0.05	NONE	-	-	-	-	-	-
Hexachlorobutadiene	µg/l	0.05	NONE	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/l	0.05	NONE	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/l	0.05	NONE	-	-	-	-	-	-
2-Methylnaphthalene	µg/l	0.05	NONE	-	-	-	-	-	-
2-Chloronaphthalene	µg/l	0.05	NONE	-	-	-	-	-	-
Dimethylphthalate	µg/l	0.05	NONE	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/l	0.05	NONE	-	-	-	-	-	-
Acenaphthylene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Acenaphthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/l	0.05	NONE	-	-	-	-	-	-
Dibenzofuran	µg/l	0.05	NONE	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	-	-	-	-	-	-
Diethyl phthalate	µg/l	0.05	NONE	-	-	-	-	-	-
4-Nitroaniline	µg/l	0.05	NONE	-	-	-	-	-	-
Fluorene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Azobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Bromophenyl phenyl ether	µg/l	0.05	NONE	-	-	-	-	-	-
Hexachlorobenzene	µg/l	0.05	NONE	-	-	-	-	-	-
Phenanthrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Anthracene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Carbazole	µg/l	0.05	NONE	-	-	-	-	-	-
Dibutyl phthalate	µg/l	0.05	NONE	-	-	-	-	-	-
Anthraquinone	µg/l	0.05	NONE	-	-	-	-	-	-

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010948	2010949	2010952	2010953	2010955	2010956
Sample Reference				EEBS211-01	EEBS212-01	EEBS207-01	EEBS208-01	EEBS205-01	EEBS206-01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	7.00	0.50	5.90	1.00	5.00
Date Sampled				26/08/2021	26/08/2021	22/08/2021	22/08/2021	21/08/2021	21/08/2021
Time Taken				0840	0852	1313	1345	1545	1620
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
Fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Pyrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Butyl benzyl phthalate	µg/l	0.05	NONE	-	-	-	-	-	-
Benzo(a)anthracene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Chrysene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(a)pyrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	-	-	-	-	-	-
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	-	-	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010958	2010959	2010961	2010962	2010964	2011065
Sample Reference				EEBS203-01	EEBS204-01	EEBS201-01	EEBS202-01	Trip Blank	EEBS202-02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	3.90	0.50	1.00	None Supplied	1.0
Date Sampled				21/08/2021	21/08/2021	21/08/2021	21/08/2021	Deviating	Deviating
Time Taken				1338	1400	1013	1019	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
General Inorganics									
pH	pH Units	N/A	ISO 17025	7.1	7.1	6.7	6.8	7.3	7.3
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	4.29	1.2	6.28	5.93	1.93	6.78
Total Suspended Solids	mg/l	2	ISO 17025	68	500	160	150	< 2.0	140
Heavy Metals / Metalloids									
Aluminium (dissolved)	mg/l	0.012	ISO 17025	0.1	0.44	0.046	0.88	< 0.012	0.033
Arsenic (dissolved)	µg/l	1	ISO 17025	8.4	3.5	3.4	4.2	< 1.0	2.7
Barium (dissolved)	µg/l	0.05	ISO 17025	17	15	10	12	28	10
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.4	1.1	1.2	1.5	< 0.4	0.7
Copper (dissolved)	µg/l	0.7	ISO 17025	5.1	< 0.7	3.2	6.5	1.0	2.6
Iron (dissolved)	mg/l	0.004	ISO 17025	0.12	0.26	0.24	0.88	0.033	0.23
Lead (dissolved)	µg/l	1	ISO 17025	5.4	3.2	5	3.7	< 1.0	4.6
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	7	5.3	6	6.8	1.9	5.5
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	12	< 4.0	< 4.0	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	59	35	70	72	13	46
Monoaromatics									
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010958	2010959	2010961	2010962	2010964	2011065
Sample Reference				EEBS203-01	EEBS204-01	EEBS201-01	EEBS202-01	Trip Blank	EEBS202-02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	3.90	0.50	1.00	None Supplied	1.0
Date Sampled				21/08/2021	21/08/2021	21/08/2021	21/08/2021	Deviating	Deviating
Time Taken				1338	1400	1013	1019	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
Petroleum Hydrocarbons									
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10	< 10

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Analytical Report Number: 21-99398
Project / Site name: Terrasond EBS Guyana

Lab Sample Number				2010958	2010959	2010961	2010962	2010964	2011065
Sample Reference				EEBS203-01	EEBS204-01	EEBS201-01	EEBS202-01	Trip Blank	EEBS202-02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	3.90	0.50	1.00	None Supplied	1.0
Date Sampled				21/08/2021	21/08/2021	21/08/2021	21/08/2021	Deviating	Deviating
Time Taken				1338	1400	1013	1019	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
SVOCs									
Aniline	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Phenol	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
2-Chlorophenol	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
1,3-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
1,2-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
1,4-Dichlorobenzene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
2-Methylphenol	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Hexachloroethane	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Nitrobenzene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
4-Methylphenol	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Isophorone	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
2-Nitrophenol	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
4-Nitrophenol	µg/l	0.05	ISO 17025	-	-	-	-	< 0.05	-
2,4-Dimethylphenol	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Naphthalene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
2,4-Dichlorophenol	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
4-Chloroaniline	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Hexachlorobutadiene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
4-Chloro-3-methylphenol	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
2,4,6-Trichlorophenol	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
2,4,5-Trichlorophenol	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
2-Methylnaphthalene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
2-Chloronaphthalene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Dimethylphthalate	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
2,6-Dinitrotoluene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Acenaphthylene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Acenaphthene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
2,4-Dinitrotoluene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Dibenzofuran	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Diethyl phthalate	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
4-Nitroaniline	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Fluorene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Azobenzene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Bromophenyl phenyl ether	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Hexachlorobenzene	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Phenanthrene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Anthracene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Carbazole	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Dibutyl phthalate	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Anthraquinone	µg/l	0.05	NONE	-	-	-	-	< 0.05	-

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Lab Sample Number				2010958	2010959	2010961	2010962	2010964	2011065
Sample Reference				EEBS203-01	EEBS204-01	EEBS201-01	EEBS202-01	Trip Blank	EEBS202-02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	3.90	0.50	1.00	None Supplied	1.0
Date Sampled				21/08/2021	21/08/2021	21/08/2021	21/08/2021	Deviating	Deviating
Time Taken				1338	1400	1013	1019	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status						
Fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Pyrene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Butyl benzyl phthalate	µg/l	0.05	NONE	-	-	-	-	< 0.05	-
Benzo(a)anthracene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Chrysene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Benzo(a)pyrene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	-	-	-	-	< 0.01	-

U/S = Unsuitable Sample I/S = Insufficient Sample

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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2010930	EEBS129-01	None Supplied	None Supplied	Grey silt.
2010931	EEBS127-01	None Supplied	None Supplied	Brown silt.
2010935	EEBS125-01	None Supplied	None Supplied	Grey silt.
2010936	EEBS123-01	None Supplied	None Supplied	Grey silt.
2010939	EEBS121-01	None Supplied	None Supplied	Grey silt.
2010942	EEBS119-01	None Supplied	None Supplied	Grey silt.
2010943	EEBS117-01	None Supplied	None Supplied	Grey silt.
2010946	EEBS115-01	None Supplied	None Supplied	Grey silt.
2010947	EEBS113-01	None Supplied	None Supplied	Brown silt.
2010950	EEBS111-01	None Supplied	None Supplied	Grey silt.
2010951	EEBS109-01	None Supplied	None Supplied	Grey silt.
2010954	EEBS107-01	None Supplied	7	Grey silt.
2010957	EEBS105-01	None Supplied	6	Grey silt.
2010960	EEBS103-01	None Supplied	4.9	Grey silt.
2010963	EEBS101-01	None Supplied	1.5	Grey silt.

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Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	NONE
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Redox Potential of soil	Determination of redox potential in soil by electrometric measurement.	In house method.	L084-PL	W	NONE
Suspended solids in water	Determined gravimetrically with GFC filtration papers.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	NONE
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	NONE
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
EEBS101-01	None Supplied	S	2010963	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS101-01	None Supplied	S	2010963	bc	Redox Potential of soil	L084-PL	c
EEBS101-01	None Supplied	S	2010963	bc	TPHCWG (Soil)	L088/76-PL	bc
EEBS103-01	None Supplied	S	2010960	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS103-01	None Supplied	S	2010960	bc	Redox Potential of soil	L084-PL	c
EEBS103-01	None Supplied	S	2010960	bc	TPHCWG (Soil)	L088/76-PL	bc
EEBS105-01	None Supplied	S	2010957	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS105-01	None Supplied	S	2010957	bc	Redox Potential of soil	L084-PL	c
EEBS105-01	None Supplied	S	2010957	bc	TPHCWG (Soil)	L088/76-PL	bc
EEBS107-01	None Supplied	S	2010954	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS107-01	None Supplied	S	2010954	bc	Redox Potential of soil	L084-PL	c
EEBS107-01	None Supplied	S	2010954	bc	TPHCWG (Soil)	L088/76-PL	bc
EEBS109-01	None Supplied	S	2010951	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS109-01	None Supplied	S	2010951	bc	Redox Potential of soil	L084-PL	c
EEBS109-01	None Supplied	S	2010951	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS111-01	None Supplied	S	2010950	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS111-01	None Supplied	S	2010950	bc	Redox Potential of soil	L084-PL	c
EEBS111-01	None Supplied	S	2010950	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS113-01	None Supplied	S	2010947	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS113-01	None Supplied	S	2010947	bc	Redox Potential of soil	L084-PL	c
EEBS113-01	None Supplied	S	2010947	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS115-01	None Supplied	S	2010946	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS115-01	None Supplied	S	2010946	bc	Redox Potential of soil	L084-PL	c
EEBS115-01	None Supplied	S	2010946	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS117-01	None Supplied	S	2010943	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS117-01	None Supplied	S	2010943	bc	Redox Potential of soil	L084-PL	c
EEBS117-01	None Supplied	S	2010943	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS119-01	None Supplied	S	2010942	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS119-01	None Supplied	S	2010942	bc	Redox Potential of soil	L084-PL	c
EEBS119-01	None Supplied	S	2010942	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS121-01	None Supplied	S	2010939	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS121-01	None Supplied	S	2010939	bc	Redox Potential of soil	L084-PL	c
EEBS121-01	None Supplied	S	2010939	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS123-01	None Supplied	S	2010936	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS123-01	None Supplied	S	2010936	bc	Redox Potential of soil	L084-PL	c
EEBS123-01	None Supplied	S	2010936	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS125-01	None Supplied	S	2010935	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS125-01	None Supplied	S	2010935	bc	Redox Potential of soil	L084-PL	c
EEBS125-01	None Supplied	S	2010935	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS127-01	None Supplied	S	2010931	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS127-01	None Supplied	S	2010931	bc	Redox Potential of soil	L084-PL	c
EEBS127-01	None Supplied	S	2010931	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS129-01	None Supplied	S	2010930	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS129-01	None Supplied	S	2010930	bc	Redox Potential of soil	L084-PL	c
EEBS129-01	None Supplied	S	2010930	bc	TPHCWG (Soil)	L088/76-PL	b
EEBS201-01	None Supplied	W	2010961	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS201-01	None Supplied	W	2010961	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS201-01	None Supplied	W	2010961	bc	Settleable Solids in water	L004-PL	c
EEBS201-01	None Supplied	W	2010961	bc	Suspended solids in water	L004-PL	c
EEBS201-01	None Supplied	W	2010961	bc	TPHCWG (Waters)	L070-PL	bc
EEBS201-01	None Supplied	W	2010961	bc	Total organic carbon in water	L037-PL	c
EEBS201-01	None Supplied	W	2010961	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS202-01	None Supplied	W	2010962	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS202-01	None Supplied	W	2010962	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS202-01	None Supplied	W	2010962	bc	Settleable Solids in water	L004-PL	c

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Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
EEBS101-01	None Supplied	S	2010963	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS202-01	None Supplied	W	2010962	bc	Suspended solids in water	L004-PL	c
EEBS202-01	None Supplied	W	2010962	bc	TPHCWG (Waters)	L070-PL	bc
EEBS202-01	None Supplied	W	2010962	bc	Total organic carbon in water	L037-PL	c
EEBS202-01	None Supplied	W	2010962	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS202-02	None Supplied	W	2011065	a	None Supplied	None Supplied	None Supplied
EEBS203-01	None Supplied	W	2010958	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS203-01	None Supplied	W	2010958	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS203-01	None Supplied	W	2010958	bc	Settleable Solids in water	L004-PL	c
EEBS203-01	None Supplied	W	2010958	bc	Suspended solids in water	L004-PL	c
EEBS203-01	None Supplied	W	2010958	bc	TPHCWG (Waters)	L070-PL	bc
EEBS203-01	None Supplied	W	2010958	bc	Total organic carbon in water	L037-PL	c
EEBS203-01	None Supplied	W	2010958	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS204-01	None Supplied	W	2010959	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS204-01	None Supplied	W	2010959	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS204-01	None Supplied	W	2010959	bc	Settleable Solids in water	L004-PL	c
EEBS204-01	None Supplied	W	2010959	bc	Suspended solids in water	L004-PL	c
EEBS204-01	None Supplied	W	2010959	bc	TPHCWG (Waters)	L070-PL	bc
EEBS204-01	None Supplied	W	2010959	bc	Total organic carbon in water	L037-PL	c
EEBS204-01	None Supplied	W	2010959	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS205-01	None Supplied	W	2010955	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS205-01	None Supplied	W	2010955	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS205-01	None Supplied	W	2010955	bc	Settleable Solids in water	L004-PL	c
EEBS205-01	None Supplied	W	2010955	bc	Suspended solids in water	L004-PL	c
EEBS205-01	None Supplied	W	2010955	bc	TPHCWG (Waters)	L070-PL	bc
EEBS205-01	None Supplied	W	2010955	bc	Total organic carbon in water	L037-PL	c
EEBS205-01	None Supplied	W	2010955	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS206-01	None Supplied	W	2010956	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS206-01	None Supplied	W	2010956	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS206-01	None Supplied	W	2010956	bc	Settleable Solids in water	L004-PL	c
EEBS206-01	None Supplied	W	2010956	bc	Suspended solids in water	L004-PL	c
EEBS206-01	None Supplied	W	2010956	bc	TPHCWG (Waters)	L070-PL	bc
EEBS206-01	None Supplied	W	2010956	bc	Total organic carbon in water	L037-PL	c
EEBS206-01	None Supplied	W	2010956	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS207-01	None Supplied	W	2010952	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS207-01	None Supplied	W	2010952	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS207-01	None Supplied	W	2010952	bc	Settleable Solids in water	L004-PL	c
EEBS207-01	None Supplied	W	2010952	bc	Suspended solids in water	L004-PL	c
EEBS207-01	None Supplied	W	2010952	bc	TPHCWG (Waters)	L070-PL	bc
EEBS207-01	None Supplied	W	2010952	bc	Total organic carbon in water	L037-PL	c
EEBS207-01	None Supplied	W	2010952	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS208-01	None Supplied	W	2010953	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS208-01	None Supplied	W	2010953	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS208-01	None Supplied	W	2010953	bc	Settleable Solids in water	L004-PL	c
EEBS208-01	None Supplied	W	2010953	bc	Suspended solids in water	L004-PL	c
EEBS208-01	None Supplied	W	2010953	bc	TPHCWG (Waters)	L070-PL	bc
EEBS208-01	None Supplied	W	2010953	bc	Total organic carbon in water	L037-PL	c
EEBS208-01	None Supplied	W	2010953	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS211-01	None Supplied	W	2010948	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS211-01	None Supplied	W	2010948	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS211-01	None Supplied	W	2010948	bc	Settleable Solids in water	L004-PL	c
EEBS211-01	None Supplied	W	2010948	bc	Suspended solids in water	L004-PL	c
EEBS211-01	None Supplied	W	2010948	bc	TPHCWG (Waters)	L070-PL	bc
EEBS211-01	None Supplied	W	2010948	bc	Total organic carbon in water	L037-PL	c
EEBS211-01	None Supplied	W	2010948	bc	pH at 20oC in water (automated)	L099-PL	c

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Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
EEBS101-01	None Supplied	S	2010963	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS212-01	None Supplied	W	2010949	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS212-01	None Supplied	W	2010949	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS212-01	None Supplied	W	2010949	bc	Settleable Solids in water	L004-PL	c
EEBS212-01	None Supplied	W	2010949	bc	Suspended solids in water	L004-PL	c
EEBS212-01	None Supplied	W	2010949	bc	TPHCWG (Waters)	L070-PL	bc
EEBS212-01	None Supplied	W	2010949	bc	Total organic carbon in water	L037-PL	c
EEBS212-01	None Supplied	W	2010949	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS213-01	None Supplied	W	2010944	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS213-01	None Supplied	W	2010944	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS213-01	None Supplied	W	2010944	bc	Settleable Solids in water	L004-PL	c
EEBS213-01	None Supplied	W	2010944	bc	Suspended solids in water	L004-PL	c
EEBS213-01	None Supplied	W	2010944	bc	TPHCWG (Waters)	L070-PL	bc
EEBS213-01	None Supplied	W	2010944	bc	Total organic carbon in water	L037-PL	c
EEBS213-01	None Supplied	W	2010944	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS214-01	None Supplied	W	2010945	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS214-01	None Supplied	W	2010945	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS214-01	None Supplied	W	2010945	bc	Settleable Solids in water	L004-PL	c
EEBS214-01	None Supplied	W	2010945	bc	Suspended solids in water	L004-PL	c
EEBS214-01	None Supplied	W	2010945	bc	TPHCWG (Waters)	L070-PL	bc
EEBS214-01	None Supplied	W	2010945	bc	Total organic carbon in water	L037-PL	c
EEBS214-01	None Supplied	W	2010945	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS215-01	None Supplied	W	2010940	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS215-01	None Supplied	W	2010940	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS215-01	None Supplied	W	2010940	bc	Settleable Solids in water	L004-PL	c
EEBS215-01	None Supplied	W	2010940	bc	Suspended solids in water	L004-PL	c
EEBS215-01	None Supplied	W	2010940	bc	TPHCWG (Waters)	L070-PL	bc
EEBS215-01	None Supplied	W	2010940	bc	Total organic carbon in water	L037-PL	c
EEBS215-01	None Supplied	W	2010940	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS216-01	None Supplied	W	2010941	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS216-01	None Supplied	W	2010941	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS216-01	None Supplied	W	2010941	bc	Settleable Solids in water	L004-PL	c
EEBS216-01	None Supplied	W	2010941	bc	Suspended solids in water	L004-PL	c
EEBS216-01	None Supplied	W	2010941	bc	TPHCWG (Waters)	L070-PL	bc
EEBS216-01	None Supplied	W	2010941	bc	Total organic carbon in water	L037-PL	c
EEBS216-01	None Supplied	W	2010941	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS217-01	None Supplied	W	2010937	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS217-01	None Supplied	W	2010937	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS217-01	None Supplied	W	2010937	bc	Settleable Solids in water	L004-PL	c
EEBS217-01	None Supplied	W	2010937	bc	Suspended solids in water	L004-PL	c
EEBS217-01	None Supplied	W	2010937	bc	TPHCWG (Waters)	L070-PL	bc
EEBS217-01	None Supplied	W	2010937	bc	Total organic carbon in water	L037-PL	c
EEBS217-01	None Supplied	W	2010937	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS218-01	None Supplied	W	2010938	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS218-01	None Supplied	W	2010938	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS218-01	None Supplied	W	2010938	bc	Settleable Solids in water	L004-PL	c
EEBS218-01	None Supplied	W	2010938	bc	Suspended solids in water	L004-PL	c
EEBS218-01	None Supplied	W	2010938	bc	TPHCWG (Waters)	L070-PL	bc
EEBS218-01	None Supplied	W	2010938	bc	Total organic carbon in water	L037-PL	c
EEBS218-01	None Supplied	W	2010938	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS219-01	None Supplied	W	2010932	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS219-01	None Supplied	W	2010932	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS219-01	None Supplied	W	2010932	bc	Settleable Solids in water	L004-PL	c
EEBS219-01	None Supplied	W	2010932	bc	Suspended solids in water	L004-PL	c
EEBS219-01	None Supplied	W	2010932	bc	TPHCWG (Waters)	L070-PL	bc

Sample Deviation Report

Analytical Report Number : 21-99398
Project / Site name: Terrasond EBS Guyana

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
EEBS101-01	None Supplied	S	2010963	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	bc
EEBS219-01	None Supplied	W	2010932	bc	Total organic carbon in water	L037-PL	c
EEBS219-01	None Supplied	W	2010932	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS220-01	None Supplied	W	2010933	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS220-01	None Supplied	W	2010933	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS220-01	None Supplied	W	2010933	bc	Settleable Solids in water	L004-PL	c
EEBS220-01	None Supplied	W	2010933	bc	Suspended solids in water	L004-PL	c
EEBS220-01	None Supplied	W	2010933	bc	TPHCWG (Waters)	L070-PL	bc
EEBS220-01	None Supplied	W	2010933	bc	Total organic carbon in water	L037-PL	c
EEBS220-01	None Supplied	W	2010933	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS221-01	None Supplied	W	2010934	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS221-01	None Supplied	W	2010934	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS221-01	None Supplied	W	2010934	bc	Settleable Solids in water	L004-PL	c
EEBS221-01	None Supplied	W	2010934	bc	Suspended solids in water	L004-PL	c
EEBS221-01	None Supplied	W	2010934	bc	TPHCWG (Waters)	L070-PL	bc
EEBS221-01	None Supplied	W	2010934	bc	Total organic carbon in water	L037-PL	c
EEBS221-01	None Supplied	W	2010934	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS222-01	None Supplied	W	2010927	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS222-01	None Supplied	W	2010927	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS222-01	None Supplied	W	2010927	bc	Settleable Solids in water	L004-PL	c
EEBS222-01	None Supplied	W	2010927	bc	Suspended solids in water	L004-PL	c
EEBS222-01	None Supplied	W	2010927	bc	TPHCWG (Waters)	L070-PL	bc
EEBS222-01	None Supplied	W	2010927	bc	Total organic carbon in water	L037-PL	c
EEBS222-01	None Supplied	W	2010927	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS223-01	None Supplied	W	2010928	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS223-01	None Supplied	W	2010928	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS223-01	None Supplied	W	2010928	bc	Settleable Solids in water	L004-PL	c
EEBS223-01	None Supplied	W	2010928	bc	Suspended solids in water	L004-PL	c
EEBS223-01	None Supplied	W	2010928	bc	TPHCWG (Waters)	L070-PL	bc
EEBS223-01	None Supplied	W	2010928	bc	Total organic carbon in water	L037-PL	c
EEBS223-01	None Supplied	W	2010928	bc	pH at 20oC in water (automated)	L099-PL	c
EEBS224-01	None Supplied	W	2010929	bc	BTEX and MTBE in water (Monoaromatics)	L073B-PL	bc
EEBS224-01	None Supplied	W	2010929	bc	Metals in water by ICP-OES (dissolved)	L039-PL	c
EEBS224-01	None Supplied	W	2010929	bc	Settleable Solids in water	L004-PL	c
EEBS224-01	None Supplied	W	2010929	bc	Suspended solids in water	L004-PL	c
EEBS224-01	None Supplied	W	2010929	bc	TPHCWG (Waters)	L070-PL	bc
EEBS224-01	None Supplied	W	2010929	bc	Total organic carbon in water	L037-PL	c
EEBS224-01	None Supplied	W	2010929	bc	pH at 20oC in water (automated)	L099-PL	c
Trip Blank	None Supplied	W	2010964	ab	Semi-volatile organic compounds in water	L102B-PL	b

Annex C: PSD Curves

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

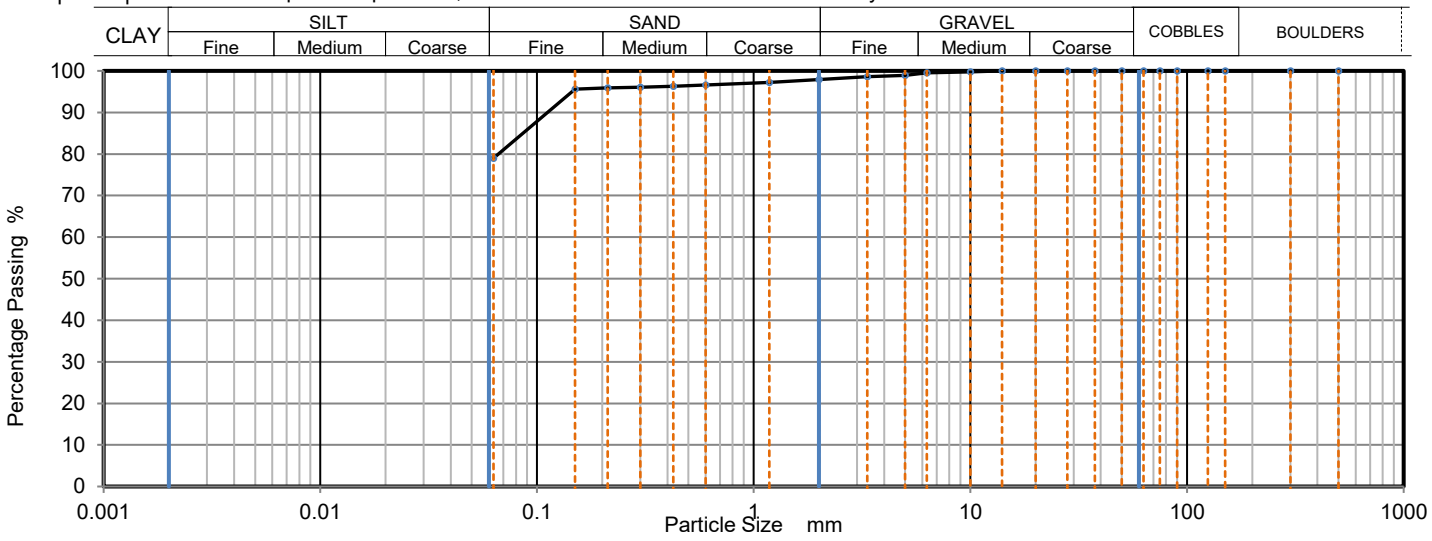
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010685	Depth Top [m]:	Not Given
Hole No.:	EEBS129-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey sandy CLAY with shales		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	98		
1.18	97		
0.6	97		
0.425	96		
0.3	96		
0.212	96		
0.15	96		
0.063	80		

Sample Proportions	% dry mass
Very coarse	0
Gravel	2
Sand	18
Fines <0.063mm	80

Grading Analysis		
D100	mm	14
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

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Signed:

Szczepan Bielatowicz
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

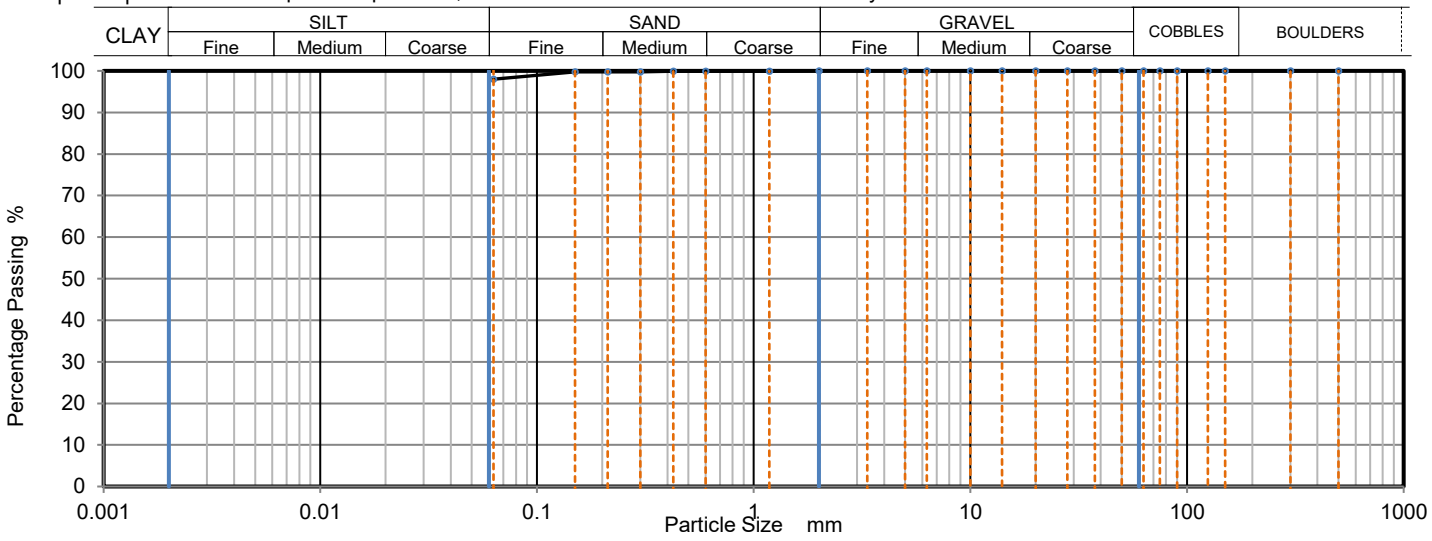
i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010686	Depth Top [m]:	Not Given
Hole No.:	EEBS127-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	99		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	1
Fines <0.063mm	99

Grading Analysis		
D100	mm	3.35
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

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Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

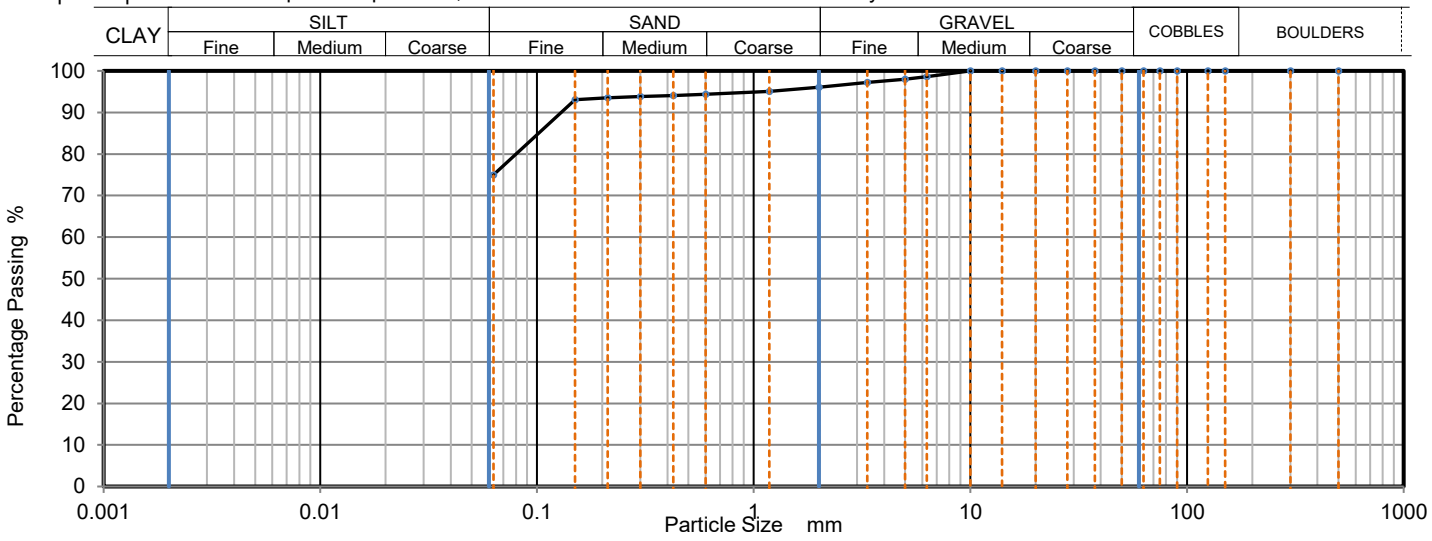
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010687	Depth Top [m]:	Not Given
Hole No.:	EEBS125-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey sandy CLAY with shales		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	98		
3.35	97		
2	96		
1.18	95		
0.6	94		
0.425	94		
0.3	94		
0.212	94		
0.15	93		
0.063	75		

Sample Proportions	% dry mass
Very coarse	0
Gravel	4
Sand	21
Fines <0.063mm	75

Grading Analysis		
D100	mm	10
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

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PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

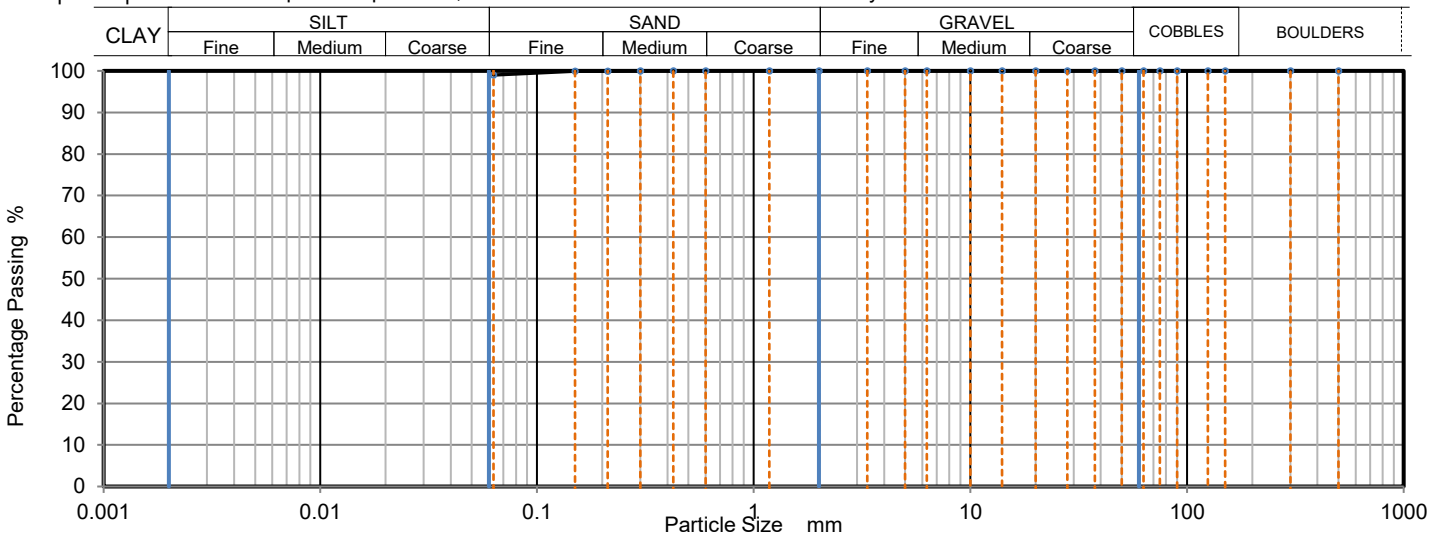
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010688	Depth Top [m]:	Not Given
Hole No.:	EEBS123-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	100		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	0
Fines <0.063mm	100

Grading Analysis		
D100	mm	1.18
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

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PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

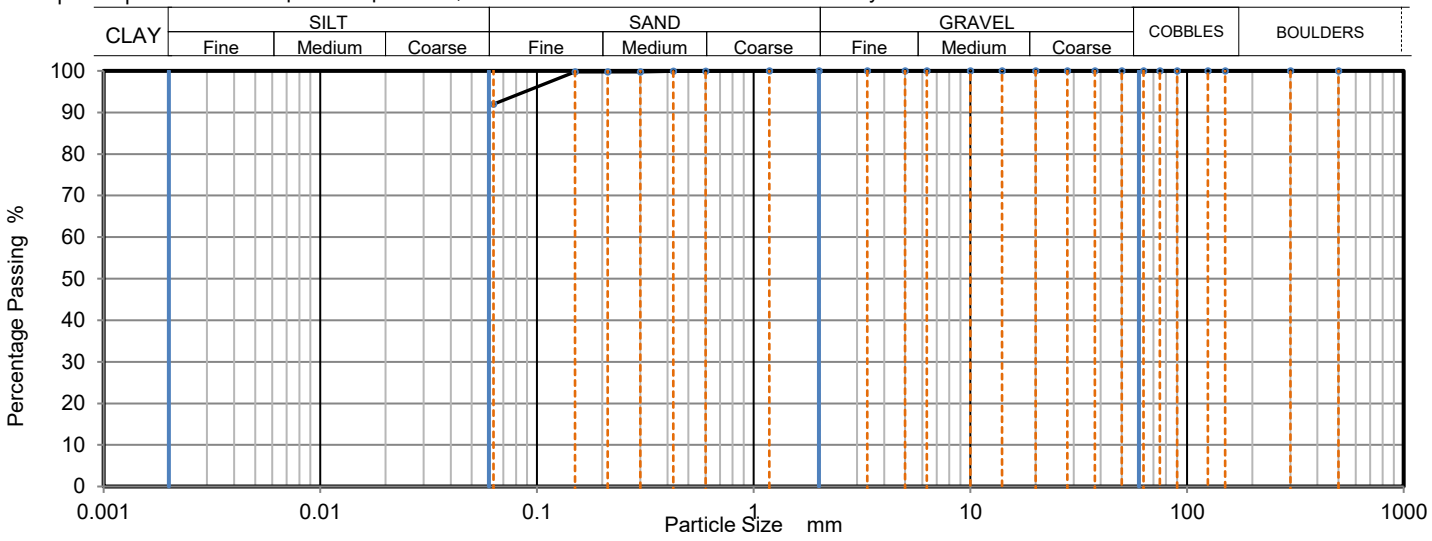
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010689	Depth Top [m]:	Not Given
Hole No.:	EEBS121-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	92		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	8
Fines <0.063mm	92

Grading Analysis		
D100	mm	3.35
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

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PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

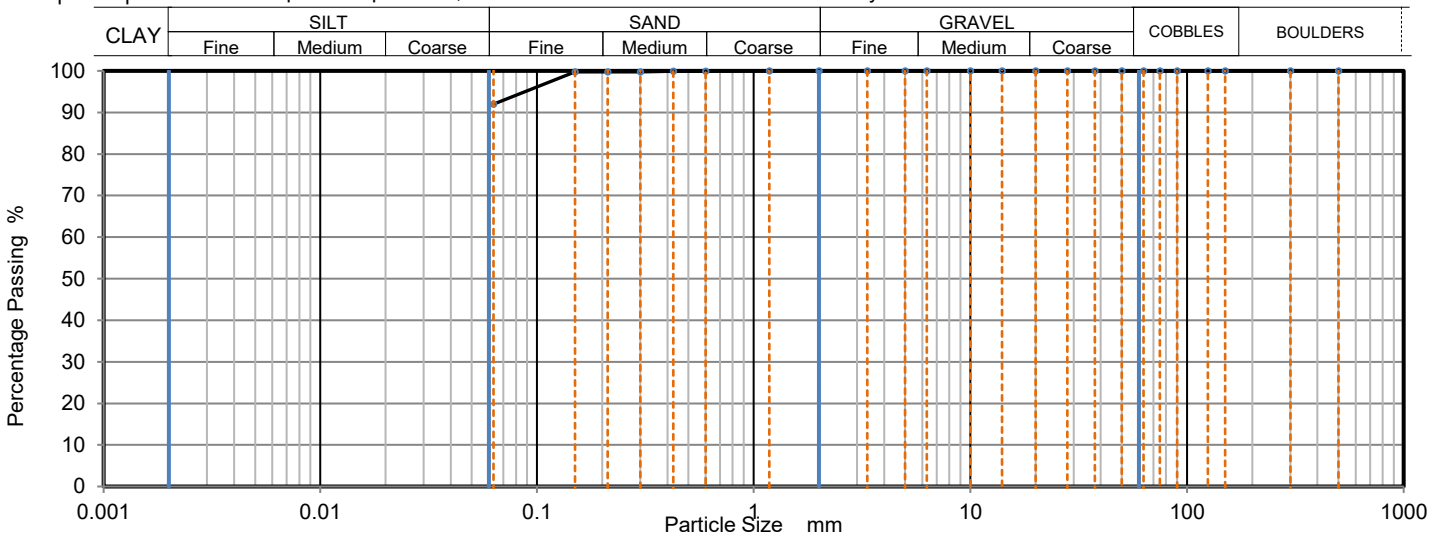
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010690	Depth Top [m]:	Not Given
Hole No.:	EEBS119-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey slightly sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	92		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	8
Fines <0.063mm	92

Grading Analysis		
D100	mm	3.35
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

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Signed:

Szczepan Bielatowicz
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

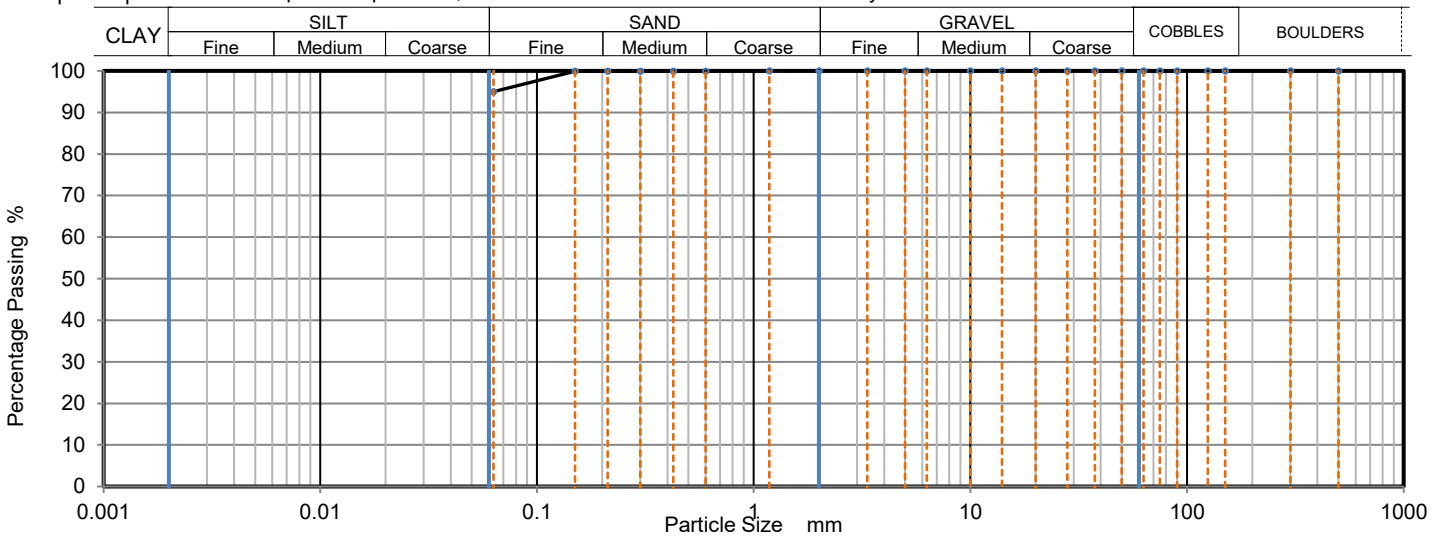
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010691	Depth Top [m]:	Not Given
Hole No.:	EEBS117-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey slightly sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	96		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	4
Fines <0.063mm	96

Grading Analysis		
D100	mm	3.35
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

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Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

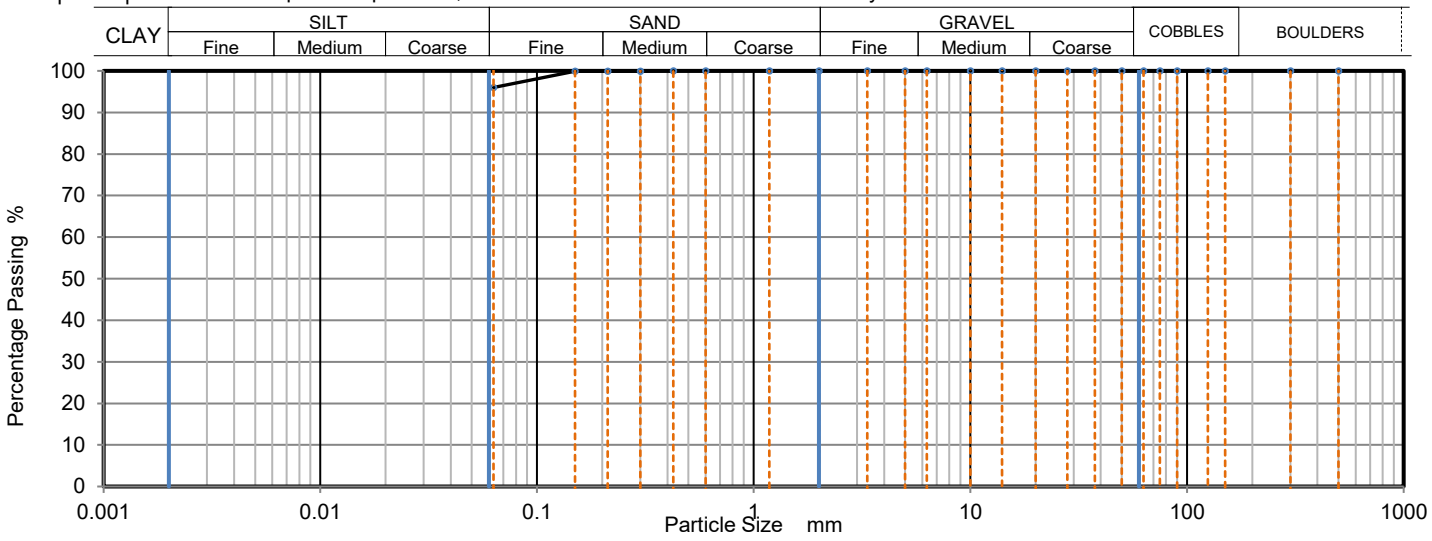
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010692	Depth Top [m]:	Not Given
Hole No.:	EEBS115-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	97		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	3
Fines <0.063mm	97

Grading Analysis		
D100	mm	2
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

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Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

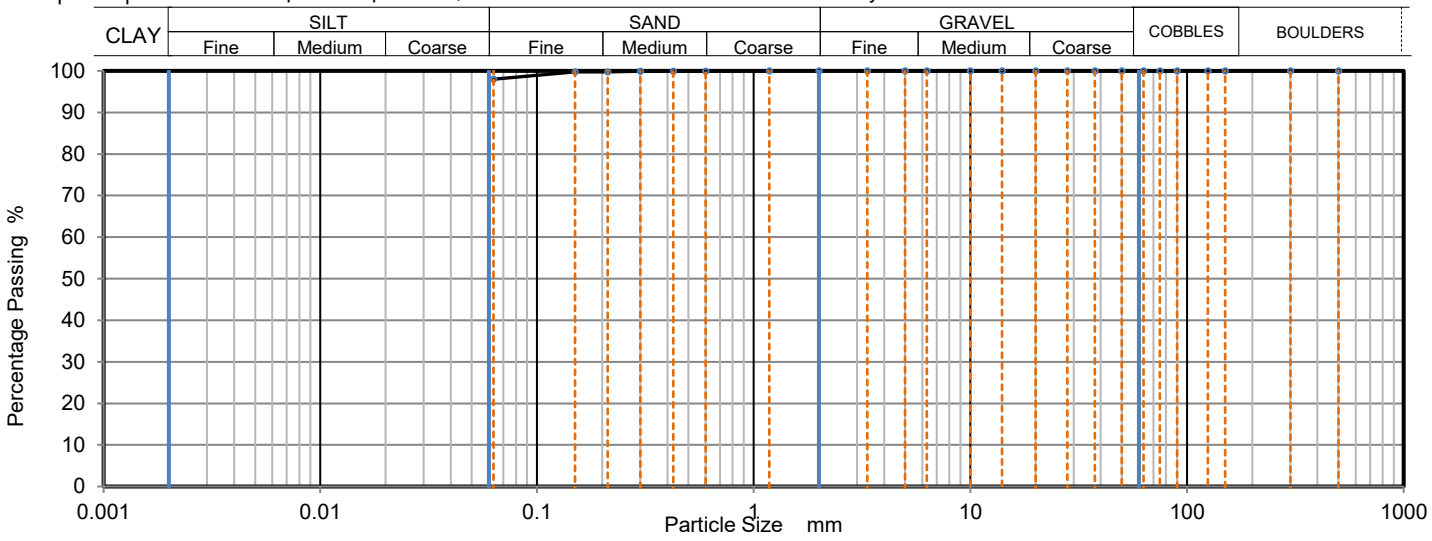
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010693	Depth Top [m]:	Not Given
Hole No.:	EEBS113-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	99		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	1
Fines <0.063mm	99

Grading Analysis		
D100	mm	2
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

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Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

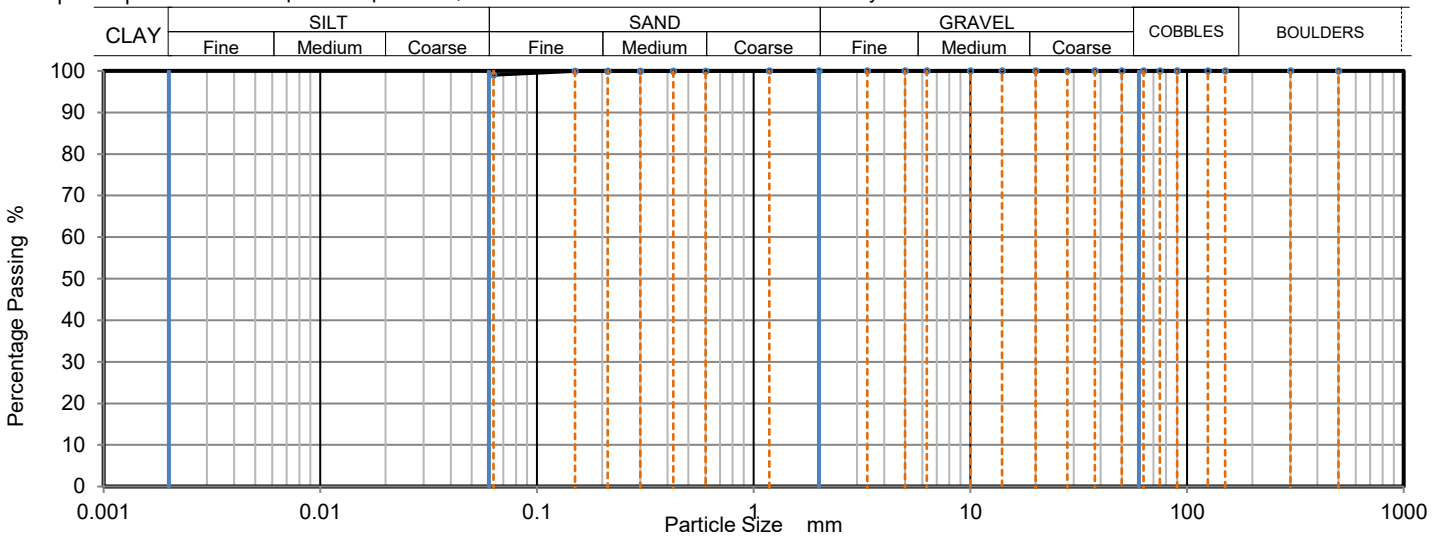
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010694	Depth Top [m]:	Not Given
Hole No.:	EEBS111-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	99		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	1
Fines <0.063mm	99

Grading Analysis		
D100	mm	2
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

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Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

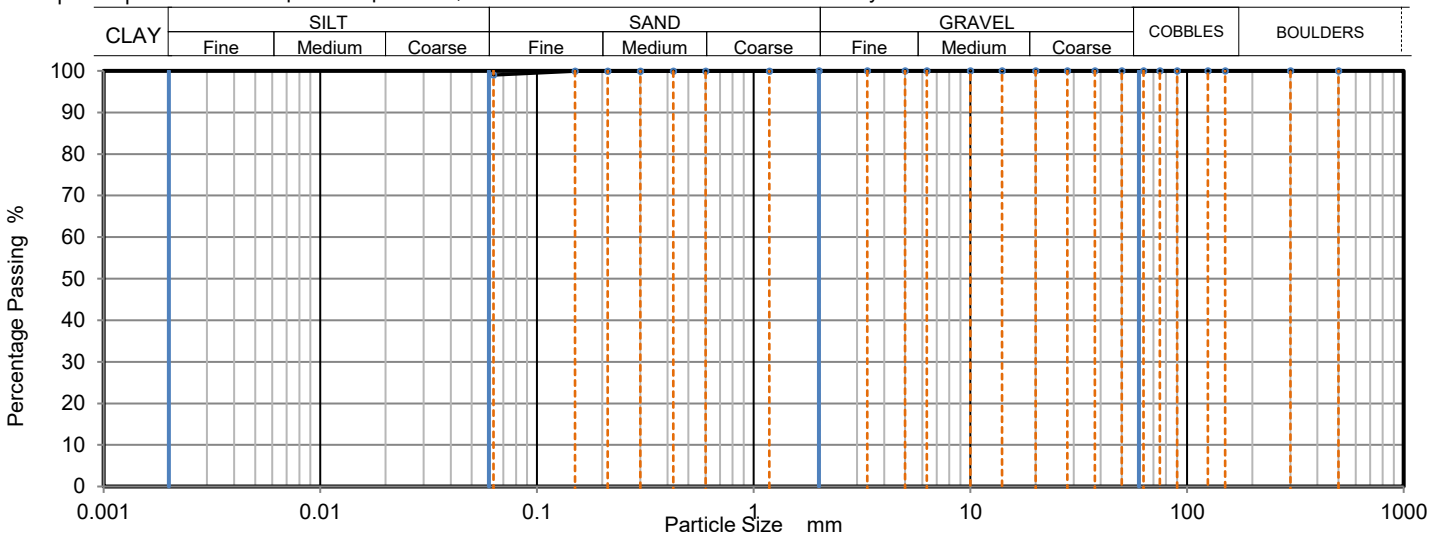
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	29/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010695	Depth Top [m]:	Not Given
Hole No.:	EEBS109-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	99		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	1
Fines <0.063mm	99

Grading Analysis		
D100	mm	3.35
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

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PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

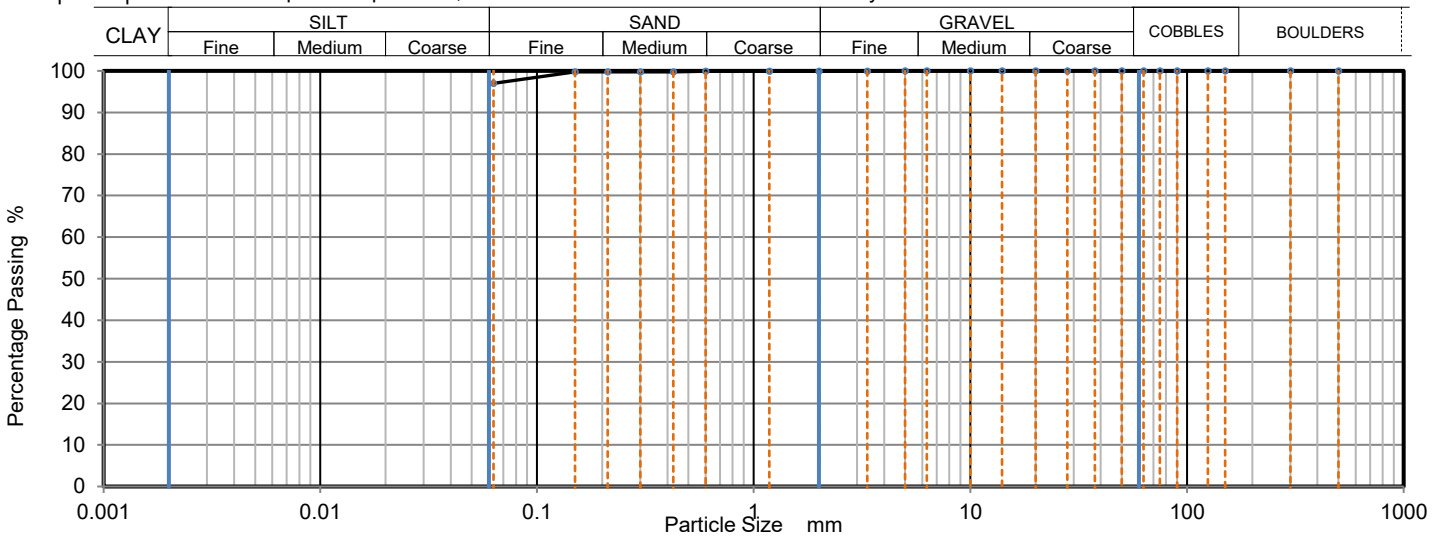
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	22/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010696	Depth Top [m]:	7.00
Hole No.:	EEBS107-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey slightly sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	97		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	3
Fines <0.063mm	97

Grading Analysis		
D100	mm	6.3
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

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for and on behalf of i2 Analytical Ltd

Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

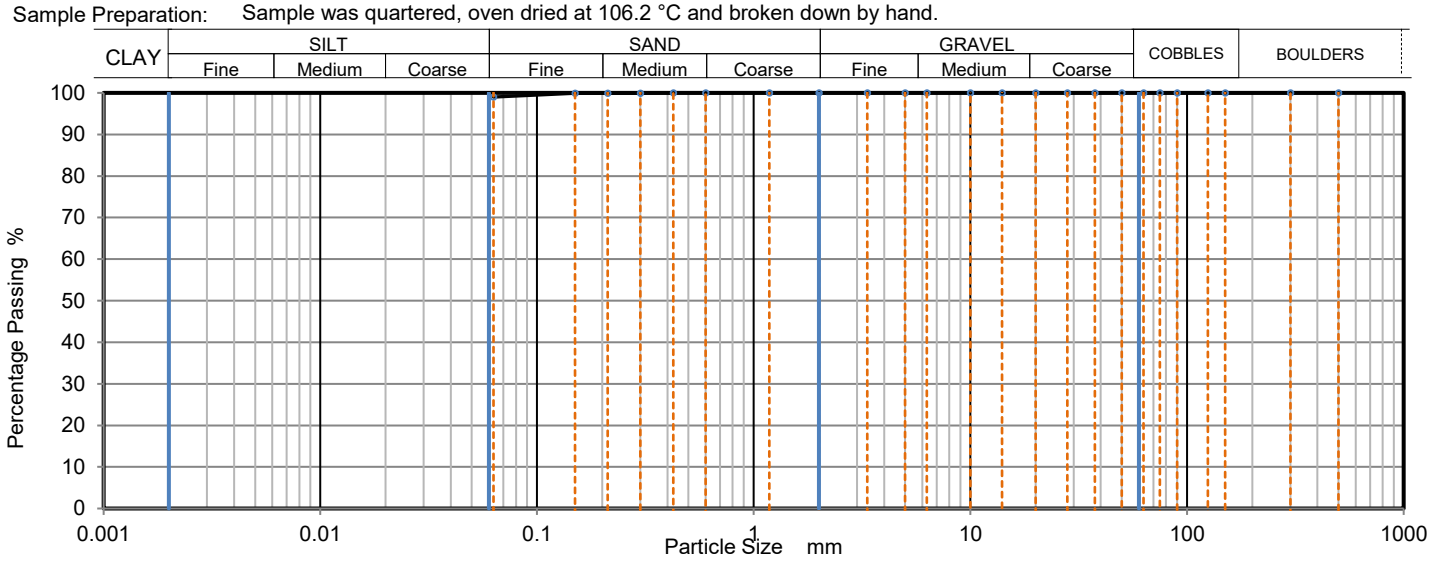
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	21/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010697	Depth Top [m]:	6.00
Hole No.:	EEBS105-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	100		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	0
Fines <0.063mm	100

Grading Analysis		
D100	mm	2
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

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Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

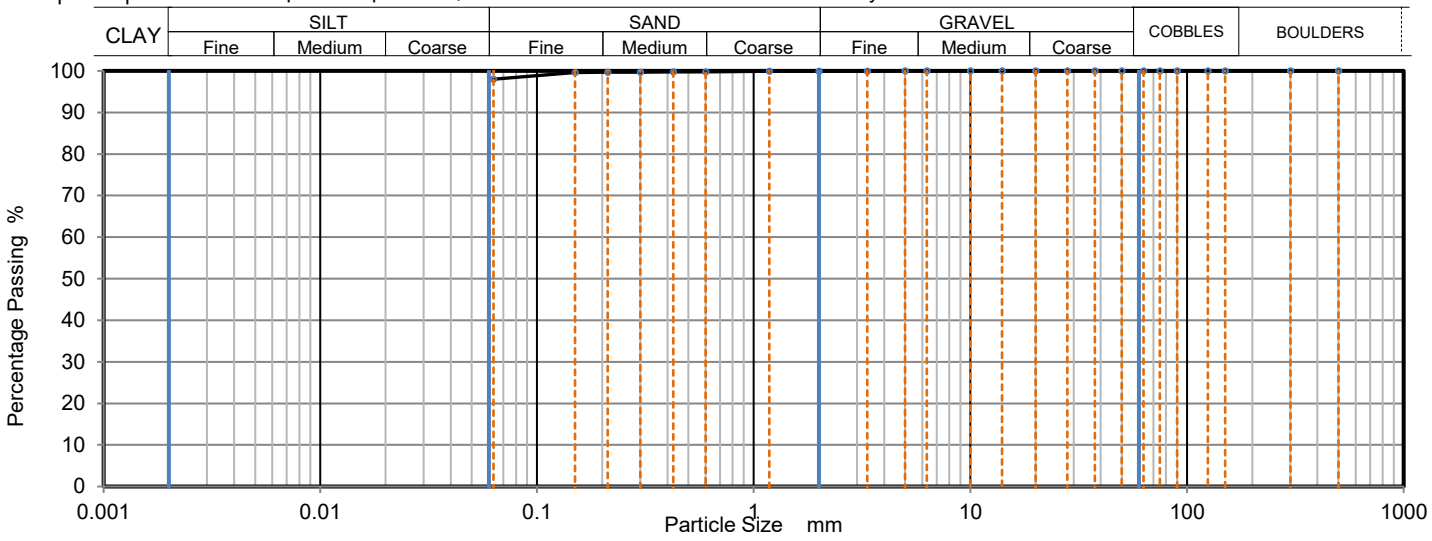
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	21/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010698	Depth Top [m]:	4.90
Hole No.:	EEBS103-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey slightly sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	98		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	2
Fines <0.063mm	98

Grading Analysis		
D100	mm	6.3
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

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Date Reported: 23/09/2021

GF 100.20

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

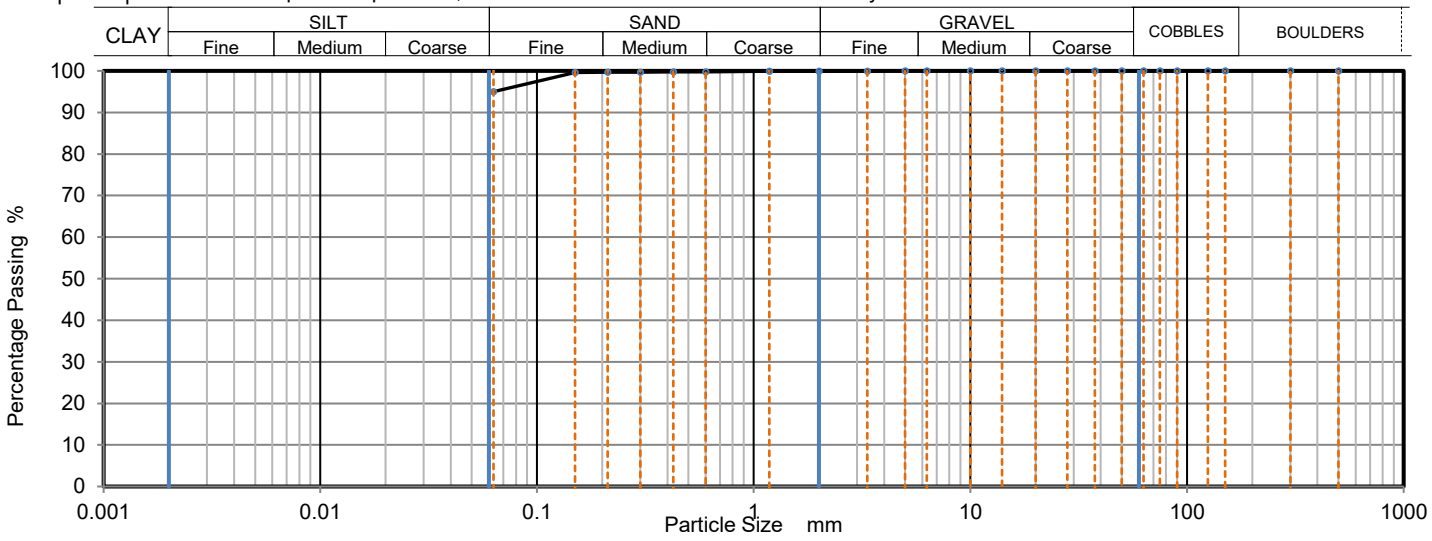
Environmental Science

Client:	Earth&Marine Environmental Ltd	Client Reference:	021-1863
Client Address:	7th Floor, Forth Banks, NE1 3PA	Job Number:	21-99360
		Date Sampled:	21/08/2021
		Date Received:	13/09/2021
Contact:	Toby Nash	Date Tested:	16/09/2021
Site Address:	Terrasond EBS Guyana	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2010699	Depth Top [m]:	1.50
Hole No.:	EEBS101-04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Grey slightly sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.2 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	96		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	4
Fines <0.063mm	95

Grading Analysis		
D100	mm	5
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		N/A
Curvature Coefficient		

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:

Szczepan Bielatowicz
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 23/09/2021

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APPENDIX G

Demerara River Baseline Field Study

Resubmitted without changes

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APPENDIX G – DEMERARA RIVER BASELINE FIELD STUDY

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1. SCOPE

This Appendix describes the field studies undertaken to characterize the surfacewater and sediment field studies undertaken in support of the Environmental Impact Assessment (EIA) conducted for Esso Exploration and Production Guyana Limited's (EEPGL's) proposed Gas to Power Project ("the Project"). The objective of the studies are to 1) characterize baseline water and sediment quality in the study area, 2) characterize sediment targeted for dredging, and 3) provide data required for water quality modeling.

The EIA required several concurrent data sets covering water and sediment quality. Station locations consist of coastal, riverine, streams/canals, and dredge areas. Station locations for sampling are shown on Figure 1; Table 1 provides the station location coordinates. Sampling consists of a combination of continuous water quality monitoring as well as discrete water and sediment sampling, depending on location as shown in Table 1. Generally, continuous sampling will support modeling to be conducted in the EIA, while discrete sampling primarily serves to support baseline characterization.

Discrete and continuous water quality sampling was carried out across the sites during the dry and wet seasons. Discrete coastal and riverine water samples were taken twice during each season. Discrete stream/canal water sampling were also taken twice during each season. All sediment sampling was performed once during the dry season.

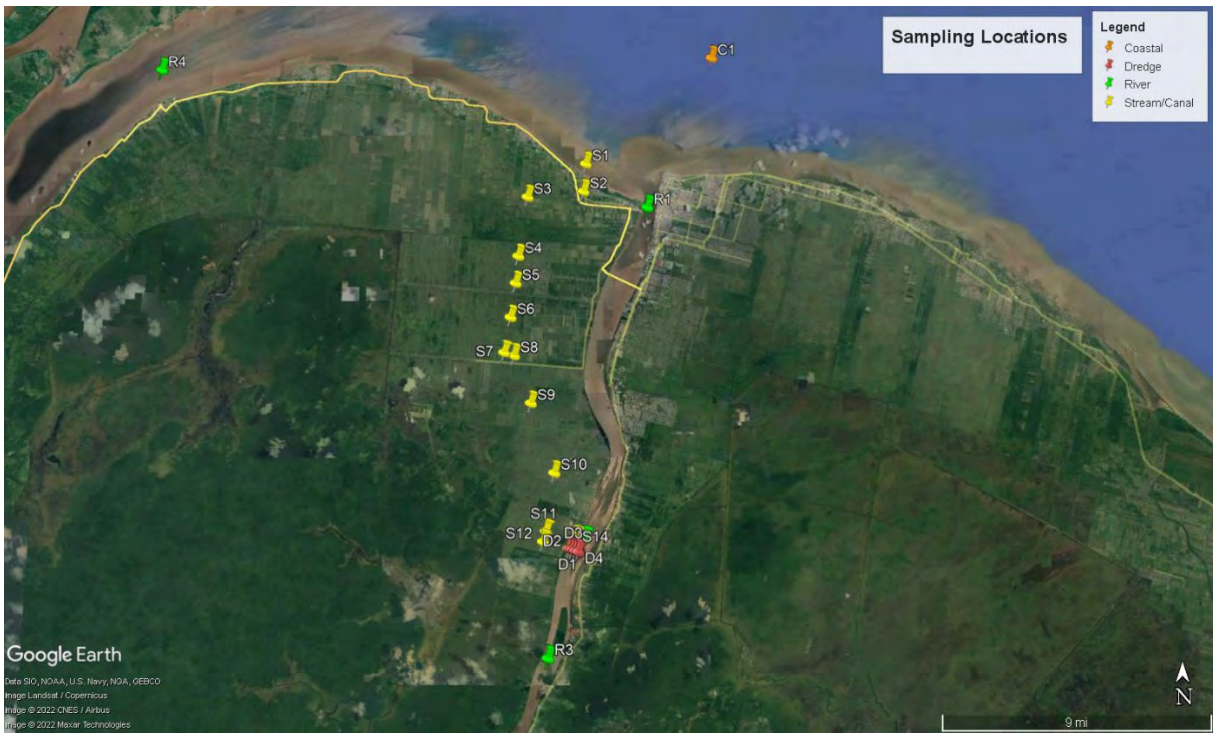

Figure 1: Station Locations

Table 1: Station Information and Associated Programs

	Station	Latitude	Longitude	Continuous	Discrete	
				Water	Water	Sediment
Coastal Station	C1	6°52'53.65"N	58° 8'30.63"W	X	X	X
River Stations	R1	6°48'12.85"N	58°10'30.72"W	X	X	X
	R2	6°38'18.55"N	58°12'23.78"W		X	X
	R3	6°34'52.47"N	58°13'28.00"W	X	X	X
	R4	6°52'31.45"N	58°25'30.02"W	X		
Stream/Canal Stations	S1	6°49'33.81"N	58°12'23.39"W		X	
	S2	6°48'42.36"N	58°12'27.53"W		X	
	S3	6°48'32.10"N	58°14'9.86"W		X	
	S4	6°46'42.99"N	58°14'25.87"W		X	
	S5	6°45'53.53"N	58°14'30.36"W		X	
	S6	6°44'51.53"N	58°14'39.04"W		X	
	S7	6°43'47.77"N	58°14'49.96"W		X	
	S8	6°43'42.21"N	58°14'32.17"W		X	
	S9	6°42'17.05"N	58°14'1.16"W		X	
	S10	6°40'13.44"N	58°13'18.57"W		X	
	S11	6°38'31.32"N	58°13'32.85"W		X	X
	S12	6°38'12.88"N	58°13'37.79"W		X	X
	S13	6°38'1.51"N	58°12'52.60"W		X	X
	S14	6°38'20.08"N	58°12'39.97"W		X	X
Dredge Stations	D1	6°38'0.84"N	58°12'50.88"W			X
	D2	6°37'59.78"N	58°12'45.74"W			X
	D3	6°37'57.48"N	58°12'40.40"W			X
	D4	6°37'55.60"N	58°12'35.46"W			X

2. RESULTS

2.1. CONTINUOUS MONITORING

Dataloggers were initially deployed at locations C1, R1, R3, and R4 on November 24, 2011. They consisted of Solinst 5 CTD (conductivity, temperature, depth) dataloggers. Upon retrieval on December 8, 2021, three (R1, R3, and R4) of the four dataloggers were found to be lost. C1 datalogger was redeployed on December 20, 2021 and three replacement dataloggers were ordered. Upon retrieval of the C1 datalogger on December 11, 2021, that device was also found to be lost. The three replacement dataloggers were then redeployed on January 11, 2022 at stations C1, R3, and R4, foregoing station R1 as the other three locations were more critical to modeling. The devices were retrieved and redeployed on January 26, 2022. Final retrieval occurred on February 2, 2022. The summary of dates of data coverage is given in Table 2. The complete hourly datalogger data for all deployments is provided in this Appendix.

Table 2: Continuous Monitoring Data Coverage

	Dates of Deployment (2021-22)							
Station	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**
C1	Nov 11	Dec 8	Dec 20	L	Jan 14	Jan 26	Jan 26	Feb 2
R1	Nov 11	L	ND	ND	ND	ND	ND	ND
R3	Nov 11	L	ND	ND	Jan 14	Jan 26	Jan 26	Feb 2
R4	Nov 11	L	ND	ND	Jan 14	Jan 26	Jan 26	Feb 2

L=Equipment Lost

ND=Not Deployed

2.2. DISCRETE WATER SAMPLING

Discrete water samples were collected at various times during the dry weather period from October through December 2021. At least one round of dry sampling were conducted for all 18 stations except S11 and S12 (locations were found to be inaccessible). The onset of the wet season precluded the collection of two full rounds of dry season sampling for all stations. Two rounds of dry sampling were conducted for five stations.

Discrete wet weather samples were collected during two rounds in January and February 2022. Samples were collected for 16 of the 18 stations (stations S1 and S12 were inaccessible).

The dates of collection of discrete water samples is summarized in Table 3. The complete laboratory reports on all water samples is provided in this Appendix.

Table 3: Discrete Water Sampling Collection

	Dates of Collection (2021-22)			
Station	**Round 1 (dry)**	**Round 2 (dry)**	**Round 3 (wet)**	**Round 4 (wet)**
C1		Nov 24	Jan 11	Feb 2
R1	Oct 28	Nov 24	Jan 11	Feb 1
R2	Oct 28	Nov 24	Jan 11	Feb 2
R3	Oct 28	Nov 24	Jan 11	Feb 1
S1		Nov 29	NA	NA
S2		Nov 29	Jan 14	Feb 4
S3		Nov 29	Jan 21	Feb 4
S4		Dec 3	Jan 21	Feb 4
S5		Nov 29	Jan 21	Feb 1
S6		Dec 3	Jam 21	Feb 4
S7		Dec 3	Jan 14	Feb 4
S8		Dec 3	Jan 14	Feb 4
S9		Dec 3	Jan 14	Feb 4
S10		Nov 29	Jan 21	Feb 2
S11		NA	Jan 13	Feb 1

	Dates of Collection (2021-22)			
Station	Round 1 (dry)	Round 2 (dry)	Round 3 (wet)	Round 4 (wet)
S12		NA	NA	NA
S13	Oct 28	Nov 24	Jan 14	Feb 2
S14	Oct 28	Nov 24	Jan 14	Feb 2

NA=Not Accessible

2.3. DISCRETE SEDIMENT SAMPLING

Discrete sediment samples were collected at various times from November 2021 through January 2022. Samples were collected in one round without regard to dry or wet seasons as sediment quality is not expected to vary much with seasonality. Samples were collected for ten of the twelve stations (location S12 was found to be inaccessible and sampling of location D1 was forgone as this location is coincident to location S13).

The dates of collection of discrete sediment samples is summarized in Table 4. The complete laboratory reports on all sediment samples is provided in this Appendix.

Table 4: Discrete Sediment Sampling Collection

Station	Dates of Collection (2021-22)
C1	Nov 18
R1	Nov 18
R2	Nov 18
R3	Nov 18
S11	Jan 22
S12	NA
S13	Nov 18
S14	Nov 18
D1	NC
D2	Dec 20
D3	Dec 20
D4	Dec 20

NA=Not Accessible

NC=Not Collected

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3. DATALOGGER DATA

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Serial_number:1082357/Project ID:Gas to Energy/Location:C1/LEVELUNIT: m/Offset: 0.000000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm
Total Depth on 12/8/21 10:07: 2.2m/Height of Sensor above Bed: 1.5m

DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND
11/24/2021	22:00	12.7104	28.429	30370.0	11/27/2021	23:00	13.2467	28.769	49530.3	12/1/2021	0:00	13.6194	28.702	47354.4
11/24/2021	23:00	12.4664	28.589	32381.8	11/28/2021	0:00	12.8992	28.748	48229.8	12/1/2021	1:00	13.5750	28.639	48318.3
11/25/2021	0:00	12.2908	28.526	27615.5	11/28/2021	1:00	12.6909	28.699	45363.2	12/1/2021	2:00	13.4520	28.661	47908.2
11/25/2021	1:00	11.8529	28.447	23039.0	11/28/2021	2:00	12.4496	28.793	41929.3	12/1/2021	3:00	13.1311	28.641	47546.5
11/25/2021	2:00	11.9083	28.427	21340.9	11/28/2021	3:00	12.2121	28.562	33240.3	12/1/2021	4:00	12.8606	28.566	45827.7
11/25/2021	3:00	12.0870	28.405	19911.0	11/28/2021	4:00	12.1509	28.320	30211.7	12/1/2021	5:00	12.4838	28.550	45844.0
11/25/2021	4:00	12.2671	28.066	17888.9	11/28/2021	5:00	12.3029	28.124	27872.4	12/1/2021	6:00	12.3643	28.430	41065.6
11/25/2021	5:00	12.6748	28.358	19223.0	11/28/2021	6:00	12.2836	28.194	28028.0	12/1/2021	7:00	12.0278	28.271	31753.3
11/25/2021	6:00	12.8132	28.520	34615.6	11/28/2021	7:00	12.3423	28.257	30487.2	12/1/2021	8:00	11.9329	28.261	28133.0
11/25/2021	7:00	13.0272	28.523	37406.0	11/28/2021	8:00	12.6349	28.220	31843.3	12/1/2021	9:00	12.0862	28.415	28842.2
11/25/2021	8:00	13.0918	28.558	47673.3	11/28/2021	9:00	12.8037	28.542	44775.5	12/1/2021	10:00	12.4838	28.629	35838.5
11/25/2021	9:00	13.0289	28.516	36017.8	11/28/2021	10:00	13.1809	28.549	50440.7	12/1/2021	11:00	12.9912	28.608	45632.6
11/25/2021	10:00	12.9179	28.522	33135.7	11/28/2021	11:00	13.3718	28.549	52786.3	12/1/2021	12:00	13.6460	28.986	47072.7
11/25/2021	11:00	12.6807	28.521	29634.7	11/28/2021	12:00	13.2943	28.569	52480.0	12/1/2021	13:00	13.9657	28.946	50005.3
11/25/2021	12:00	12.3780	28.338	25679.2	11/28/2021	13:00	13.2306	28.619	52539.4	12/1/2021	14:00	13.9838	29.110	51494.4
11/25/2021	13:00	12.1878	28.402	23054.5	11/28/2021	14:00	12.8952	28.896	50706.8	12/1/2021	15:00	13.7679	29.034	51821.6
11/25/2021	14:00	12.0665	28.377	19861.1	11/28/2021	15:00	12.5165	29.022	46847.8	12/1/2021	16:00	13.3568	29.091	51554.7
11/25/2021	15:00	12.2391	30.434	17843.7	11/28/2021	16:00	12.3586	28.928	46238.9	12/1/2021	17:00	12.9491	29.208	50657.6
11/25/2021	16:00	12.5017	28.441	22128.9	11/28/2021	17:00	12.1400	29.495	39930.2	12/1/2021	18:00	12.6198	29.020	46685.6
11/25/2021	17:00	12.8271	28.548	36728.7	11/28/2021	18:00	12.1656	29.344	37356.8	12/1/2021	19:00	12.1683	28.997	43024.0
11/25/2021	18:00	13.2586	28.588	50179.2	11/28/2021	19:00	12.5120	29.297	39372.0	12/1/2021	20:00	11.6880	28.696	38945.6
11/25/2021	19:00	13.4033	28.610	53140.9	11/28/2021	20:00	12.7889	29.278	43769.1	12/1/2021	21:00	11.8298	28.403	33317.1
11/25/2021	20:00	13.3876	28.616	53500.2	11/28/2021	21:00	13.1256	28.915	47996.2	12/1/2021	22:00	12.2598	28.424	35365.0
11/25/2021	21:00	13.1907	28.601	52448.6	11/28/2021	22:00	13.3407	28.943	50030.3	12/1/2021	23:00	12.9084	28.513	39394.7
11/25/2021	22:00	12.9048	28.541	39301.1	11/28/2021	23:00	13.3905	28.773	52293.1	12/2/2021	0:00	13.4032	28.860	45676.6
11/25/2021	23:00	12.6506	28.505	28662.2	11/29/2021	0:00	13.2377	28.709	52450.1	12/2/2021	1:00	13.5970	28.830	49484.7
11/26/2021	0:00	12.3476	29.259	18513.0	11/29/2021	1:00	12.9014	28.622	51252.9	12/2/2021	2:00	13.6385	28.809	50665.0
11/26/2021	1:00	12.1824	28.988	18248.9	11/29/2021	2:00	12.7663	28.837	48830.1	12/2/2021	3:00	13.6371	28.690	50694.7
11/26/2021	2:00	12.0894	28.885	17999.4	11/29/2021	3:00	12.5228	28.789	47478.7	12/2/2021	4:00	13.3284	28.526	49807.1
11/26/2021	3:00	12.0144	28.807	16283.2	11/29/2021	4:00	12.2866	28.597	42624.0	12/2/2021	5:00	12.9078	28.354	47931.6
11/26/2021	4:00	12.1187	28.716	14770.3	11/29/2021	5:00	12.1503	28.670	38446.3	12/2/2021	6:00	12.5948	28.315	47043.8
11/26/2021	5:00	12.3367	28.498	15093.9	11/29/2021	6:00	12.1692	28.388	30449.3	12/2/2021	7:00	12.4776	28.258	39950.9
11/26/2021	6:00	12.6161	28.786	20601.3	11/29/2021	7:00	12.4040	28.396	29104.9	12/2/2021	8:00	11.8907	28.175	34156.7
11/26/2021	7:00	12.8964	28.615	37737.2	11/29/2021	8:00	12.4467	28.539	36793.7	12/2/2021	9:00	11.7669	28.147	29721.8
11/26/2021	8:00	13.0628	28.614	49812.5	11/29/2021	9:00	12.6050	28.483	30797.5	12/2/2021	10:00	12.1122	28.151	30852.0
11/26/2021	9:00	13.0554	28.630	52235.7	11/29/2021	10:00	13.0101	28.599	48603.9	12/2/2021	11:00	12.5642	28.243	35567.8
11/26/2021	10:00	13.0859	28.625	50342.1	11/29/2021	11:00	13.2702	28.604	48425.3	12/2/2021	12:00	13.6075	28.298	43666.9
11/26/2021	11:00	12.9253	28.612	50607.2	11/29/2021	12:00	13.6251	28.952	49911.3	12/2/2021	13:00	14.0609	28.513	47660.4
11/26/2021	12:00	12.6732	28.611	50186.0	11/29/2021	13:00	13.3740	28.992	50163.5	12/2/2021	14:00	14.1254	28.801	47305.0
11/26/2021	13:00	12.4574	28.609	49730.8	11/29/2021	14:00	13.2286	29.219	50372.9	12/2/2021	15:00	14.0768	28.775	47456.8
11/26/2021	14:00	12.2701	28.642	33575.0	11/29/2021	15:00	12.9164	29.053	49193.7	12/2/2021	16:00	13.7382	28.804	47733.4
11/26/2021	15:00	12.1939	28.746	31297.8	11/29/2021	16:00	12.5709	28.660	47176.0	12/2/2021	17:00	13.2242	28.865	47515.5
11/26/2021	16:00	12.2920	28.777	25739.5	11/29/2021	17:00	12.3032	28.671	42993.3	12/2/2021	18:00	12.8184	28.891	45465.1
11/26/2021	17:00	12.5471	28.763	32338.0	11/29/2021	18:00	12.0534	28.833	34634.9	12/2/2021	19:00	12.2257	28.670	37008.5
11/26/2021	18:00	13.0501	28.625	43054.4	11/29/2021	19:00	12.0874	28.822	27206.8	12/2/2021	20:00	11.7175	28.463	34817.9
11/26/2021	19:00	13.1552	28.634	48382.6	11/29/2021	20:00	12.2238	28.718	22653.6	12/2/2021	21:00	11.4827	28.389	30705.1
11/26/2021	20:00	13.2953	28.659	52759.1	11/29/2021	21:00	12.8460	28.718	39976.8	12/2/2021	22:00	11.6462	28.329	29973.0
11/26/2021	21:00	13.3847	28.657	54962.9	11/29/2021	22:00	13.2482	28.720	45077.1	12/2/2021	23:00	12.2467	28.237	31362.6
11/26/2021	22:00	13.2181	28.653	54564.9	11/29/2021	23:00	13.3862	29.134	50302.3	12/3/2021	0:00	12.9583	28.348	36181.5
11/26/2021	23:00	12.8977	28.649	51969.1	11/30/2021	0:00	13.5263	29.112	50685.5	12/3/2021	1:00	13.5473	28.630	45114.0
11/27/2021	0:00	12.6371	28.964	31513.2	11/30/2021	1:00	13.4610	29.140	50149.6	12/3/2021	2:00	13.7340	28.685	48013.8
11/27/2021	1:00	12.3402	29.011	28173.0	11/30/2021	2:00	13.0793	28.790	45762.9	12/3/2021	3:00	13.8379	28.619	49309.5
11/27/2021	2:00	12.1460	29.034	27152.8	11/30/2021	3:00	12.8797	28.688	41960.3	12/3/2021	4:00	13.6395	28.539	48275.7
11/27/2021	3:00	12.0849	28.460	21262.4	11/30/2021	4:00	12.5428	28.468	31721.8	12/3/2021	5:00	13.2286	28.313	46223.4
11/27/2021	4:00	12.0658	28.536	21478.6	11/30/2021	5:00	12.2965	28.558	34570.9	12/3/2021	6:00	12.8327	28.301	45934.6
11/27/2021	5:00	12.2481	28.464	19473.1	11/30/2021	6:00	12.0254	28.414	26701.7	12/3/2021	7:00	12.6123	28.176	40603.6
11/27/2021	6:00	12.4016	28.614	24209.9	11/30/2021	7:00	11.9535	28.160	23401.2	12/3/2021	8:00	11.9883	28.241	32565.0
11/27/2021	7:00	12.6957	28.723	29940.3	11/30/2021	8:00	12.1698	28.201	22571.8	12/3/2021	9:00	11.6867	28.209	27853.2
11/27/2021	8:00	13.0097	28.807	36155.1	11/30/2021	9:00	12.3928	28.195	23292.4	12/3/2021	10:00	11.7488	28.179	27232.0
11/27/2021	9:00	13.0425	28.727	38607.3	11/30/2021	10:00	12.7331	28.804	44415.8	12/3/2021	11:00	12.2739	28.284	32002.5
11/27/2021	10:00	13.2501	28.792	43473.2	11/30/2021	11:00	13.2009	28.916	46887.9	12/3/2021	12:00	13.0466	28.193	39700.4
11/27/2021	11:00	13.2627	28.717	51914.0	11/30/2021	12:00	13.6115	28.806	48437.4	12/3/2021	13:00	13.5750	28.390	46667.6
11/27/2021	12:00	13.0395	28.740	50921.8	11/30/2021	13:00	13.7514	28.695	48886.5	12/3/2021	14:00	14.0619	28.438	48655.0
11/27/2021	13:00	12.7381	28.818	45419.8	11/30/2021	14:00	13.5734	28.696	48987.3	12/3/2021	15:00	14.2394	28.530	50564.0
11/27/2021	14:00	12.5134	28.796	44446.4	11/30/2021	15:00	13.3258	29.090	48056.2	12/3/2021	16:00	14.0632	28.552	51159.5
11/27/2021	15:00	12.3134	28.810	38250.7	11/30/2021	16:00	12.8892	29.345	46001.9	12/3/2021	17:00	13.6472	28.534	50583.6
11/27/2021	16:00	12.2178	28.888	27064.8	11/30/2021	17:00	12.5119	28.966	43607.5	12/3/2021	18:00	13.0865	28.374	47151.4
11/27/2021	17:00	12.2954	28.772	32861.0	11/30/2021	18:00	12.1849	28.875	39043.8	12/3/2021	19:00	12.7562	29.047	42348.5
11/27/2021	18:00	12.4182	28.858	25842.5	11/30/2021	19:00	11.8941	28.697	30045.9	12/3/2021	20:00	12.2033	28.878	33794.0
11/27/2021	19:00	12.9021	28.884	35964.2	11/30/2021	20:00	11.8811	28.706	27847.2	12/3/2021	21:00	11.5767	28.495	31738.0
11/27/2021	20:00	13.2414	28.883	41798.1	11/30/2021	21:00	12.2690	28.527	28837.6	12/3/2021	22:00	11.4159	28.556	28558.3
11/27/2021	21:00	13.2306	28.789	49418.3	11/30/2021	22:00	12.6634	28.641	35857.2	12/3/2021	23:00	11.7545	28.448	27687.2
11/27/2021	22:00	13.3576	28.882	49664.2	11/30/2021	23:00	13.3751	28.848	47126.7	12/4/2021	0:00	12.4659	28.341	30240.6

Serial_number:1082357/Project ID:Gas to Energy/Location:C1/LEVELUNIT: m/Offset: 0.000000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm
Total Depth on 12/8/21 10:07: 2.2m/Height of Sensor above Bed: 1.5m

DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND
12/4/2021	1:00	13.0902	28.650	37053.7	12/7/2021	2:00	11.9366	27.615	17837.9					
12/4/2021	2:00	13.6833	28.654	45766.9	12/7/2021	3:00	12.6377	27.651	18260.2					
12/4/2021	3:00	13.8361	28.571	45309.7	12/7/2021	4:00	13.4820	28.183	32450.8					
12/4/2021	4:00	13.8617	28.571	45834.0	12/7/2021	5:00	13.8600	28.306	35319.5					
12/4/2021	5:00	13.6911	28.552	46142.4	12/7/2021	6:00	13.8059	28.292	35921.4					
12/4/2021	6:00	13.2609	28.542	43812.3	12/7/2021	7:00	13.7991	28.320	36694.2					
12/4/2021	7:00	12.8885	28.417	42578.4	12/7/2021	8:00	13.5022	28.268	36027.5					
12/4/2021	8:00	12.6572	28.261	37601.7	12/7/2021	9:00	13.1322	27.938	31993.5					
12/4/2021	9:00	11.9945	28.417	31304.9	12/7/2021	10:00	13.0409	27.939	29996.5					
12/4/2021	10:00	11.5941	28.357	28822.1	12/7/2021	11:00	12.6695	27.811	20977.8					
12/4/2021	11:00	11.8922	28.386	29404.7	12/7/2021	12:00	12.0972	27.954	17213.2					
12/4/2021	12:00	12.4797	28.516	32511.6	12/7/2021	13:00	11.9526	28.114	15634.9					
12/4/2021	13:00	13.2080	28.388	37694.2	12/7/2021	14:00	12.4231	28.076	14129.5					
12/4/2021	14:00	13.7711	28.495	43906.8	12/7/2021	15:00	13.0519	27.933	18561.6					
12/4/2021	15:00	14.1441	28.546	44193.7	12/7/2021	16:00	13.4538	28.040	18898.4					
12/4/2021	16:00	14.2498	28.519	45723.6	12/7/2021	17:00	13.7642	28.089	19144.7					
12/4/2021	17:00	14.0758	28.471	45433.9	12/7/2021	18:00	13.9579	28.048	21657.9					
12/4/2021	18:00	13.6584	28.526	44162.9	12/7/2021	19:00	14.0156	28.035	21615.5					
12/4/2021	19:00	13.2291	28.832	42976.3	12/7/2021	20:00	13.7578	28.030	18629.5					
12/4/2021	20:00	12.8175	29.294	38824.5	12/7/2021	21:00	13.5136	27.964	17252.2					
12/4/2021	21:00	12.1838	28.924	31418.3	12/7/2021	22:00	13.2296	28.099	16643.4					
12/4/2021	22:00	11.6921	28.852	25826.8	12/7/2021	23:00	12.7509	27.879	12872.8					
12/4/2021	23:00	11.4384	28.912	22353.1	12/8/2021	0:00	12.1728	27.689	12684.0					
12/5/2021	0:00	11.7550	28.911	21336.8	12/8/2021	1:00	11.8544	27.740	12601.6					
12/5/2021	1:00	12.6069	28.718	25289.1	12/8/2021	2:00	11.7249	27.538	10608.6					
12/5/2021	2:00	13.4759	28.788	32377.6	12/8/2021	3:00	12.2162	27.482	10139.7					
12/5/2021	3:00	13.8264	28.873	39791.8	12/8/2021	4:00	12.9466	27.561	11569.3					
12/5/2021	4:00	13.9479	28.661	41190.5	12/8/2021	5:00	13.3868	27.720	13368.6					
12/5/2021	5:00	13.9301	28.703	41661.2	12/8/2021	6:00	13.6629	27.492	15566.3					
12/5/2021	6:00	13.6564	28.654	39699.6	12/8/2021	7:00	13.6788	27.842	23511.6					
12/5/2021	7:00	13.2193	28.460	36746.8	12/8/2021	8:00	13.6025	27.894	24798.5					
12/5/2021	8:00	12.8456	28.412	35824.2	12/8/2021	9:00	13.3154	27.745	19672.1					
12/5/2021	9:00	12.5849	28.535	30509.5	12/8/2021	10:00	12.9576	27.392	15345.7					
12/5/2021	10:00	11.9196	28.622	24087.2	12/8/2021	11:00	12.5298	27.607	13423.9					
12/5/2021	11:00	11.6687	28.728	22137.6										
12/5/2021	12:00	12.1270	28.843	22261.9										
12/5/2021	13:00	12.7191	28.817	24595.9										
12/5/2021	14:00	13.5070	28.556	34746.1										
12/5/2021	15:00	13.9438	28.638	38343.7										
12/5/2021	16:00	14.1625	28.678	41398.1										
12/5/2021	17:00	14.1945	28.683	41974.6										
12/5/2021	18:00	13.9900	28.756	41929.4										
12/5/2021	19:00	13.5533	28.871	39108.4										
12/5/2021	20:00	13.1261	28.822	38971.9										
12/5/2021	21:00	12.7669	28.802	32119.8										
12/5/2021	22:00	12.1848	28.792	25950.1										
12/5/2021	23:00	11.7324	28.593	22794.1										
12/6/2021	0:00	11.5409	28.573	19742.8										
12/6/2021	1:00	11.9321	28.608	19987.3										
12/6/2021	2:00	12.7225	28.468	22523.4										
12/6/2021	3:00	13.2495	28.584	30164.2										
12/6/2021	4:00	13.7099	28.668	37643.7										
12/6/2021	5:00	13.9457	28.630	39538.6										
12/6/2021	6:00	13.8342	28.620	39110.7										
12/6/2021	7:00	13.5562	28.560	37140.5										
12/6/2021	8:00	13.1898	28.433	36507.2										
12/6/2021	9:00	12.9705	28.298	33579.1										
12/6/2021	10:00	12.5778	28.460	24746.4										
12/6/2021	11:00	11.8312	28.469	20574.3										
12/6/2021	12:00	11.7966	28.291	18522.8										
12/6/2021	13:00	12.2079	28.272	19121.9										
12/6/2021	14:00	12.7463	28.383	23464.0										
12/6/2021	15:00	13.5512	28.143	30323.3										
12/6/2021	16:00	13.8365	28.463	35988.8										
12/6/2021	17:00	14.0299	28.526	39221.3										
12/6/2021	18:00	14.1008	28.441	39498.0										
12/6/2021	19:00	13.8895	28.487	39143.6										
12/6/2021	20:00	13.4555	28.304	35247.9										
12/6/2021	21:00	13.0392	28.138	32049.2										
12/6/2021	22:00	12.7788	27.996	23982.6										
12/6/2021	23:00	12.1240	27.959	20369.7										
12/7/2021	0:00	11.5628	27.605	15643.6										
12/7/2021	1:00	11.4621	27.718	16588.5										

Serial_number:1082634/Project ID:GTE/Location:C1/LEVELUNIT: m/Offset: 0.000000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm
Total Depth at Deployment: 3.6m/Height of Sensor above Bed: 2.0m

DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND
1/14/2022	12:00	13.5002	27.388	37243.8	1/17/2022	13:00	13.1853	27.687	32757.1	1/20/2022	14:00	12.6595	27.487	11782.4
1/14/2022	13:00	13.7034	27.427	46765.1	1/17/2022	14:00	13.6873	27.631	40172.5	1/20/2022	15:00	13.4018	27.516	34194.9
1/14/2022	14:00	13.7386	27.437	49448.5	1/17/2022	15:00	13.8838	27.599	42345.0	1/20/2022	16:00	13.7118	27.497	40303.4
1/14/2022	15:00	13.6026	27.443	50181.6	1/17/2022	16:00	13.8734	27.608	41601.7	1/20/2022	17:00	13.9734	27.490	42534.9
1/14/2022	16:00	13.3156	27.455	49754.0	1/17/2022	17:00	13.7614	27.634	38192.5	1/20/2022	18:00	13.9948	27.487	43287.2
1/14/2022	17:00	12.9876	27.418	44795.3	1/17/2022	18:00	13.4680	27.644	28613.7	1/20/2022	19:00	13.8118	27.497	40499.8
1/14/2022	18:00	12.7623	27.359	27215.1	1/17/2022	19:00	13.0844	27.684	18624.7	1/20/2022	20:00	13.4582	27.501	37050.2
1/14/2022	19:00	12.4533	27.279	17954.0	1/17/2022	20:00	12.7309	28.050	21641.0	1/20/2022	21:00	13.0071	27.580	28738.1
1/14/2022	20:00	12.3092	27.413	12931.4	1/17/2022	21:00	12.2562	28.026	16452.8	1/20/2022	22:00	12.8053	27.789	25388.3
1/14/2022	21:00	12.0649	27.561	7190.4	1/17/2022	22:00	11.9179	27.964	9187.1	1/20/2022	23:00	12.3318	27.794	15539.6
1/14/2022	22:00	12.1784	27.470	6254.8	1/17/2022	23:00	11.8402	27.834	7485.0	1/21/2022	0:00	11.8799	27.913	7142.5
1/14/2022	23:00	12.4453	27.642	4633.3	1/18/2022	0:00	11.9915	27.813	6484.6	1/21/2022	1:00	11.9090	27.893	6182.0
1/15/2022	0:00	12.8677	27.529	17288.9	1/18/2022	1:00	12.4553	27.739	9872.9	1/21/2022	2:00	12.2814	27.814	9040.8
1/15/2022	1:00	13.1357	27.396	18889.8	1/18/2022	2:00	13.0631	28.054	18913.5	1/21/2022	3:00	12.8273	27.808	16081.6
1/15/2022	2:00	13.3974	27.428	46994.8	1/18/2022	3:00	13.3939	27.800	28306.2	1/21/2022	4:00	13.3868	27.556	18723.3
1/15/2022	3:00	13.4901	27.440	47124.4	1/18/2022	4:00	13.5963	27.660	37996.0	1/21/2022	5:00	13.6535	27.646	22233.4
1/15/2022	4:00	13.4340	27.438	46686.6	1/18/2022	5:00	13.6860	27.605	39743.4	1/21/2022	6:00	13.9104	27.706	25600.0
1/15/2022	5:00	13.1897	27.439	46665.2	1/18/2022	6:00	13.5217	27.756	34070.0	1/21/2022	7:00	13.8101	27.303	22183.2
1/15/2022	6:00	12.9091	27.422	45057.7	1/18/2022	7:00	13.1771	27.659	26440.0	1/21/2022	8:00	13.5874	27.222	20789.8
1/15/2022	7:00	12.6407	27.403	34285.7	1/18/2022	8:00	12.9151	27.842	27001.2	1/21/2022	9:00	13.3272	27.368	21627.8
1/15/2022	8:00	12.4125	27.448	17312.4	1/18/2022	9:00	12.6221	27.365	21622.0	1/21/2022	10:00	12.9994	27.446	19890.9
1/15/2022	9:00	12.2594	27.428	19857.2	1/18/2022	10:00	12.1981	27.397	13568.6	1/21/2022	11:00	12.6279	27.366	17628.3
1/15/2022	10:00	12.3550	27.390	13496.1	1/18/2022	11:00	11.9424	27.520	8646.0	1/21/2022	12:00	12.1855	27.415	14265.4
1/15/2022	11:00	12.7373	27.447	9312.8	1/18/2022	12:00	12.2602	27.524	10596.0	1/21/2022	13:00	12.1434	27.473	10293.4
1/15/2022	12:00	13.1520	27.434	17938.6	1/18/2022	13:00	12.7999	27.395	22688.0	1/21/2022	14:00	12.3086	27.476	9448.0
1/15/2022	13:00	13.5203	27.429	34228.4	1/18/2022	14:00	13.3379	27.538	35737.8	1/21/2022	15:00	12.9576	27.390	15863.8
1/15/2022	14:00	13.7384	27.446	45516.7	1/18/2022	15:00	13.8290	27.490	47822.6	1/21/2022	16:00	13.4067	27.527	21132.6
1/15/2022	15:00	13.7233	27.453	46301.7	1/18/2022	16:00	13.9466	27.546	49059.9	1/21/2022	17:00	14.0024	27.520	20349.1
1/15/2022	16:00	13.5513	27.486	47488.2	1/18/2022	17:00	13.9250	27.561	49137.4	1/21/2022	18:00	14.0959	27.461	20433.9
1/15/2022	17:00	13.2203	27.467	46338.2	1/18/2022	18:00	13.6689	27.515	49484.0	1/21/2022	19:00	13.9762	27.256	22043.6
1/15/2022	18:00	12.9875	27.467	40414.0	1/18/2022	19:00	13.2862	27.677	41520.7	1/21/2022	20:00	13.6063	27.194	22125.5
1/15/2022	19:00	12.7233	27.457	33939.4	1/18/2022	20:00	12.9852	27.636	42693.1	1/21/2022	21:00	13.2678	27.295	20070.9
1/15/2022	20:00	12.4190	27.630	26702.5	1/18/2022	21:00	12.7100	27.522	40222.7	1/21/2022	22:00	12.9473	27.323	19711.5
1/15/2022	21:00	12.0558	27.792	16124.7	1/18/2022	22:00	12.3161	27.819	26369.2	1/21/2022	23:00	12.6231	27.211	18525.9
1/15/2022	22:00	11.9903	27.914	9208.4	1/18/2022	23:00	11.8350	27.868	12229.6	1/22/2022	0:00	12.1595	27.280	13400.3
1/15/2022	23:00	12.1582	27.810	12206.5	1/19/2022	0:00	11.9029	27.830	11022.5	1/22/2022	1:00	12.0173	27.214	8692.8
1/16/2022	0:00	12.4711	27.838	12170.1	1/19/2022	1:00	12.2417	27.812	20092.2	1/22/2022	2:00	12.0501	27.093	7740.5
1/16/2022	1:00	12.9821	27.599	13026.8	1/19/2022	2:00	12.7230	27.736	29554.9	1/22/2022	3:00	12.4770	27.248	11299.3
1/16/2022	2:00	13.3041	27.566	35837.7	1/19/2022	3:00	13.2442	27.599	43980.3	1/22/2022	4:00	13.0520	27.185	15586.7
1/16/2022	3:00	13.5265	27.521	38223.8	1/19/2022	4:00	13.5887	27.571	46082.5	1/22/2022	5:00	13.4873	27.044	15515.7
1/16/2022	4:00	13.5947	27.506	42993.4	1/19/2022	5:00	13.7846	27.547	47325.8	1/22/2022	6:00	13.6209	27.023	17578.7
1/16/2022	5:00	13.4551	27.501	42312.7	1/19/2022	6:00	13.7228	27.549	46995.8	1/22/2022	7:00	13.7120	27.062	18101.4
1/16/2022	6:00	13.1225	27.498	43532.4	1/19/2022	7:00	13.4338	27.589	43555.8	1/22/2022	8:00	13.6514	27.012	17593.4
1/16/2022	7:00	12.8165	27.701	29879.9	1/19/2022	8:00	13.1357	27.576	42834.6	1/22/2022	9:00	13.4291	26.916	17301.9
1/16/2022	8:00	12.6153	27.708	27182.4	1/19/2022	9:00	12.9075	27.576	38491.4	1/22/2022	10:00	13.0663	26.905	16277.8
1/16/2022	9:00	12.2914	27.649	23783.9	1/19/2022	10:00	12.6199	27.503	28569.6	1/22/2022	11:00	12.7707	26.906	14626.6
1/16/2022	10:00	12.1412	27.688	12639.0	1/19/2022	11:00	12.2172	27.449	19246.2	1/22/2022	12:00	12.4747	26.893	12038.8
1/16/2022	11:00	12.3960	27.687	15650.0	1/19/2022	12:00	12.0839	27.423	12814.5	1/22/2022	13:00	12.1355	27.056	8160.5
1/16/2022	12:00	12.9229	27.689	30561.0	1/19/2022	13:00	12.4957	27.464	19888.9	1/22/2022	14:00	12.0720	27.224	6872.7
1/16/2022	13:00	13.4259	27.574	41242.7	1/19/2022	14:00	13.1270	27.475	27030.3	1/22/2022	15:00	12.4261	27.122	7611.5
1/16/2022	14:00	13.6966	27.524	46294.2	1/19/2022	15:00	13.5780	27.456	38180.0	1/22/2022	16:00	13.0580	27.022	10413.5
1/16/2022	15:00	13.8791	27.516	46544.7	1/19/2022	16:00	13.9476	27.500	40260.3	1/22/2022	17:00	13.5077	27.122	19554.3
1/16/2022	16:00	13.7208	27.502	48739.0	1/19/2022	17:00	14.0725	27.524	42436.2	1/22/2022	18:00	13.8102	27.131	21275.5
1/16/2022	17:00	13.4936	27.552	47592.5	1/19/2022	18:00	13.9203	27.621	39341.5	1/22/2022	19:00	13.8842	27.062	17820.8
1/16/2022	18:00	13.1888	27.709	39804.4	1/19/2022	19:00	13.6289	27.853	28805.9	1/22/2022	20:00	13.7399	27.347	11633.5
1/16/2022	19:00	12.8610	27.616	38752.2	1/19/2022	20:00	13.3466	27.805	27373.7	1/22/2022	21:00	13.4913	27.309	10057.6
1/16/2022	20:00	12.6342	27.848	29632.1	1/19/2022	21:00	12.9292	27.820	24612.7	1/22/2022	22:00	13.1823	27.224	8435.8
1/16/2022	21:00	12.2737	28.129	19150.4	1/19/2022	22:00	12.7118	27.840	19445.5	1/22/2022	23:00	13.0873	27.281	10945.8
1/16/2022	22:00	11.9686	28.006	9764.1	1/19/2022	23:00	12.1039	27.795	12090.1	1/23/2022	0:00	12.5855	27.202	6707.1
1/16/2022	23:00	11.9728	27.911	8985.0	1/20/2022	0:00	11.7727	27.725	10273.9	1/23/2022	1:00	12.0578	27.131	5082.2
1/17/2022	0:00	12.1980	27.999	13619.8	1/20/2022	1:00	11.9869	27.629	10237.6	1/23/2022	2:00	12.0108	27.160	4194.7
1/17/2022	1:00	12.7197	27.835	15483.0	1/20/2022	2:00	12.5696	27.583	11234.9	1/23/2022	3:00	12.3007	27.087	4237.3
1/17/2022	2:00	13.1421	27.787	16261.8	1/20/2022	3:00	13.1019	27.599	14779.4	1/23/2022	4:00	12.6971	26.987	5007.1
1/17/2022	3:00	13.5775	27.787	28099.3	1/20/2022	4:00	13.5518	27.551	23241.3	1/23/2022	5:00	13.1781	26.724	5058.9
1/17/2022	4:00	13.7505	27.808	31124.8	1/20/2022	5:00	13.8071	27.628	31945.5	1/23/2022	6:00	13.5551	26.764	7433.0
1/17/2022	5:00	13.6340	27.849	31033.1	1/20/2022	6:00	13.7953	27.632	32539.8	1/23/2022	7:00	13.6897	26.952	7801.2
1/17/2022	6:00	13.4071	27.834	29224.8	1/20/2022	7:00	13.6325	27.583	31796.4	1/23/2022	8:00	13.7708	26.973	8108.3
1/17/2022	7:00	13.1029	27.826	27305.3	1/20/2022	8:00	13.2919	27.345	25421.5	1/23/2022	9:00	13.5999	27.005	8860.1
1/17/2022	8:00	12.8740	27.696	22742.6	1/20/2022	9:00	12.9303	27.421	25101.0	1/23/2022	10:00	13.3533	26.865	7362.9
1/17/2022	9:00	12.3863	27.572	16409.3	1/20/2022	10:00	12.5746	27.414	21187.9	1/23/2022	11:00	13.1002	26.816	6936.9
1/17/2022	10:00	12.1165	27.539	12749.7	1/20/2022	11:00	12.3625	27.422	13752.3	1/23/2022	12:00	12.8155	26.797	5793.3
1/17/2022	11:00	12.1649	27.635	11046.5	1/20/2022	12:00	11.9704	27.420	10109.3	1/23/2022	13:00	12.4309	27.040	4425.4
1/17/2022	12:00	12.5619	27.576	12238.0	1/20/2022	13:00	12.1651	27.445	8873.1	1/23/2022	14:00	12.0901	26.991	3111.4

Serial_number:1082634/Project ID:GTE/Location:C1/LEVELUNIT: m/Offset: 0.000000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm
Total Depth at Deployment: 3.6m/Height of Sensor above Bed: 2.0m

DATE	TIME	LEVEL	TEMP	COND
1/23/2022	15:00	12.1274	26.945	2806.5
1/23/2022	16:00	12.5334	26.965	2984.2
1/23/2022	17:00	13.1823	27.104	12732.5
1/23/2022	18:00	13.5942	27.241	21097.4
1/23/2022	19:00	13.7852	27.232	22807.0
1/23/2022	20:00	13.8160	27.191	22775.3
1/23/2022	21:00	13.6285	27.201	21611.4
1/23/2022	22:00	13.4408	27.226	20855.4
1/23/2022	23:00	13.1269	27.179	15406.6
1/24/2022	0:00	12.8492	27.199	14574.6
1/24/2022	1:00	12.5801	27.226	10701.9
1/24/2022	2:00	12.1943	27.239	4135.4
1/24/2022	3:00	12.1716	27.220	2932.0
1/24/2022	4:00	12.4568	27.234	5433.1
1/24/2022	5:00	12.8908	27.220	5861.0
1/24/2022	6:00	13.3135	27.245	18278.1
1/24/2022	7:00	13.5393	27.201	21422.1
1/24/2022	8:00	13.7334	27.203	22720.1
1/24/2022	9:00	13.7093	27.276	16962.5
1/24/2022	10:00	13.5538	27.261	18472.9
1/24/2022	11:00	13.2765	27.219	18955.4
1/24/2022	12:00	13.1252	27.207	16749.4
1/24/2022	13:00	12.9772	27.228	15739.9
1/24/2022	14:00	12.6262	27.168	10481.1
1/24/2022	15:00	12.2753	27.130	5847.6
1/24/2022	16:00	12.2573	27.214	3053.1
1/24/2022	17:00	12.6512	27.352	2986.3
1/24/2022	18:00	13.1708	27.423	3006.7
1/24/2022	19:00	13.4729	27.276	11263.6
1/24/2022	20:00	13.6932	27.314	9057.6
1/24/2022	21:00	13.7100	27.307	9811.8
1/24/2022	22:00	13.5377	27.288	10018.4
1/24/2022	23:00	13.2477	27.277	6176.2
1/25/2022	0:00	12.9887	27.171	5185.4
1/25/2022	1:00	12.7851	27.087	3530.9
1/25/2022	2:00	12.5151	27.091	3932.2
1/25/2022	3:00	12.2271	27.010	3125.2
1/25/2022	4:00	12.3397	26.827	2761.2
1/25/2022	5:00	12.6862	26.847	3352.8
1/25/2022	6:00	13.1206	26.766	3041.4
1/25/2022	7:00	13.5537	26.898	7039.4
1/25/2022	8:00	13.6860	26.767	7804.6
1/25/2022	9:00	13.8006	26.654	8477.3
1/25/2022	10:00	13.7510	26.656	9660.7
1/25/2022	11:00	13.5885	26.694	9365.0
1/25/2022	12:00	13.3021	26.920	9766.7
1/25/2022	13:00	13.1962	26.822	9248.1
1/25/2022	14:00	12.8784	26.809	7039.2
1/25/2022	15:00	12.4640	26.823	4704.3
1/25/2022	16:00	12.2240	26.964	3364.1
1/25/2022	17:00	12.2718	26.968	2883.4
1/25/2022	18:00	12.5983	26.951	3310.5
1/25/2022	19:00	13.1220	27.078	4294.4
1/25/2022	20:00	13.4653	26.907	8035.8
1/25/2022	21:00	13.5253	27.019	9930.1
1/25/2022	22:00	13.5648	27.082	11151.5
1/25/2022	23:00	13.3907	27.111	6270.9
1/26/2022	0:00	13.1337	27.061	5231.0
1/26/2022	1:00	13.0202	26.836	4668.5
1/26/2022	2:00	12.8138	26.745	3835.3
1/26/2022	3:00	12.6403	26.848	4219.9
1/26/2022	4:00	12.4458	26.841	3200.7
1/26/2022	5:00	12.4359	26.844	2644.9
1/26/2022	6:00	12.6019	26.811	2313.3
1/26/2022	7:00	12.8532	26.612	2126.3

DATE	TIME	LEVEL	TEMP	COND

DATE	TIME	LEVEL	TEMP	COND

Serial_number:1082935/Project ID:GTE/Location:Demerara River R3/LEVELUNIT: m/Offset: 0.000000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm
Total Depth at Deployment: 4.7m/Height of Sensor above Bed: 2.5m

DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND
1/14/2022	12:00	14.9261	26.260	21.9	1/17/2022	13:00	14.4064	26.512	21.1	1/20/2022	14:00	13.8266	26.601	23.6
1/14/2022	13:00	15.5166	26.592	21.9	1/17/2022	14:00	15.0776	26.882	20.7	1/20/2022	15:00	14.6284	26.792	22.3
1/14/2022	14:00	15.7425	26.799	21.1	1/17/2022	15:00	16.0524	26.973	22.1	1/20/2022	16:00	15.7471	26.899	20.8
1/14/2022	15:00	15.7263	27.039	20.7	1/17/2022	16:00	16.0957	27.220	23.3	1/20/2022	17:00	16.4362	26.952	19.8
1/14/2022	16:00	15.4870	27.065	20.9	1/17/2022	17:00	15.9273	27.438	23.7	1/20/2022	18:00	16.3988	27.202	22.5
1/14/2022	17:00	15.1825	27.004	20.8	1/17/2022	18:00	15.6137	27.474	24.1	1/20/2022	19:00	16.0030	27.293	25.0
1/14/2022	18:00	14.8374	26.777	21.8	1/17/2022	19:00	15.2450	27.224	23.9	1/20/2022	20:00	15.6744	27.230	24.3
1/14/2022	19:00	14.4891	26.729	22.4	1/17/2022	20:00	14.8705	26.989	23.3	1/20/2022	21:00	15.3272	27.158	22.4
1/14/2022	20:00	14.2422	26.603	22.6	1/17/2022	21:00	14.5114	26.868	22.3	1/20/2022	22:00	14.8971	26.958	20.7
1/14/2022	21:00	13.9695	26.532	22.8	1/17/2022	22:00	14.1993	26.686	21.6	1/20/2022	23:00	14.6393	26.820	20.2
1/14/2022	22:00	13.8125	26.471	22.0	1/17/2022	23:00	13.9472	26.564	21.9	1/21/2022	0:00	14.3395	26.747	20.3
1/14/2022	23:00	13.8861	26.446	22.1	1/18/2022	0:00	13.6741	26.461	22.5	1/21/2022	1:00	13.9586	26.633	21.3
1/15/2022	0:00	14.2348	26.441	20.8	1/18/2022	1:00	13.7098	26.404	22.9	1/21/2022	2:00	13.7174	26.485	23.7
1/15/2022	1:00	14.6936	26.425	20.5	1/18/2022	2:00	14.2282	26.389	20.6	1/21/2022	3:00	14.0579	26.456	24.1
1/15/2022	2:00	15.2108	26.479	20.9	1/18/2022	3:00	15.0382	26.381	20.2	1/21/2022	4:00	14.8914	26.467	23.2
1/15/2022	3:00	15.4050	26.527	21.2	1/18/2022	4:00	15.6218	26.464	19.7	1/21/2022	5:00	15.7928	26.577	20.6
1/15/2022	4:00	15.4388	26.590	21.4	1/18/2022	5:00	15.8304	26.560	20.5	1/21/2022	6:00	16.1374	26.664	20.7
1/15/2022	5:00	15.3232	26.581	21.4	1/18/2022	6:00	15.6648	26.666	22.0	1/21/2022	7:00	15.9847	26.804	22.6
1/15/2022	6:00	15.0808	26.583	21.4	1/18/2022	7:00	15.4447	26.727	23.1	1/21/2022	8:00	15.7412	26.869	23.3
1/15/2022	7:00	14.8057	26.453	21.0	1/18/2022	8:00	15.1182	26.596	21.3	1/21/2022	9:00	15.4950	26.881	23.0
1/15/2022	8:00	14.4584	26.422	20.7	1/18/2022	9:00	14.7079	26.452	20.2	1/21/2022	10:00	15.2548	26.831	22.3
1/15/2022	9:00	14.1606	26.391	20.3	1/18/2022	10:00	14.3866	26.470	20.8	1/21/2022	11:00	14.9894	26.667	20.2
1/15/2022	10:00	13.9671	26.415	20.4	1/18/2022	11:00	14.0593	26.474	21.9	1/21/2022	12:00	14.5383	26.619	20.7
1/15/2022	11:00	14.0534	26.434	20.5	1/18/2022	12:00	13.8267	26.553	22.3	1/21/2022	13:00	14.2535	26.505	23.5
1/15/2022	12:00	14.5810	26.644	20.2	1/18/2022	13:00	13.9389	26.619	23.1	1/21/2022	14:00	13.9809	26.460	25.5
1/15/2022	13:00	15.1915	26.759	19.9	1/18/2022	14:00	14.6092	26.933	20.6	1/21/2022	15:00	13.9397	26.491	25.7
1/15/2022	14:00	15.6269	26.844	20.0	1/18/2022	15:00	15.5708	27.081	19.9	1/21/2022	16:00	14.8972	26.537	25.7
1/15/2022	15:00	15.7915	27.094	20.8	1/18/2022	16:00	16.2724	27.281	20.0	1/21/2022	17:00	16.0781	26.583	23.9
1/15/2022	16:00	15.6891	27.191	21.2	1/18/2022	17:00	16.2790	27.499	22.6	1/21/2022	18:00	16.4614	26.697	21.0
1/15/2022	17:00	15.4113	27.173	21.1	1/18/2022	18:00	15.8892	27.564	24.5	1/21/2022	19:00	16.2385	26.836	22.3
1/15/2022	18:00	15.1245	27.058	20.8	1/18/2022	19:00	15.5253	27.443	23.9	1/21/2022	20:00	15.9622	26.899	25.1
1/15/2022	19:00	14.7235	26.851	19.9	1/18/2022	20:00	15.1675	27.273	21.4	1/21/2022	21:00	15.5979	26.888	24.5
1/15/2022	20:00	14.4069	26.780	19.5	1/18/2022	21:00	14.7545	27.121	20.5	1/21/2022	22:00	15.3276	26.728	21.1
1/15/2022	21:00	14.1348	26.666	19.9	1/18/2022	22:00	14.4019	26.947	20.5	1/21/2022	23:00	14.7903	26.613	21.2
1/15/2022	22:00	13.9078	26.573	21.5	1/18/2022	23:00	14.1098	26.836	20.6	1/22/2022	0:00	14.4810	26.488	23.5
1/15/2022	23:00	13.7129	26.434	23.7	1/19/2022	0:00	13.7355	26.733	21.2	1/22/2022	1:00	14.1282	26.437	24.1
1/16/2022	0:00	13.8668	26.353	24.7	1/19/2022	1:00	13.6425	26.585	21.8	1/22/2022	2:00	13.9069	26.339	23.6
1/16/2022	1:00	14.2372	26.335	24.5	1/19/2022	2:00	13.9884	26.538	22.0	1/22/2022	3:00	13.7551	26.211	24.1
1/16/2022	2:00	14.9198	26.411	22.9	1/19/2022	3:00	14.6574	26.548	21.5	1/22/2022	4:00	14.2730	26.202	24.0
1/16/2022	3:00	15.4203	26.572	20.0	1/19/2022	4:00	15.7006	26.634	19.6	1/22/2022	5:00	15.4270	26.252	23.1
1/16/2022	4:00	15.7246	26.639	19.6	1/19/2022	5:00	16.1500	26.713	19.3	1/22/2022	6:00	16.0231	26.363	24.0
1/16/2022	5:00	15.5386	26.715	20.9	1/19/2022	6:00	15.9607	26.870	21.4	1/22/2022	7:00	15.9614	26.401	23.8
1/16/2022	6:00	15.2659	26.723	20.9	1/19/2022	7:00	15.6471	26.931	22.9	1/22/2022	8:00	15.8782	26.487	23.8
1/16/2022	7:00	14.9984	26.616	20.2	1/19/2022	8:00	15.3629	26.961	23.1	1/22/2022	9:00	15.5666	26.571	24.5
1/16/2022	8:00	14.6789	26.516	20.6	1/19/2022	9:00	15.0545	26.815	20.7	1/22/2022	10:00	15.2967	26.564	23.6
1/16/2022	9:00	14.3463	26.471	22.3	1/19/2022	10:00	14.6605	26.705	20.5	1/22/2022	11:00	14.9872	26.600	23.8
1/16/2022	10:00	14.0958	26.405	24.3	1/19/2022	11:00	14.3273	26.654	21.5	1/22/2022	12:00	14.6123	26.495	25.0
1/16/2022	11:00	13.7799	26.438	24.4	1/19/2022	12:00	14.0306	26.631	22.3	1/22/2022	13:00	14.2976	26.576	25.1
1/16/2022	12:00	14.1986	26.435	24.3	1/19/2022	13:00	13.8107	26.632	23.1	1/22/2022	14:00	14.0707	26.594	25.8
1/16/2022	13:00	14.8684	26.961	24.8	1/19/2022	14:00	14.2589	26.683	23.0	1/22/2022	15:00	13.8248	26.679	26.5
1/16/2022	14:00	15.4746	26.827	23.3	1/19/2022	15:00	15.6251	26.781	20.8	1/22/2022	16:00	14.2743	26.697	26.3
1/16/2022	15:00	15.8512	27.112	21.3	1/19/2022	16:00	16.1662	26.871	20.2	1/22/2022	17:00	15.2611	26.771	25.2
1/16/2022	16:00	15.9214	27.281	21.1	1/19/2022	17:00	16.4614	27.177	21.7	1/22/2022	18:00	16.1047	26.881	25.3
1/16/2022	17:00	15.6623	27.334	21.9	1/19/2022	18:00	16.3027	27.326	24.4	1/22/2022	19:00	16.3315	27.034	25.7
1/16/2022	18:00	15.3514	27.205	21.3	1/19/2022	19:00	15.8978	27.309	26.2	1/22/2022	20:00	15.9582	27.120	26.5
1/16/2022	19:00	14.9815	27.009	21.3	1/19/2022	20:00	15.5615	27.260	23.0	1/22/2022	21:00	15.7027	27.098	26.2
1/16/2022	20:00	14.6180	26.850	22.4	1/19/2022	21:00	15.2268	27.104	20.7	1/22/2022	22:00	15.4179	27.038	25.5
1/16/2022	21:00	14.3548	26.684	24.4	1/19/2022	22:00	14.7867	26.895	19.4	1/22/2022	23:00	15.0106	26.824	24.5
1/16/2022	22:00	14.0334	26.573	23.9	1/19/2022	23:00	14.4307	26.732	18.9	1/23/2022	0:00	14.7558	26.699	23.9
1/16/2022	23:00	13.7950	26.428	23.0	1/20/2022	0:00	14.0805	26.678	19.2	1/23/2022	1:00	14.3991	26.598	23.6
1/17/2022	0:00	13.7411	26.346	22.1	1/20/2022	1:00	13.8282	26.587	20.0	1/23/2022	2:00	14.1003	26.504	24.3
1/17/2022	1:00	13.9262	26.309	22.0	1/20/2022	2:00	13.6781	26.498	20.6	1/23/2022	3:00	13.8493	26.412	23.4
1/17/2022	2:00	14.5432	26.316	21.4	1/20/2022	3:00	14.3551	26.497	20.6	1/23/2022	4:00	14.0727	26.382	23.1
1/17/2022	3:00	15.2421	26.383	22.1	1/20/2022	4:00	15.3574	26.542	19.9	1/23/2022	5:00	14.7743	26.373	23.2
1/17/2022	4:00	15.6935	26.530	23.3	1/20/2022	5:00	16.0757	26.633	19.4	1/23/2022	6:00	15.4163	26.381	24.0
1/17/2022	5:00	15.8019	26.645	23.1	1/20/2022	6:00	16.3659	26.750	20.1	1/23/2022	7:00	16.0820	26.470	25.1
1/17/2022	6:00	15.6136	26.763	22.8	1/20/2022	7:00	15.9503	26.900	22.7	1/23/2022	8:00	15.9327	26.551	25.5
1/17/2022	7:00	15.2876	26.693	23.2	1/20/2022	8:00	15.5822	26.915	23.9	1/23/2022	9:00	15.7355	26.676	26.7
1/17/2022	8:00	14.8958	26.558	23.9	1/20/2022	9:00	15.2974	26.819	22.4	1/23/2022	10:00	15.4829	26.726	26.4
1/17/2022	9:00	14.5294	26.484	23.9	1/20/2022	10:00	14.8752	26.636	21.5	1/23/2022	11:00	15.2478	26.742	24.8
1/17/2022	10:00	14.2756	26.396	23.8	1/20/2022	11:00	14.5260	26.578	22.3	1/23/2022	12:00	14.9665	26.891	24.5
1/17/2022	11:00	13.9204	26.403	23.3	1/20/2022	12:00	14.1916	26.569	22.2	1/23/2022	13:00	14.5955	26.784	24.1
1/17/2022	12:00	13.8416	26.406	23.2	1/20/2022	13:00	13.8835	26.586	24.3	1/23/2022	14:00	14.1863	26.858	24.5

Serial_number:1082935/Project ID:GTE/Location:Demerara River R3/LEVELUNIT: m/Offset: 0.000000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm

Total Depth at Deployment: 4.7m/Height of Sensor above Bed: 2.5m

DATE	TIME	LEVEL	TEMP	COND
1/23/2022	15:00	13.9585	26.922	23.1
1/23/2022	16:00	13.8165	26.931	22.4
1/23/2022	17:00	14.3579	26.941	22.3
1/23/2022	18:00	15.2671	26.903	21.8
1/23/2022	19:00	15.9225	26.991	22.9
1/23/2022	20:00	16.1700	27.161	24.6
1/23/2022	21:00	15.8719	27.285	26.6
1/23/2022	22:00	15.4908	27.272	26.5
1/23/2022	23:00	15.1560	27.055	24.6
1/24/2022	0:00	14.8231	26.881	22.9
1/24/2022	1:00	14.4375	26.798	21.9
1/24/2022	2:00	14.1289	26.693	21.5
1/24/2022	3:00	13.8987	26.538	22.4
1/24/2022	4:00	13.8899	26.403	23.1
1/24/2022	5:00	14.2659	26.389	23.2
1/24/2022	6:00	14.8342	26.423	22.8
1/24/2022	7:00	15.5559	26.544	22.5
1/24/2022	8:00	15.7864	26.657	22.3
1/24/2022	9:00	15.7723	26.787	23.7
1/24/2022	10:00	15.6216	26.880	25.3
1/24/2022	11:00	15.4136	26.891	23.1
1/24/2022	12:00	15.1387	26.915	21.8
1/24/2022	13:00	14.8798	27.049	20.7
1/24/2022	14:00	14.5398	26.905	20.6
1/24/2022	15:00	14.1750	26.844	21.5
1/24/2022	16:00	13.9561	26.720	21.4
1/24/2022	17:00	13.9683	26.760	21.6
1/24/2022	18:00	14.4750	26.726	21.2
1/24/2022	19:00	15.1552	26.705	21.3
1/24/2022	20:00	15.6783	26.787	22.4
1/24/2022	21:00	15.9109	26.885	23.2
1/24/2022	22:00	15.7544	26.942	24.3
1/24/2022	23:00	15.4084	26.926	24.4
1/25/2022	0:00	15.1262	26.850	21.4
1/25/2022	1:00	14.7905	26.690	21.1
1/25/2022	2:00	14.4660	26.602	20.7
1/25/2022	3:00	14.1773	26.573	20.9
1/25/2022	4:00	14.0112	26.517	21.9
1/25/2022	5:00	14.1318	26.449	22.8
1/25/2022	6:00	14.4736	26.442	22.1
1/25/2022	7:00	14.9410	26.427	21.2
1/25/2022	8:00	15.5983	26.411	21.3
1/25/2022	9:00	15.7179	26.449	21.5
1/25/2022	10:00	15.7350	26.518	22.2
1/25/2022	11:00	15.6225	26.670	22.7
1/25/2022	12:00	15.4728	26.784	22.4
1/25/2022	13:00	15.2038	26.674	21.2
1/25/2022	14:00	14.8213	26.795	20.4
1/25/2022	15:00	14.5059	26.712	21.8
1/25/2022	16:00	14.1902	26.603	23.1
1/25/2022	17:00	13.9478	26.614	23.3
1/25/2022	18:00	13.9881	26.551	23.4
1/25/2022	19:00	14.4327	26.537	22.7
1/25/2022	20:00	15.1604	26.525	22.0
1/25/2022	21:00	15.6024	26.509	21.8
1/25/2022	22:00	15.6123	26.538	21.8
1/25/2022	23:00	15.5042	26.564	22.3
1/26/2022	0:00	15.2654	26.575	21.7
1/26/2022	1:00	14.9724	26.511	21.3
1/26/2022	2:00	14.6773	26.443	21.8
1/26/2022	3:00	14.4279	26.419	21.7
1/26/2022	4:00	14.2527	26.352	21.8
1/26/2022	5:00	14.1260	26.287	21.9
1/26/2022	6:00	14.1859	26.235	22.1
1/26/2022	7:00	14.3578	26.228	22.1
1/26/2022	8:00	14.7406	26.231	22.1
1/26/2022	9:00	15.2700	26.305	21.7
1/26/2022	10:00	15.7004	26.420	21.5

DATE	TIME	LEVEL	TEMP	COND

DATE	TIME	LEVEL	TEMP	COND

Serial_number:1082650/Project ID:GTE/Location:R4/LEVELUNIT: m/Offset: 0.000000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm
Total Depth at Deployment: 3.8m/Height of Sensor above Bed: 2.0m

DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND
1/14/2022	12:00	13.7668	27.383	12.0	1/17/2022	13:00	13.1111	27.782	12.3	1/20/2022	14:00	12.5183	28.112	12.9
1/14/2022	13:00	14.2730	27.431	12.4	1/17/2022	14:00	13.7960	27.893	12.9	1/20/2022	15:00	13.2163	28.056	12.5
1/14/2022	14:00	14.5420	27.466	12.7	1/17/2022	15:00	14.3960	27.876	13.6	1/20/2022	16:00	13.9893	28.061	13.4
1/14/2022	15:00	14.4016	27.520	13.2	1/17/2022	16:00	14.6920	27.918	14.3	1/20/2022	17:00	14.5471	27.998	14.0
1/14/2022	16:00	14.1678	27.569	13.4	1/17/2022	17:00	14.4330	27.909	14.7	1/20/2022	18:00	14.7102	27.967	14.3
1/14/2022	17:00	13.9090	27.501	13.0	1/17/2022	18:00	14.1630	27.902	14.6	1/20/2022	19:00	14.5508	27.976	14.7
1/14/2022	18:00	13.5834	27.579	12.6	1/17/2022	19:00	13.8580	27.825	13.6	1/20/2022	20:00	14.2114	27.954	14.7
1/14/2022	19:00	13.1833	27.599	12.7	1/17/2022	20:00	13.4451	27.827	13.0	1/20/2022	21:00	13.8345	27.931	13.9
1/14/2022	20:00	12.8852	27.579	13.2	1/17/2022	21:00	13.0259	27.765	12.8	1/20/2022	22:00	13.3443	27.959	13.5
1/14/2022	21:00	12.6490	27.519	13.1	1/17/2022	22:00	12.7245	27.794	12.5	1/20/2022	23:00	12.9283	27.987	13.2
1/14/2022	22:00	12.5332	27.496	12.3	1/17/2022	23:00	12.4150	27.823	12.2	1/21/2022	0:00	12.6119	27.978	13.1
1/14/2022	23:00	12.7195	27.514	11.9	1/18/2022	0:00	12.2340	27.886	12.2	1/21/2022	1:00	12.3722	27.967	13.0
1/15/2022	0:00	13.1103	27.477	11.9	1/18/2022	1:00	12.4524	27.812	12.2	1/21/2022	2:00	12.3096	27.992	12.9
1/15/2022	1:00	13.5437	27.461	12.1	1/18/2022	2:00	12.9916	27.835	12.3	1/21/2022	3:00	12.7394	27.980	13.0
1/15/2022	2:00	13.9534	27.487	12.5	1/18/2022	3:00	13.5736	27.672	12.6	1/21/2022	4:00	13.4131	27.956	12.8
1/15/2022	3:00	14.1686	27.482	12.8	1/18/2022	4:00	14.0676	27.567	13.0	1/21/2022	5:00	13.8440	27.859	13.2
1/15/2022	4:00	14.2102	27.440	13.0	1/18/2022	5:00	14.3318	27.480	14.0	1/21/2022	6:00	14.3606	27.786	14.1
1/15/2022	5:00	14.0456	27.385	13.2	1/18/2022	6:00	14.2586	27.481	14.2	1/21/2022	7:00	14.4997	27.748	14.5
1/15/2022	6:00	13.8027	27.384	13.0	1/18/2022	7:00	13.9625	27.480	13.7	1/21/2022	8:00	14.3604	27.765	14.4
1/15/2022	7:00	13.4645	27.415	12.7	1/18/2022	8:00	13.6845	27.453	13.6	1/21/2022	9:00	14.0699	27.746	14.6
1/15/2022	8:00	13.1327	27.377	13.8	1/18/2022	9:00	13.2532	27.567	12.7	1/21/2022	10:00	13.7468	27.732	14.3
1/15/2022	9:00	12.8789	27.409	12.8	1/18/2022	10:00	12.8538	27.657	12.7	1/21/2022	11:00	13.3782	27.766	13.6
1/15/2022	10:00	12.6965	27.515	12.5	1/18/2022	11:00	12.5547	27.835	12.5	1/21/2022	12:00	13.0209	27.772	13.3
1/15/2022	11:00	12.8954	27.529	12.1	1/18/2022	12:00	12.3451	28.029	12.4	1/21/2022	13:00	12.7059	27.782	12.9
1/15/2022	12:00	13.4795	27.531	12.2	1/18/2022	13:00	12.6346	28.101	12.4	1/21/2022	14:00	12.5834	27.810	12.8
1/15/2022	13:00	13.9001	27.783	12.5	1/18/2022	14:00	13.3436	28.054	12.9	1/21/2022	15:00	12.7314	27.824	12.7
1/15/2022	14:00	14.3989	27.744	12.9	1/18/2022	15:00	14.0355	28.034	13.7	1/21/2022	16:00	13.4498	27.805	12.7
1/15/2022	15:00	14.5420	27.795	13.3	1/18/2022	16:00	14.5457	27.962	14.8	1/21/2022	17:00	14.1537	27.741	13.0
1/15/2022	16:00	14.3728	27.834	13.8	1/18/2022	17:00	14.6127	27.943	15.6	1/21/2022	18:00	14.6697	27.653	13.6
1/15/2022	17:00	14.1212	27.834	13.8	1/18/2022	18:00	14.3875	27.985	16.0	1/21/2022	19:00	14.6549	27.619	13.8
1/15/2022	18:00	13.8449	27.799	11.8	1/18/2022	19:00	14.0593	27.998	15.2	1/21/2022	20:00	14.4207	27.566	14.4
1/15/2022	19:00	13.4728	27.828	11.8	1/18/2022	20:00	13.6414	27.969	13.6	1/21/2022	21:00	14.1410	27.522	14.4
1/15/2022	20:00	13.0826	27.810	13.1	1/18/2022	21:00	13.1949	27.957	13.4	1/21/2022	22:00	13.6939	27.608	13.6
1/15/2022	21:00	12.7549	27.755	13.0	1/18/2022	22:00	12.8122	28.032	12.9	1/21/2022	23:00	13.2659	27.600	13.1
1/15/2022	22:00	12.5395	27.642	12.6	1/18/2022	23:00	12.4908	28.107	12.7	1/22/2022	0:00	12.9199	27.611	12.7
1/15/2022	23:00	12.4910	27.619	12.5	1/19/2022	0:00	12.2626	28.092	12.6	1/22/2022	1:00	12.6302	27.586	12.5
1/16/2022	0:00	12.7399	27.589	12.0	1/19/2022	1:00	12.2850	28.072	12.7	1/22/2022	2:00	12.3875	27.583	12.6
1/16/2022	1:00	13.1196	27.591	11.9	1/19/2022	2:00	12.6878	28.084	12.7	1/22/2022	3:00	12.3843	27.563	12.9
1/16/2022	2:00	13.6407	27.614	12.2	1/19/2022	3:00	13.2205	28.068	12.7	1/22/2022	4:00	13.0489	27.561	12.9
1/16/2022	3:00	14.0416	27.684	12.8	1/19/2022	4:00	13.8755	27.924	12.9	1/22/2022	5:00	13.7122	27.494	12.8
1/16/2022	4:00	14.1297	27.639	13.5	1/19/2022	5:00	14.3661	27.838	13.7	1/22/2022	6:00	14.1469	27.490	13.1
1/16/2022	5:00	14.1244	27.629	13.6	1/19/2022	6:00	14.3993	27.737	14.3	1/22/2022	7:00	14.3437	27.413	13.7
1/16/2022	6:00	13.8243	27.601	13.6	1/19/2022	7:00	14.2127	27.759	14.3	1/22/2022	8:00	14.3767	27.393	14.1
1/16/2022	7:00	13.5579	27.614	13.3	1/19/2022	8:00	13.9288	27.757	14.0	1/22/2022	9:00	14.1085	27.400	14.0
1/16/2022	8:00	13.1283	27.645	12.7	1/19/2022	9:00	13.5656	27.808	13.6	1/22/2022	10:00	13.8362	27.447	14.0
1/16/2022	9:00	12.7985	27.632	12.5	1/19/2022	10:00	13.1293	27.845	13.3	1/22/2022	11:00	13.4918	27.549	13.0
1/16/2022	10:00	12.5014	27.648	12.2	1/19/2022	11:00	12.7359	28.032	13.0	1/22/2022	12:00	13.0185	27.693	13.2
1/16/2022	11:00	12.3756	27.709	12.2	1/19/2022	12:00	12.4854	28.103	12.8	1/22/2022	13:00	12.7131	27.750	13.0
1/16/2022	12:00	12.8455	27.713	12.3	1/19/2022	13:00	12.4308	28.230	12.7	1/22/2022	14:00	12.4444	27.815	13.0
1/16/2022	13:00	13.6246	27.790	12.5	1/19/2022	14:00	13.0240	28.214	12.9	1/22/2022	15:00	12.4012	27.906	13.0
1/16/2022	14:00	14.0766	27.765	13.3	1/19/2022	15:00	13.8044	28.225	13.1	1/22/2022	16:00	13.0171	27.898	13.0
1/16/2022	15:00	14.6179	27.782	13.4	1/19/2022	16:00	14.3944	28.084	13.8	1/22/2022	17:00	13.5924	27.859	13.0
1/16/2022	16:00	14.5151	27.790	14.2	1/19/2022	17:00	14.8888	28.034	14.1	1/22/2022	18:00	14.3314	27.815	13.4
1/16/2022	17:00	14.2078	27.814	14.3	1/19/2022	18:00	14.7550	27.953	15.0	1/22/2022	19:00	14.5679	27.797	13.7
1/16/2022	18:00	13.9690	27.763	14.0	1/19/2022	19:00	14.4475	27.952	14.8	1/22/2022	20:00	14.5430	27.758	14.0
1/16/2022	19:00	13.5973	27.774	13.2	1/19/2022	20:00	14.1407	27.872	15.5	1/22/2022	21:00	14.2620	27.743	14.1
1/16/2022	20:00	13.2599	27.694	13.0	1/19/2022	21:00	13.6509	27.960	13.9	1/22/2022	22:00	13.9367	27.711	13.8
1/16/2022	21:00	12.8698	27.756	12.6	1/19/2022	22:00	13.2396	28.009	13.7	1/22/2022	23:00	13.4842	27.681	13.2
1/16/2022	22:00	12.5777	27.714	12.3	1/19/2022	23:00	12.9065	28.006	13.2	1/23/2022	0:00	13.1069	27.650	13.1
1/16/2022	23:00	12.3681	27.695	12.0	1/20/2022	0:00	12.5657	28.065	13.1	1/23/2022	1:00	12.7787	27.689	12.8
1/17/2022	0:00	12.4154	27.660	12.0	1/20/2022	1:00	12.3974	28.042	12.8	1/23/2022	2:00	12.5192	27.708	13.1
1/17/2022	1:00	12.6253	27.654	12.0	1/20/2022	2:00	12.4732	28.035	12.8	1/23/2022	3:00	12.4433	27.706	12.9
1/17/2022	2:00	13.3232	27.669	12.1	1/20/2022	3:00	13.0805	28.020	12.8	1/23/2022	4:00	12.8195	27.676	12.9
1/17/2022	3:00	13.8497	27.580	12.5	1/20/2022	4:00	13.7234	27.963	12.8	1/23/2022	5:00	13.2926	27.606	12.9
1/17/2022	4:00	14.1865	27.567	13.1	1/20/2022	5:00	14.1646	27.894	13.3	1/23/2022	6:00	13.8919	27.524	12.9
1/17/2022	5:00	14.4130	27.474	14.0	1/20/2022	6:00	14.5804	27.763	14.4	1/23/2022	7:00	14.2491	27.429	13.4
1/17/2022	6:00	14.1707	27.499	14.0	1/20/2022	7:00	14.4216	27.774	14.4	1/23/2022	8:00	14.3981	27.448	13.9
1/17/2022	7:00	13.8990	27.463	13.6	1/20/2022	8:00	14.1551	27.760	14.6	1/23/2022	9:00	14.2962	27.422	13.9
1/17/2022	8:00	13.5031	27.516	13.0	1/20/2022	9:00	13.7629	27.749	14.0	1/23/2022	10:00	14.0797	27.439	14.0
1/17/2022	9:00	13.0712	27.516	12.8	1/20/2022	10:00	13.2783	27.805	13.6	1/23/2022	11:00	13.8033	27.534	13.6
1/17/2022	10:00	12.7789	27.613	12.3	1/20/2022	11:00	12.8782	27.899	13.1	1/23/2022	12:00	13.4128	27.669	13.4
1/17/2022	11:00	12.5288	27.713	12.2	1/20/2022	12:00	12.5760	27.994	12.9	1/23/2022	13:00	12.9938	27.807	13.2
1/17/2022	12:00	12.5348	27.804	12.1	1/20/2022	13:00	12.3443	28.091	12.7	1/23/2022	14:00	12.6900	27.885	13.1

Serial_number:1082650/Project ID:GTE/Location:R4/LEVELUNIT: m/Offset: 0.000000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm

Total Depth at Deployment: 3.8m/Height of Sensor above Bed: 2.0m

DATE	TIME	LEVEL	TEMP	COND
1/23/2022	15:00	12.4430	27.973	12.9
1/23/2022	16:00	12.5012	27.966	12.9
1/23/2022	17:00	13.1053	28.002	12.9
1/23/2022	18:00	13.6984	28.023	12.8
1/23/2022	19:00	14.3258	27.922	13.3
1/23/2022	20:00	14.4948	27.883	13.7
1/23/2022	21:00	14.3735	27.852	13.9
1/23/2022	22:00	14.0798	27.834	13.9
1/23/2022	23:00	13.7761	27.839	13.4
1/24/2022	0:00	13.3305	27.827	13.1
1/24/2022	1:00	12.9720	27.777	12.9
1/24/2022	2:00	12.6237	27.766	12.6
1/24/2022	3:00	12.4697	27.680	12.4
1/24/2022	4:00	12.5819	27.605	12.5
1/24/2022	5:00	13.0207	27.627	12.4
1/24/2022	6:00	13.4509	27.617	12.4
1/24/2022	7:00	13.9329	27.678	12.9
1/24/2022	8:00	14.2166	27.642	13.3
1/24/2022	9:00	14.2995	27.674	13.6
1/24/2022	10:00	14.2546	27.691	13.9
1/24/2022	11:00	14.0350	27.723	13.7
1/24/2022	12:00	13.7710	27.761	13.2
1/24/2022	13:00	13.3752	27.742	12.8
1/24/2022	14:00	13.0222	27.752	12.7
1/24/2022	15:00	12.6937	27.794	12.6
1/24/2022	16:00	12.4848	27.771	12.2
1/24/2022	17:00	12.7239	27.747	12.3
1/24/2022	18:00	13.2221	27.750	12.2
1/24/2022	19:00	13.7061	27.767	12.4
1/24/2022	20:00	14.1962	27.742	12.8
1/24/2022	21:00	14.3898	27.759	13.2
1/24/2022	22:00	14.2417	27.765	13.5
1/24/2022	23:00	13.9855	27.739	13.4
1/25/2022	0:00	13.6901	27.655	12.9
1/25/2022	1:00	13.3797	27.639	12.7
1/25/2022	2:00	13.0212	27.614	12.6
1/25/2022	3:00	12.8048	27.570	12.3
1/25/2022	4:00	12.6015	27.500	12.2
1/25/2022	5:00	12.9191	27.448	12.6
1/25/2022	6:00	13.1404	27.458	12.6
1/25/2022	7:00	13.7369	27.479	12.5
1/25/2022	8:00	14.0631	27.453	12.7
1/25/2022	9:00	14.2679	27.414	13.2
1/25/2022	10:00	14.2811	27.425	13.4
1/25/2022	11:00	14.3386	27.464	13.5
1/25/2022	12:00	14.0816	27.497	13.5
1/25/2022	13:00	13.7953	27.606	12.9
1/25/2022	14:00	13.3917	27.567	12.3
1/25/2022	15:00	12.9874	27.607	12.1
1/25/2022	16:00	12.7038	27.608	12.5
1/25/2022	17:00	12.5640	27.545	12.6
1/25/2022	18:00	12.6929	27.520	12.6
1/25/2022	19:00	13.1257	27.522	12.6
1/25/2022	20:00	13.6249	27.512	12.6
1/25/2022	21:00	14.0725	27.507	13.5
1/25/2022	22:00	14.2015	27.472	14.0
1/25/2022	23:00	14.0994	27.438	13.3
1/26/2022	0:00	13.8488	27.404	13.3
1/26/2022	1:00	13.6202	27.445	12.8
1/26/2022	2:00	13.3158	27.385	12.7
1/26/2022	3:00	13.0239	27.341	12.8
1/26/2022	4:00	12.8239	27.337	12.9
1/26/2022	5:00	12.7621	27.301	12.8
1/26/2022	6:00	12.7834	27.248	12.9
1/26/2022	7:00	13.0680	27.247	12.8
1/26/2022	8:00	13.4096	27.254	12.7

DATE	TIME	LEVEL	TEMP	COND

DATE	TIME	LEVEL	TEMP	COND

Serial_number:1082634/Project ID:GTE/Location:C1/LEVELUNIT: m/Offset: 2.500000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm
Total Depth at Deployment: 4.3m/Height of Sensor above Bed: 2.0m

DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND
1/26/2022	12:00	16.0372	26.921	14490.6	1/29/2022	13:00	16.4761	27.163	43067.4	2/1/2022	14:00	16.3596	27.072	19882.4
1/26/2022	13:00	15.7833	27.116	9337.4	1/29/2022	14:00	16.5122	27.199	44738.7	2/1/2022	15:00	16.5736	27.201	28618.2
1/26/2022	14:00	15.5464	26.774	10325.6	1/29/2022	15:00	16.3251	27.161	40643.5	2/1/2022	16:00	16.7339	27.155	30279.6
1/26/2022	15:00	15.2877	26.864	7040.1	1/29/2022	16:00	15.9870	27.141	38093.7	2/1/2022	17:00	16.6987	27.148	30115.8
1/26/2022	16:00	14.7666	26.943	4465.9	1/29/2022	17:00	15.8208	27.147	35075.2	2/1/2022	18:00	16.4702	27.191	29973.2
1/26/2022	17:00	14.5169	26.919	3381.6	1/29/2022	18:00	15.4934	27.061	29359.5	2/1/2022	19:00	16.2224	27.173	27820.5
1/26/2022	18:00	14.5336	26.844	3244.4	1/29/2022	19:00	15.0978	27.129	9482.0	2/1/2022	20:00	15.8987	27.268	24669.6
1/26/2022	19:00	14.8597	26.794	3267.7	1/29/2022	20:00	14.4447	27.018	3411.8	2/1/2022	21:00	15.2776	27.430	14769.9
1/26/2022	20:00	15.4580	26.894	4757.5	1/29/2022	21:00	14.2474	26.985	2489.4	2/1/2022	22:00	14.7874	27.589	4829.5
1/26/2022	21:00	15.7923	27.066	17113.0	1/29/2022	22:00	14.5178	26.939	2221.8	2/1/2022	23:00	14.2063	27.527	3205.1
1/26/2022	22:00	15.8942	27.011	17185.0	1/29/2022	23:00	15.0656	26.847	2740.0	2/2/2022	0:00	14.0573	27.413	2979.3
1/26/2022	23:00	15.8649	26.915	10005.8	1/30/2022	0:00	15.7007	27.168	11359.4	2/2/2022	1:00	15.3612	27.434	3386.8
1/27/2022	0:00	15.7636	26.673	7730.9	1/30/2022	1:00	16.0967	27.145	34700.1	2/2/2022	2:00	15.5068	27.530	6405.7
1/27/2022	1:00	15.5787	26.698	8018.1	1/30/2022	2:00	16.1831	27.035	16841.3	2/2/2022	3:00	16.3690	27.154	16508.2
1/27/2022	2:00	15.3907	26.864	10153.5	1/30/2022	3:00	16.1624	26.900	17566.1	2/2/2022	4:00	16.4667	27.106	19866.1
1/27/2022	3:00	15.2011	26.734	7746.1	1/30/2022	4:00	15.9756	26.863	12491.4	2/2/2022	5:00	16.4619	27.233	24422.1
1/27/2022	4:00	15.0490	26.580	3356.4	1/30/2022	5:00	15.6564	26.636	9417.9	2/2/2022	6:00	16.3959	27.218	26951.0
1/27/2022	5:00	14.8674	26.612	4340.0	1/30/2022	6:00	15.5583	26.591	18087.2	2/2/2022	7:00	16.0370	27.111	23678.3
1/27/2022	6:00	14.8729	26.612	4318.3	1/30/2022	7:00	15.3756	26.934	17838.3					
1/27/2022	7:00	15.0537	26.425	2785.6	1/30/2022	8:00	14.9330	26.736	8932.3					
1/27/2022	8:00	15.2719	26.510	4142.3	1/30/2022	9:00	14.5895	26.641	4463.5					
1/27/2022	9:00	15.6803	26.422	5627.4	1/30/2022	10:00	14.7296	26.645	3669.4					
1/27/2022	10:00	15.9700	26.446	6976.1	1/30/2022	11:00	15.2281	26.644	6194.7					
1/27/2022	11:00	16.1578	26.794	12825.1	1/30/2022	12:00	15.8613	26.701	11941.2					
1/27/2022	12:00	16.2183	26.619	7854.2	1/30/2022	13:00	16.2312	26.977	25682.5					
1/27/2022	13:00	16.0687	26.598	6358.2	1/30/2022	14:00	16.6109	27.083	34629.7					
1/27/2022	14:00	15.7600	26.703	6697.2	1/30/2022	15:00	16.6978	27.194	40632.5					
1/27/2022	15:00	15.5561	27.159	6414.1	1/30/2022	16:00	16.4331	27.203	43194.0					
1/27/2022	16:00	15.3830	27.106	9224.5	1/30/2022	17:00	16.0633	27.180	34698.0					
1/27/2022	17:00	15.0316	26.928	5062.1	1/30/2022	18:00	15.8256	27.012	24220.8					
1/27/2022	18:00	14.5678	26.972	3061.3	1/30/2022	19:00	15.5145	27.021	22226.7					
1/27/2022	19:00	14.4428	26.859	2571.6	1/30/2022	20:00	14.9862	27.083	5479.9					
1/27/2022	20:00	14.7241	26.805	2552.4	1/30/2022	21:00	14.4665	27.002	3694.2					
1/27/2022	21:00	15.1388	26.787	3051.7	1/30/2022	22:00	14.1597	26.959	2570.4					
1/27/2022	22:00	15.6238	26.860	4645.0	1/30/2022	23:00	14.4868	26.879	2785.8					
1/27/2022	23:00	15.8302	26.881	5401.0	1/31/2022	0:00	15.2689	26.836	4157.5					
1/28/2022	0:00	15.8920	26.868	5582.6	1/31/2022	1:00	15.8355	26.878	6692.2					
1/28/2022	1:00	15.8628	26.858	5897.8	1/31/2022	2:00	16.2218	26.897	17065.8					
1/28/2022	2:00	15.6916	26.739	5733.0	1/31/2022	3:00	16.3866	26.854	19472.1					
1/28/2022	3:00	15.4470	26.607	5513.9	1/31/2022	4:00	16.3294	26.749	17068.9					
1/28/2022	4:00	15.2675	26.623	6069.8	1/31/2022	5:00	16.0712	26.730	15070.5					
1/28/2022	5:00	15.1412	26.632	6013.6	1/31/2022	6:00	15.7127	26.666	14866.5					
1/28/2022	6:00	14.8504	26.583	3961.0	1/31/2022	7:00	15.7226	26.826	17733.4					
1/28/2022	7:00	14.7498	26.501	3486.3	1/31/2022	8:00	15.2286	26.642	10379.7					
1/28/2022	8:00	14.8706	26.527	3295.6	1/31/2022	9:00	14.8049	26.709	5761.6					
1/28/2022	9:00	15.1625	26.502	3510.4	1/31/2022	10:00	14.4606	26.758	3810.2					
1/28/2022	10:00	15.6187	26.628	5980.8	1/31/2022	11:00	14.6531	26.787	3442.6					
1/28/2022	11:00	15.9702	26.757	9135.4	1/31/2022	12:00	15.4116	26.967	5739.4					
1/28/2022	12:00	16.3100	27.090	35026.1	1/31/2022	13:00	16.2060	26.798	17935.4					
1/28/2022	13:00	16.2930	27.172	26311.6	1/31/2022	14:00	16.3760	26.935	23150.1					
1/28/2022	14:00	16.1335	27.092	24761.8	1/31/2022	15:00	16.8234	27.197	37343.6					
1/28/2022	15:00	15.9332	27.096	26617.3	1/31/2022	16:00	16.7889	27.224	37851.7					
1/28/2022	16:00	15.7569	27.184	31358.4	1/31/2022	17:00	16.5009	27.254	38219.3					
1/28/2022	17:00	15.4330	27.025	22079.3	1/31/2022	18:00	16.0333	27.253	37160.0					
1/28/2022	18:00	15.0316	27.104	5273.7	1/31/2022	19:00	15.9521	27.203	35239.3					
1/28/2022	19:00	14.5268	26.979	2702.4	1/31/2022	20:00	15.4819	27.221	22028.5					
1/28/2022	20:00	14.3462	26.957	1928.5	1/31/2022	21:00	14.8703	27.315	6066.5					
1/28/2022	21:00	14.5765	26.925	1902.0	1/31/2022	22:00	14.3191	27.287	3187.1					
1/28/2022	22:00	14.9950	26.873	2889.5	1/31/2022	23:00	14.0498	27.174	2301.2					
1/28/2022	23:00	15.6917	27.172	18283.3	2/1/2022	0:00	14.5105	27.130	2904.8					
1/29/2022	0:00	15.8450	27.128	31372.8	2/1/2022	1:00	15.4453	27.122	4484.9					
1/29/2022	1:00	15.9441	27.139	22534.9	2/1/2022	2:00	16.0175	27.037	13570.4					
1/29/2022	2:00	15.9666	26.978	9078.1	2/1/2022	3:00	16.5632	26.982	19279.5					
1/29/2022	3:00	15.8201	26.793	9508.9	2/1/2022	4:00	16.5552	27.106	25439.4					
1/29/2022	4:00	15.5926	26.670	5975.6	2/1/2022	5:00	16.4221	27.169	27909.6					
1/29/2022	5:00	15.4865	26.942	8428.7	2/1/2022	6:00	16.0912	27.016	17700.4					
1/29/2022	6:00	15.2056	26.587	6288.8	2/1/2022	7:00	15.9959	27.118	22696.1					
1/29/2022	7:00	14.9922	26.593	6962.6	2/1/2022	8:00	15.6870	26.955	17445.4					
1/29/2022	8:00	14.7344	26.595	4490.9	2/1/2022	9:00	15.1861	26.862	8835.7					
1/29/2022	9:00	14.7781	26.520	3352.4	2/1/2022	10:00	14.6461	27.003	4644.3					
1/29/2022	10:00	15.2064	26.473	4709.5	2/1/2022	11:00	14.3733	27.063	3362.9					
1/29/2022	11:00	15.7260	26.538	4311.2	2/1/2022	12:00	14.7458	27.071	3523.4					
1/29/2022	12:00	16.2049	27.132	35801.2	2/1/2022	13:00	15.3442	27.432	7824.1					

Serial_number:1082935/Project ID:GTE/Location:Demerara River R3/LEVELUNIT: m/Offset: 2.500000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm
Total Depth at Deployment: 7.9m/Height of Sensor above Bed: 2.5m

DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND
1/26/2022	11:00	18.2939	26.486	22.5	1/29/2022	12:00	17.7899	26.531	22.1	2/1/2022	13:00	16.4868	27.029	21.7
1/26/2022	12:00	18.1974	26.545	22.4	1/29/2022	13:00	18.4089	26.836	22.0	2/1/2022	14:00	17.2946	27.288	20.4
1/26/2022	13:00	17.9971	26.575	22.4	1/29/2022	14:00	18.6290	26.966	21.4	2/1/2022	15:00	18.3116	27.473	20.1
1/26/2022	14:00	17.6761	26.614	22.0	1/29/2022	15:00	18.5887	27.103	23.4	2/1/2022	16:00	18.8257	27.694	22.3
1/26/2022	15:00	17.2818	26.588	21.7	1/29/2022	16:00	18.2752	27.148	23.5	2/1/2022	17:00	19.0784	27.772	26.2
1/26/2022	16:00	16.9569	26.630	21.9	1/29/2022	17:00	17.9171	27.161	22.9	2/1/2022	18:00	18.7829	27.772	27.3
1/26/2022	17:00	16.6659	26.494	22.6	1/29/2022	18:00	17.4692	27.030	21.8	2/1/2022	19:00	18.3596	27.718	27.6
1/26/2022	18:00	16.3740	26.412	23.2	1/29/2022	19:00	17.0410	26.975	21.6	2/1/2022	20:00	17.9038	27.522	25.2
1/26/2022	19:00	16.3062	26.342	22.7	1/29/2022	20:00	16.7035	26.713	21.7	2/1/2022	21:00	17.5539	27.560	23.5
1/26/2022	20:00	16.6948	26.331	22.6	1/29/2022	21:00	16.3690	26.601	21.1	2/1/2022	22:00	17.1541	27.411	20.0
1/26/2022	21:00	17.2462	26.328	22.3	1/29/2022	22:00	16.1205	26.566	20.9	2/1/2022	23:00	16.6651	27.301	20.1
1/26/2022	22:00	17.8071	26.341	22.6	1/29/2022	23:00	16.2908	26.533	21.2	2/2/2022	0:00	16.3576	27.092	21.0
1/26/2022	23:00	17.9303	26.411	21.7	1/30/2022	0:00	16.9146	26.532	20.9	2/2/2022	1:00	16.0194	26.975	21.8
1/27/2022	0:00	17.8753	26.440	22.0	1/30/2022	1:00	17.6364	26.521	20.2	2/2/2022	2:00	16.3923	26.919	22.0
1/27/2022	1:00	17.6938	26.417	22.5	1/30/2022	2:00	18.1870	26.556	20.5	2/2/2022	3:00	17.4161	26.964	18.7
1/27/2022	2:00	17.4413	26.382	21.9	1/30/2022	3:00	18.3735	26.707	21.4	2/2/2022	4:00	18.4667	27.076	18.5
1/27/2022	3:00	17.1986	26.318	21.1	1/30/2022	4:00	18.1967	26.744	22.4	2/2/2022	5:00	18.9446	27.240	21.2
1/27/2022	4:00	16.8986	26.233	22.1	1/30/2022	5:00	17.9122	26.736	22.8	2/2/2022	6:00	18.6335	27.306	25.0
1/27/2022	5:00	16.6987	26.171	21.8	1/30/2022	6:00	17.5835	26.679	21.4	2/2/2022	7:00	18.3730	27.269	27.5
1/27/2022	6:00	16.5922	26.119	22.0	1/30/2022	7:00	17.2112	26.496	20.6	2/2/2022	8:00	17.9762	27.253	25.0
1/27/2022	7:00	16.6560	26.048	22.5	1/30/2022	8:00	16.9223	26.405	20.2	2/2/2022	9:00	17.6019	27.301	22.4
1/27/2022	8:00	16.8890	26.077	22.4	1/30/2022	9:00	16.6422	26.451	20.0	2/2/2022	10:00	17.1587	27.219	20.6
1/27/2022	9:00	17.1787	26.117	21.9	1/30/2022	10:00	16.3659	26.476	20.4	2/2/2022	11:00	16.8626	27.104	19.9
1/27/2022	10:00	17.7085	26.343	21.7	1/30/2022	11:00	16.4899	26.488	21.0	2/2/2022	12:00	12.8140	28.553	0.0
1/27/2022	11:00	18.0773	26.379	21.7	1/30/2022	12:00	17.0446	26.727	20.6					
1/27/2022	12:00	18.2895	26.479	22.0	1/30/2022	13:00	17.8816	26.811	19.5					
1/27/2022	13:00	18.2341	26.651	22.5	1/30/2022	14:00	18.6717	26.929	19.8					
1/27/2022	14:00	18.0325	26.666	22.8	1/30/2022	15:00	18.7685	27.127	22.0					
1/27/2022	15:00	17.6832	26.636	21.6	1/30/2022	16:00	18.6930	27.221	23.6					
1/27/2022	16:00	17.3326	26.638	21.6	1/30/2022	17:00	18.3632	27.227	24.1					
1/27/2022	17:00	16.9603	26.606	21.4	1/30/2022	18:00	17.9831	27.191	23.4					
1/27/2022	18:00	16.6840	26.487	21.7	1/30/2022	19:00	17.4658	27.048	21.1					
1/27/2022	19:00	16.4345	26.424	22.4	1/30/2022	20:00	17.0743	26.923	19.7					
1/27/2022	20:00	16.2612	26.368	23.0	1/30/2022	21:00	16.7768	26.791	19.8					
1/27/2022	21:00	16.5378	26.349	23.2	1/30/2022	22:00	16.3426	26.729	20.4					
1/27/2022	22:00	17.0018	26.340	22.7	1/30/2022	23:00	16.1873	26.700	20.7					
1/27/2022	23:00	17.5448	26.330	22.1	1/31/2022	0:00	16.2279	26.670	20.9					
1/28/2022	0:00	17.9137	26.338	21.2	1/31/2022	1:00	16.9387	26.661	20.7					
1/28/2022	1:00	17.9367	26.361	21.5	1/31/2022	2:00	17.8577	26.654	19.9					
1/28/2022	2:00	17.8112	26.351	21.5	1/31/2022	3:00	18.3914	26.685	18.8					
1/28/2022	3:00	17.6025	26.331	21.5	1/31/2022	4:00	18.4524	26.794	20.1					
1/28/2022	4:00	17.3551	26.323	21.0	1/31/2022	5:00	18.2936	26.841	22.6					
1/28/2022	5:00	17.0848	26.243	21.4	1/31/2022	6:00	17.9920	26.866	23.6					
1/28/2022	6:00	16.8535	26.191	21.9	1/31/2022	7:00	17.6651	26.791	21.5					
1/28/2022	7:00	16.6417	26.155	22.7	1/31/2022	8:00	17.2508	26.651	19.8					
1/28/2022	8:00	16.5187	26.162	22.9	1/31/2022	9:00	16.8918	26.617	20.2					
1/28/2022	9:00	16.6483	26.154	23.4	1/31/2022	10:00	16.6290	26.692	20.4					
1/28/2022	10:00	17.0225	26.232	23.0	1/31/2022	11:00	16.3007	26.737	20.5					
1/28/2022	11:00	17.6079	26.493	22.5	1/31/2022	12:00	16.3509	26.809	20.7					
1/28/2022	12:00	18.1615	26.596	21.4	1/31/2022	13:00	17.0897	27.058	20.4					
1/28/2022	13:00	18.4772	26.675	21.3	1/31/2022	14:00	18.1331	27.129	19.9					
1/28/2022	14:00	18.3411	26.767	22.1	1/31/2022	15:00	18.8883	27.265	19.8					
1/28/2022	15:00	18.1031	26.841	22.3	1/31/2022	16:00	19.0191	27.456	23.8					
1/28/2022	16:00	17.7545	26.919	21.5	1/31/2022	17:00	18.8251	27.534	25.4					
1/28/2022	17:00	17.3495	26.779	21.5	1/31/2022	18:00	18.4165	27.504	25.3					
1/28/2022	18:00	17.0592	26.829	22.1	1/31/2022	19:00	17.9255	27.395	22.9					
1/28/2022	19:00	16.7412	26.630	23.3	1/31/2022	20:00	17.5080	27.315	21.6					
1/28/2022	20:00	16.4473	26.571	23.5	1/31/2022	21:00	16.9974	27.171	19.1					
1/28/2022	21:00	16.1764	26.445	23.4	1/31/2022	22:00	16.7460	27.051	19.9					
1/28/2022	22:00	16.3675	26.377	23.3	1/31/2022	23:00	16.3108	26.989	19.8					
1/28/2022	23:00	16.8773	26.382	23.2	2/1/2022	0:00	16.0771	26.925	18.9					
1/29/2022	0:00	17.5769	26.443	23.0	2/1/2022	1:00	16.1873	26.850	19.0					
1/29/2022	1:00	18.1051	26.489	22.3	2/1/2022	2:00	17.0552	26.886	18.6					
1/29/2022	2:00	18.0816	26.523	21.9	2/1/2022	3:00	18.1070	26.894	19.0					
1/29/2022	3:00	17.9925	26.534	21.4	2/1/2022	4:00	18.7867	26.962	20.2					
1/29/2022	4:00	17.7378	26.518	21.8	2/1/2022	5:00	18.7875	27.058	22.6					
1/29/2022	5:00	17.4831	26.474	21.8	2/1/2022	6:00	18.3904	27.086	24.6					
1/29/2022	6:00	17.1721	26.344	22.4	2/1/2022	7:00	17.9963	27.047	24.1					
1/29/2022	7:00	16.9465	26.309	22.4	2/1/2022	8:00	17.6595	26.991	22.2					
1/29/2022	8:00	16.6384	26.215	22.3	2/1/2022	9:00	17.2119	26.962	21.0					
1/29/2022	9:00	16.4347	26.224	21.9	2/1/2022	10:00	16.8633	26.938	20.3					
1/29/2022	10:00	16.5175	26.277	21.7	2/1/2022	11:00	16.4151	27.015	20.2					
1/29/2022	11:00	17.0136	26.286	21.7	2/1/2022	12:00	16.2199	27.000	20.3					

Serial_number:1082650/Project ID:GTE/Location:R4/LEVELUNIT: m/Offset: 2.000000 m/TEMPERATUREUNIT: °C/CONDUCTIVITYUNIT: µS/cm
Total Depth at Deployment: 6.5m/Height of Sensor above Bed: 2.0m

DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND	DATE	TIME	LEVEL	TEMP	COND
1/26/2022	10:00	18.2530	27.292	12.4	1/29/2022	11:00	17.3218	27.368	11.8	2/1/2022	12:00	16.3161	27.880	11.9
1/26/2022	11:00	18.3800	27.289	12.5	1/29/2022	12:00	17.8568	27.594	12.3	2/1/2022	13:00	16.8006	27.886	12.0
1/26/2022	12:00	18.3520	27.340	12.8	1/29/2022	13:00	18.3851	27.589	12.7	2/1/2022	14:00	17.4673	27.911	11.8
1/26/2022	13:00	18.1215	27.354	12.8	1/29/2022	14:00	18.6736	27.675	13.4	2/1/2022	15:00	18.1073	27.993	12.5
1/26/2022	14:00	17.7789	27.428	12.5	1/29/2022	15:00	18.6587	27.738	14.1	2/1/2022	16:00	18.7672	27.917	13.5
1/26/2022	15:00	17.3508	27.517	12.4	1/29/2022	16:00	18.3925	27.766	14.3	2/1/2022	17:00	19.0500	27.913	13.6
1/26/2022	16:00	17.0044	27.544	12.5	1/29/2022	17:00	17.9970	27.747	13.7	2/1/2022	18:00	18.8601	27.929	15.4
1/26/2022	17:00	16.6959	27.542	12.3	1/29/2022	18:00	17.5212	27.690	13.0	2/1/2022	19:00	18.4465	27.877	15.6
1/26/2022	18:00	16.5040	27.570	12.4	1/29/2022	19:00	17.0685	27.664	12.7	2/1/2022	20:00	17.9047	27.878	13.7
1/26/2022	19:00	16.5625	27.580	12.4	1/29/2022	20:00	16.7252	27.602	13.4	2/1/2022	21:00	17.3734	27.859	13.7
1/26/2022	20:00	17.0085	27.559	12.5	1/29/2022	21:00	16.4630	27.528	12.9	2/1/2022	22:00	16.9301	27.899	12.2
1/26/2022	21:00	17.4605	27.603	12.4	1/29/2022	22:00	16.3174	27.533	12.8	2/1/2022	23:00	16.6110	27.902	12.2
1/26/2022	22:00	17.8310	27.406	12.6	1/29/2022	23:00	16.6113	27.496	11.6	2/2/2022	0:00	16.3602	27.818	12.1
1/26/2022	23:00	18.0902	27.393	12.8	1/30/2022	0:00	17.1121	27.504	11.5	2/2/2022	1:00	16.1735	27.769	11.9
1/27/2022	0:00	18.0598	27.376	12.9	1/30/2022	1:00	17.6750	27.477	12.0	2/2/2022	2:00	16.6977	27.747	11.9
1/27/2022	1:00	17.8770	27.336	12.9	1/30/2022	2:00	18.1946	27.451	12.5	2/2/2022	3:00	17.3616	27.728	12.0
1/27/2022	2:00	17.6606	27.350	12.6	1/30/2022	3:00	18.4353	27.460	13.4	2/2/2022	4:00	18.1293	27.705	12.3
1/27/2022	3:00	17.3606	27.400	13.1	1/30/2022	4:00	18.3454	27.428	13.2	2/2/2022	5:00	18.6349	27.634	13.7
1/27/2022	4:00	17.0740	27.303	13.1	1/30/2022	5:00	18.0670	27.398	13.2	2/2/2022	6:00	18.7235	27.612	13.6
1/27/2022	5:00	16.8772	27.406	13.0	1/30/2022	6:00	17.7214	27.393	13.0	2/2/2022	7:00	18.4707	27.560	14.7
1/27/2022	6:00	16.8117	27.381	12.9	1/30/2022	7:00	17.3173	27.349	12.5	2/2/2022	8:00	18.0162	27.571	14.1
1/27/2022	7:00	16.9335	27.448	12.4	1/30/2022	8:00	16.9822	27.344	11.8					
1/27/2022	8:00	17.1509	27.371	12.5	1/30/2022	9:00	16.6753	27.384	11.8					
1/27/2022	9:00	17.4631	27.432	12.3	1/30/2022	10:00	16.5583	27.420	11.6					
1/27/2022	10:00	17.8705	27.425	12.6	1/30/2022	11:00	16.7851	27.498	11.5					
1/27/2022	11:00	18.2754	27.441	12.8	1/30/2022	12:00	17.3679	27.525	11.6					
1/27/2022	12:00	18.4176	27.458	13.0	1/30/2022	13:00	17.9022	27.695	12.0					
1/27/2022	13:00	18.3933	27.464	13.2	1/30/2022	14:00	18.4325	27.643	12.9					
1/27/2022	14:00	18.1524	27.497	13.3	1/30/2022	15:00	18.8323	27.694	13.5					
1/27/2022	15:00	17.8050	27.602	13.1	1/30/2022	16:00	18.7975	27.701	14.1					
1/27/2022	16:00	17.4276	27.618	13.1	1/30/2022	17:00	18.4505	27.692	14.3					
1/27/2022	17:00	17.0736	27.685	13.4	1/30/2022	18:00	18.0173	27.637	13.3					
1/27/2022	18:00	16.7434	27.708	13.2	1/30/2022	19:00	17.4909	27.640	12.9					
1/27/2022	19:00	16.5110	27.619	13.0	1/30/2022	20:00	17.0925	27.716	12.4					
1/27/2022	20:00	16.5192	27.553	12.8	1/30/2022	21:00	16.7405	27.663	12.0					
1/27/2022	21:00	16.8115	27.540	12.4	1/30/2022	22:00	16.4713	27.595	11.8					
1/27/2022	22:00	17.2837	27.546	12.3	1/30/2022	23:00	16.2514	27.605	11.7					
1/27/2022	23:00	17.6720	27.569	12.6	1/31/2022	0:00	16.4976	27.618	11.5					
1/28/2022	0:00	18.0376	27.475	12.9	1/31/2022	1:00	17.0765	27.615	11.4					
1/28/2022	1:00	18.1423	27.423	13.3	1/31/2022	2:00	17.6889	27.496	11.8					
1/28/2022	2:00	18.0289	27.400	13.4	1/31/2022	3:00	18.2380	27.489	12.3					
1/28/2022	3:00	17.8014	27.367	13.4	1/31/2022	4:00	18.5362	27.454	13.3					
1/28/2022	4:00	17.5328	27.438	12.8	1/31/2022	5:00	18.4745	27.431	13.0					
1/28/2022	5:00	17.2383	27.402	12.8	1/31/2022	6:00	18.1308	27.391	13.3					
1/28/2022	6:00	16.9848	27.317	12.6	1/31/2022	7:00	17.7526	27.446	13.1					
1/28/2022	7:00	16.7870	27.282	12.3	1/31/2022	8:00	17.3091	27.450	13.0					
1/28/2022	8:00	16.7490	27.229	12.0	1/31/2022	9:00	16.9530	27.459	12.2					
1/28/2022	9:00	16.9344	27.247	12.0	1/31/2022	10:00	16.6180	27.553	12.1					
1/28/2022	10:00	17.2839	27.330	12.2	1/31/2022	11:00	16.4218	27.698	12.1					
1/28/2022	11:00	17.7445	27.516	12.6	1/31/2022	12:00	16.6706	27.761	11.7					
1/28/2022	12:00	18.1605	27.533	12.9	1/31/2022	13:00	17.3570	27.748	11.6					
1/28/2022	13:00	18.4764	27.538	13.2	1/31/2022	14:00	18.0172	27.747	12.0					
1/28/2022	14:00	18.4854	27.557	13.7	1/31/2022	15:00	18.6711	27.828	13.1					
1/28/2022	15:00	18.2238	27.614	13.9	1/31/2022	16:00	19.0305	27.794	13.5					
1/28/2022	16:00	17.8505	27.678	13.3	1/31/2022	17:00	18.9172	27.783	15.2					
1/28/2022	17:00	17.4494	27.719	13.1	1/31/2022	18:00	18.5293	27.765	15.2					
1/28/2022	18:00	17.0534	27.689	13.0	1/31/2022	19:00	18.0156	27.765	14.2					
1/28/2022	19:00	16.7333	27.615	12.6	1/31/2022	20:00	17.5069	27.774	13.5					
1/28/2022	20:00	16.4648	27.473	12.2	1/31/2022	21:00	17.0617	27.764	12.2					
1/28/2022	21:00	16.3701	27.463	12.1	1/31/2022	22:00	16.7250	27.758	11.9					
1/28/2022	22:00	16.6613	27.443	11.7	1/31/2022	23:00	16.4428	27.745	11.7					
1/28/2022	23:00	17.1242	27.442	11.8	2/1/2022	0:00	16.2053	27.714	12.1					
1/29/2022	0:00	17.6076	27.416	12.2	2/1/2022	1:00	16.5160	27.746	11.7					
1/29/2022	1:00	18.0559	27.477	12.7	2/1/2022	2:00	17.2203	27.724	11.6					
1/29/2022	2:00	18.2141	27.473	13.3	2/1/2022	3:00	17.8312	27.629	12.0					
1/29/2022	3:00	18.1374	27.446	13.6	2/1/2022	4:00	18.5036	27.552	12.6					
1/29/2022	4:00	17.9190	27.417	13.6	2/1/2022	5:00	18.7420	27.506	13.0					
1/29/2022	5:00	17.6514	27.406	13.1	2/1/2022	6:00	18.5375	27.494	13.6					
1/29/2022	6:00	17.3163	27.295	12.5	2/1/2022	7:00	18.1122	27.464	13.5					
1/29/2022	7:00	16.9970	27.221	12.3	2/1/2022	8:00	17.6582	27.490	12.7					
1/29/2022	8:00	16.7384	27.251	12.0	2/1/2022	9:00	17.1896	27.532	13.0					
1/29/2022	9:00	16.6075	27.288	11.8	2/1/2022	10:00	16.8440	27.621	12.1					
1/29/2022	10:00	16.8253	27.362	11.7	2/1/2022	11:00	16.5493	27.733	12.1					

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4. LABORATORY ANALYTICAL REPORTS

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
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December 14, 2021

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS21110712**

Laboratory Results for: **R1, R2, R3, S13, S14**

Dear Selina Pradhan,

ALS Environmental received 5 sample(s) on Nov 10, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Work Order: HS21110712

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21110712-01	R1	Water		28-Oct-2021 08:10	10-Nov-2021 12:00	☐
HS21110712-02	R2	Water		28-Oct-2021 09:05	10-Nov-2021 12:00	☐
HS21110712-03	R3	Water		28-Oct-2021 13:25	10-Nov-2021 12:00	☐
HS21110712-04	S13	Water		28-Oct-2021 09:22	10-Nov-2021 12:00	☐
HS21110712-05	S14	Water		28-Oct-2021 14:00	10-Nov-2021 12:00	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R1, R2, R3, S13, S14
Work Order: HS21110712

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

GCMS Semivolatiles by Method SW8270

Batch ID: 172493

Sample ID: MBLK-172493

• Samples in this batch received outside method holding time, prep out of hold .

Sample ID: R3 (HS21110712-03)

• Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: S14 (HS21110712-05)

• Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: LCSD-172493

• The RPD between the LCS and LCSD was outside of the control limit, the individual recoveries met acceptance criteria.

Batch ID: 172448

Sample ID: R1 (HS21110712-01)

• Sample extracted or prepared outside of hold time.

Sample ID: R2 (HS21110712-02)

• Sample extracted or prepared outside of hold time.

Sample ID: S13 (HS21110712-04)

• Sample extracted or prepared outside of hold time.

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW6020A

Batch ID: 172862

Sample ID: HS21110622-12MS, HS21110622-01MS

• MS and MSD are for an unrelated sample.

Metals by Method SW7470A

Batch ID: 172794

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R1, R2, R3, S13, S14
Work Order: HS21110712

WetChemistry by Method E1664A

Batch ID: R396326

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM4500 NH3-B-F

Batch ID: 172883

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R395579

- Samples received outside method holding time forDissolved Oxygen which is a field parameter. Sample results are flagged with an "H" qualifier.

WetChemistry by Method SM2520

Batch ID: R396506

Sample ID: R1 (HS21110712-01)

- Sample was analyzed outside of the holding time, results should be considered estimated.

- **Sample ID: R2 (HS21110712-02)**

- Sample was analyzed outside of the holding time, results should be considered estimated.

- **Sample ID: R3 (HS21110712-03)**

- Sample was analyzed outside of the holding time, results should be considered estimated.

- **Sample ID: S13 (HS21110712-04)**

- Sample was analyzed outside of the holding time, results should be considered estimated.

- **Sample ID: S14 (HS21110712-05)**

- Sample was analyzed outside of the holding time, results should be considered estimated.

WetChemistry by Method E365.3

Batch ID: 172880

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R1, R2, R3, S13, S14
Work Order: HS21110712

WetChemistry by Method M2540D

Batch ID: R395800

Sample ID: R1 (HS21110712-01)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: R2 (HS21110712-02)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: R3 (HS21110712-03)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: S13 (HS21110712-04)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: S14 (HS21110712-05)

- Sample was analyzed outside of the holding time, results should be considered estimated.

WetChemistry by Method M2540C

Batch ID: R395655

Sample ID: R1 (HS21110712-01)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: R2 (HS21110712-02)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: R3 (HS21110712-03)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: S13 (HS21110712-04)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: S14 (HS21110712-05)

- Sample was analyzed outside of the holding time, results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Work Order: HS21110712

CASE NARRATIVE

WetChemistry by Method M2540B

Batch ID: R395570

Sample ID: R1 (HS21110712-01)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: R2 (HS21110712-02)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: R3 (HS21110712-03)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: S14 (HS21110712-05)

- Sample was analyzed outside of the holding time, results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: R1
Collection Date: 28-Oct-2021 08:10

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-01
Matrix:Water

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**					Prep:SW3510 / 12-Nov-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	23-Nov-2021 21:32
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	23-Nov-2021 21:32
Acenaphthene	U	H		0.027	0.10	ug/L	1	23-Nov-2021 21:32
Acenaphthylene	U	H		0.015	0.10	ug/L	1	23-Nov-2021 21:32
Anthracene	U	H		0.014	0.10	ug/L	1	23-Nov-2021 21:32
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	23-Nov-2021 21:32
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	23-Nov-2021 21:32
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	23-Nov-2021 21:32
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	23-Nov-2021 21:32
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	23-Nov-2021 21:32
Chrysene	U	H		0.021	0.10	ug/L	1	23-Nov-2021 21:32
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	23-Nov-2021 21:32
Fluoranthene	U	H		0.010	0.10	ug/L	1	23-Nov-2021 21:32
Fluorene	U	H		0.030	0.10	ug/L	1	23-Nov-2021 21:32
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	23-Nov-2021 21:32
Isophorone	U	H		0.025	0.20	ug/L	1	23-Nov-2021 21:32
Naphthalene	U	H		0.020	0.10	ug/L	1	23-Nov-2021 21:32
Phenanthrene	U	H		0.021	0.10	ug/L	1	23-Nov-2021 21:32
Pyrene	U	H		0.019	0.10	ug/L	1	23-Nov-2021 21:32
Surr: 2,4,6-Tribromophenol	*108*				*34-129*	*%REC*	*1*	*23-Nov-2021 21:32*
Surr: 2-Fluorobiphenyl	*97.0*				*40-125*	*%REC*	*1*	*23-Nov-2021 21:32*
Surr: 2-Fluorophenol	*91.5*				*20-120*	*%REC*	*1*	*23-Nov-2021 21:32*
Surr: 4-Terphenyl-d14	*112*				*40-135*	*%REC*	*1*	*23-Nov-2021 21:32*
Surr: Nitrobenzene-d5	*84.8*				*41-120*	*%REC*	*1*	*23-Nov-2021 21:32*
Surr: Phenol-d6	*69.8*				*20-120*	*%REC*	*1*	*23-Nov-2021 21:32*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: R1
Collection Date: 28-Oct-2021 08:10

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 23-Nov-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	23-Nov-2021 23:37
Arsenic	**0.00138**	J	**0.000400**	**0.00200**	**mg/L**	1	23-Nov-2021 23:37
Beryllium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:37
Cadmium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:37
Chromium	**0.00169**	J	**0.000400**	**0.00400**	**mg/L**	1	23-Nov-2021 23:37
Copper	U		0.00100	0.00200	mg/L	1	23-Nov-2021 23:37
Iron	**1.13**		**0.0120**	**0.200**	**mg/L**	1	23-Nov-2021 23:37
Lead	U		0.000600	0.00200	mg/L	1	23-Nov-2021 23:37
Manganese	**0.0838**		**0.000700**	**0.00500**	**mg/L**	1	23-Nov-2021 23:37
Nickel	**0.00128**	J	**0.000600**	**0.00200**	**mg/L**	1	23-Nov-2021 23:37
Potassium	**48.5**		**0.0180**	**0.200**	**mg/L**	1	23-Nov-2021 23:37
Selenium	U		0.00110	0.00200	mg/L	1	23-Nov-2021 23:37
Silver	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:37
Thallium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:37
Zinc	**0.00429**		**0.00200**	**0.00400**	**mg/L**	1	23-Nov-2021 23:37
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 22-Nov-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	22-Nov-2021 16:45
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**0.89**	H	**0.10**	**0.50**	**mg/L**	1	14-Dec-2021 14:51
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	23-Nov-2021 14:15
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.444**	JH	**0.150**	**1.00**	**mg/L**	5	10-Dec-2021 05:09
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 23-Nov-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	23-Nov-2021 16:04
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**1,030**	H	**5.00**	**10.0**	**mg/L**	1	11-Nov-2021 14:30
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**4,910**	H	**5.00**	**10.0**	**mg/L**	1	12-Nov-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**21.4**	H	**2.50**	**2.50**	**mg/L**	1	16-Nov-2021 09:30
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.45**	JH	**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**7.37**	H	**1.00**	**1.00**	**mg/L**	1	12-Nov-2021 17:54

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: R1
Collection Date: 28-Oct-2021 08:10

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SALINITY	**Method:SM2520**						Analyst: MZD
Salinity	**5.00**	H	**2.00**	**2.00**	**ppt**	1	29-Nov-2021 10:42
PH BY SW9040C	**Method:SW9040C**						Analyst: CWG
pH	**6.53**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**23.7**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: R2
Collection Date: 28-Oct-2021 09:05

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**				Prep:SW3510 / 12-Nov-2021		Analyst: GEY
1-Methylnaphthalene	U	H	0.010	0.10	ug/L	1	23-Nov-2021 21:51
2-Methylnaphthalene	**0.026**	JH	**0.019**	**0.10**	**ug/L**	1	23-Nov-2021 21:51
Acenaphthene	U	H	0.027	0.10	ug/L	1	23-Nov-2021 21:51
Acenaphthylene	U	H	0.015	0.10	ug/L	1	23-Nov-2021 21:51
Anthracene	U	H	0.014	0.10	ug/L	1	23-Nov-2021 21:51
Benz(a)anthracene	U	H	0.050	0.10	ug/L	1	23-Nov-2021 21:51
Benzo(a)pyrene	U	H	0.020	0.10	ug/L	1	23-Nov-2021 21:51
Benzo(b)fluoranthene	U	H	0.023	0.10	ug/L	1	23-Nov-2021 21:51
Benzo(g,h,i)perylene	U	H	0.014	0.10	ug/L	1	23-Nov-2021 21:51
Benzo(k)fluoranthene	U	H	0.019	0.10	ug/L	1	23-Nov-2021 21:51
Chrysene	U	H	0.021	0.10	ug/L	1	23-Nov-2021 21:51
Dibenz(a,h)anthracene	U	H	0.024	0.10	ug/L	1	23-Nov-2021 21:51
Fluoranthene	U	H	0.010	0.10	ug/L	1	23-Nov-2021 21:51
Fluorene	U	H	0.030	0.10	ug/L	1	23-Nov-2021 21:51
Indeno(1,2,3-cd)pyrene	U	H	0.022	0.10	ug/L	1	23-Nov-2021 21:51
Isophorone	U	H	0.025	0.20	ug/L	1	23-Nov-2021 21:51
Naphthalene	**0.057**	JH	**0.020**	**0.10**	**ug/L**	1	23-Nov-2021 21:51
Phenanthrene	U	H	0.021	0.10	ug/L	1	23-Nov-2021 21:51
Pyrene	U	H	0.019	0.10	ug/L	1	23-Nov-2021 21:51
Surr: 2,4,6-Tribromophenol	*102*			*34-129*	*%REC*	*1*	*23-Nov-2021 21:51*
Surr: 2-Fluorobiphenyl	*106*			*40-125*	*%REC*	*1*	*23-Nov-2021 21:51*
Surr: 2-Fluorophenol	*96.3*			*20-120*	*%REC*	*1*	*23-Nov-2021 21:51*
Surr: 4-Terphenyl-d14	*129*			*40-135*	*%REC*	*1*	*23-Nov-2021 21:51*
Surr: Nitrobenzene-d5	*75.8*			*41-120*	*%REC*	*1*	*23-Nov-2021 21:51*
Surr: Phenol-d6	*74.1*			*20-120*	*%REC*	*1*	*23-Nov-2021 21:51*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: R2
Collection Date: 28-Oct-2021 09:05

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 23-Nov-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	23-Nov-2021 23:39
Arsenic	**0.00105**	J	**0.000400**	**0.00200**	**mg/L**	1	23-Nov-2021 23:39
Beryllium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:39
Cadmium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:39
Chromium	**0.00175**	J	**0.000400**	**0.00400**	**mg/L**	1	23-Nov-2021 23:39
Copper	**0.00124**	J	**0.00100**	**0.00200**	**mg/L**	1	23-Nov-2021 23:39
Iron	**1.33**		**0.0120**	**0.200**	**mg/L**	1	23-Nov-2021 23:39
Lead	**0.000726**	J	**0.000600**	**0.00200**	**mg/L**	1	23-Nov-2021 23:39
Manganese	**0.0603**		**0.000700**	**0.00500**	**mg/L**	1	23-Nov-2021 23:39
Nickel	**0.00115**	J	**0.000600**	**0.00200**	**mg/L**	1	23-Nov-2021 23:39
Potassium	**11.5**		**0.0180**	**0.200**	**mg/L**	1	23-Nov-2021 23:39
Selenium	U		0.00110	0.00200	mg/L	1	23-Nov-2021 23:39
Silver	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:39
Thallium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:39
Zinc	**0.00452**		**0.00200**	**0.00400**	**mg/L**	1	23-Nov-2021 23:39
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 22-Nov-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	22-Nov-2021 16:46
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**1.1**	H	**0.10**	**0.50**	**mg/L**	1	14-Dec-2021 14:51
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.22**	J	**0.610**	**2.00**	**mg/L**	1	23-Nov-2021 14:15
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.465**	JH	**0.150**	**1.00**	**mg/L**	5	10-Dec-2021 05:32
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 23-Nov-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	23-Nov-2021 16:04
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**1,150**	H	**5.00**	**10.0**	**mg/L**	1	11-Nov-2021 14:30
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**1,040**	H	**5.00**	**10.0**	**mg/L**	1	12-Nov-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**14.8**	H	**2.50**	**2.50**	**mg/L**	1	16-Nov-2021 09:30
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.68**	H	**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**6.85**	H	**1.00**	**1.00**	**mg/L**	1	12-Nov-2021 17:54

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: R2
Collection Date: 28-Oct-2021 09:05

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**	H	**2.00**	**2.00**	**ppt**	1	29-Nov-2021 10:42
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**5.63**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**24.0**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: R3
Collection Date: 28-Oct-2021 13:25

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL PAHS - 8270D	**Method:SW8270**				Prep:SW3511 / 13-Nov-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
2-Methylnaphthalene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Acenaphthene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Acenaphthylene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Anthracene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Benz(a)anthracene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Benzo(a)pyrene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Benzo(b)fluoranthene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Benzo(g,h,i)perylene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Benzo(k)fluoranthene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Chrysene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Dibenz(a,h)anthracene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Dibenzofuran	U	H	0.0322	0.107	ug/L	1	01-Dec-2021 17:50
Fluoranthene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Fluorene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Indeno(1,2,3-cd)pyrene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Naphthalene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Phenanthrene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Pyrene	U	H	0.0215	0.107	ug/L	1	01-Dec-2021 17:50
Surr: 2-Fluorobiphenyl	*58.3*			*32-130*	*%REC*	*1*	*01-Dec-2021 17:50*
Surr: 4-Terphenyl-d14	*46.2*			*40-135*	*%REC*	*1*	*01-Dec-2021 17:50*
Surr: Nitrobenzene-d5	*74.2*			*45-142*	*%REC*	*1*	*01-Dec-2021 17:50*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 23-Nov-2021		Analyst: JHD
Antimony	**0.000489**	J	**0.000400**	**0.00200**	**mg/L**	1	23-Nov-2021 23:41
Arsenic	**0.000955**	J	**0.000400**	**0.00200**	**mg/L**	1	23-Nov-2021 23:41
Beryllium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:41
Cadmium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:41
Chromium	**0.00121**	J	**0.000400**	**0.00400**	**mg/L**	1	23-Nov-2021 23:41
Copper	**0.00117**	J	**0.00100**	**0.00200**	**mg/L**	1	23-Nov-2021 23:41
Iron	**1.18**		**0.0120**	**0.200**	**mg/L**	1	23-Nov-2021 23:41
Lead	**0.000715**	J	**0.000600**	**0.00200**	**mg/L**	1	23-Nov-2021 23:41
Manganese	**0.0458**		**0.000700**	**0.00500**	**mg/L**	1	23-Nov-2021 23:41
Nickel	**0.00116**	J	**0.000600**	**0.00200**	**mg/L**	1	23-Nov-2021 23:41
Potassium	**3.52**		**0.0180**	**0.200**	**mg/L**	1	23-Nov-2021 23:41
Selenium	U		0.00110	0.00200	mg/L	1	23-Nov-2021 23:41
Silver	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:41
Thallium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:41
Zinc	**0.00869**		**0.00200**	**0.00400**	**mg/L**	1	23-Nov-2021 23:41

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: R3
Collection Date: 28-Oct-2021 13:25

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 22-Nov-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	22-Nov-2021 16:48
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**1.3**	H	**0.10**	**0.50**	**mg/L**	1	14-Dec-2021 14:51
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.61**	J	**0.610**	**2.00**	**mg/L**	1	23-Nov-2021 14:15
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.610**	JH	**0.150**	**1.00**	**mg/L**	5	10-Dec-2021 05:40
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 23-Nov-2021		Analyst: MZD
Phosphorus, Total (As P)	**0.0210**	J	**0.0200**	**0.0500**	**mg/L**	1	23-Nov-2021 16:04
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**366**	H	**5.00**	**10.0**	**mg/L**	1	11-Nov-2021 14:30
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**354**	H	**5.00**	**10.0**	**mg/L**	1	12-Nov-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**16.8**	H	**2.50**	**2.50**	**mg/L**	1	16-Nov-2021 09:30
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.66**	H	**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**5.62**	H	**1.00**	**1.00**	**mg/L**	1	12-Nov-2021 17:54
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**	H	**2.00**	**2.00**	**ppt**	1	29-Nov-2021 10:42
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**5.15**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**24.1**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: S13
Collection Date: 28-Oct-2021 09:22

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-04
Matrix:Water

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**					Prep:SW3510 / 12-Nov-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	23-Nov-2021 22:11
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	23-Nov-2021 22:11
Acenaphthene	U	H		0.027	0.10	ug/L	1	23-Nov-2021 22:11
Acenaphthylene	U	H		0.015	0.10	ug/L	1	23-Nov-2021 22:11
Anthracene	U	H		0.014	0.10	ug/L	1	23-Nov-2021 22:11
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	23-Nov-2021 22:11
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	23-Nov-2021 22:11
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	23-Nov-2021 22:11
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	23-Nov-2021 22:11
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	23-Nov-2021 22:11
Chrysene	U	H		0.021	0.10	ug/L	1	23-Nov-2021 22:11
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	23-Nov-2021 22:11
Fluoranthene	U	H		0.010	0.10	ug/L	1	23-Nov-2021 22:11
Fluorene	U	H		0.030	0.10	ug/L	1	23-Nov-2021 22:11
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	23-Nov-2021 22:11
Isophorone	U	H		0.025	0.20	ug/L	1	23-Nov-2021 22:11
Naphthalene	U	H		0.020	0.10	ug/L	1	23-Nov-2021 22:11
Phenanthrene	U	H		0.021	0.10	ug/L	1	23-Nov-2021 22:11
Pyrene	U	H		0.019	0.10	ug/L	1	23-Nov-2021 22:11
Surr: 2,4,6-Tribromophenol	*96.7*				*34-129*	*%REC*	*1*	*23-Nov-2021 22:11*
Surr: 2-Fluorobiphenyl	*108*				*40-125*	*%REC*	*1*	*23-Nov-2021 22:11*
Surr: 2-Fluorophenol	*92.3*				*20-120*	*%REC*	*1*	*23-Nov-2021 22:11*
Surr: 4-Terphenyl-d14	*112*				*40-135*	*%REC*	*1*	*23-Nov-2021 22:11*
Surr: Nitrobenzene-d5	*77.4*				*41-120*	*%REC*	*1*	*23-Nov-2021 22:11*
Surr: Phenol-d6	*66.5*				*20-120*	*%REC*	*1*	*23-Nov-2021 22:11*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: S13
Collection Date: 28-Oct-2021 09:22

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 23-Nov-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	23-Nov-2021 23:43
Arsenic	**0.00119**	J	**0.000400**	**0.00200**	**mg/L**	1	23-Nov-2021 23:43
Beryllium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:43
Cadmium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:43
Chromium	**0.00160**	J	**0.000400**	**0.00400**	**mg/L**	1	23-Nov-2021 23:43
Copper	**0.00148**	J	**0.00100**	**0.00200**	**mg/L**	1	23-Nov-2021 23:43
Iron	**1.43**		**0.0120**	**0.200**	**mg/L**	1	23-Nov-2021 23:43
Lead	**0.000818**	J	**0.000600**	**0.00200**	**mg/L**	1	23-Nov-2021 23:43
Manganese	**0.0609**		**0.000700**	**0.00500**	**mg/L**	1	23-Nov-2021 23:43
Nickel	**0.00114**	J	**0.000600**	**0.00200**	**mg/L**	1	23-Nov-2021 23:43
Potassium	**6.82**		**0.0180**	**0.200**	**mg/L**	1	23-Nov-2021 23:43
Selenium	U		0.00110	0.00200	mg/L	1	23-Nov-2021 23:43
Silver	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:43
Thallium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:43
Zinc	**0.0175**		**0.00200**	**0.00400**	**mg/L**	1	23-Nov-2021 23:43
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 22-Nov-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	22-Nov-2021 16:50
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**0.99**	H	**0.10**	**0.50**	**mg/L**	1	14-Dec-2021 14:51
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	23-Nov-2021 14:15
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.444**	JH	**0.150**	**1.00**	**mg/L**	5	10-Dec-2021 05:47
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 23-Nov-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	23-Nov-2021 16:04
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**622**	H	**5.00**	**10.0**	**mg/L**	1	11-Nov-2021 14:30
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**560**	H	**5.00**	**10.0**	**mg/L**	1	12-Nov-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**14.0**	H	**2.50**	**2.50**	**mg/L**	1	16-Nov-2021 09:30
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.55**	H	**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**7.18**	H	**1.00**	**1.00**	**mg/L**	1	12-Nov-2021 17:54

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: S13
Collection Date: 28-Oct-2021 09:22

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**	H	**2.00**	**2.00**	**ppt**	1	29-Nov-2021 10:42
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**5.27**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**23.9**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: S14
Collection Date: 28-Oct-2021 14:00

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL PAHS - 8270D	**Method:SW8270**				Prep:SW3511 / 13-Nov-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
2-Methylnaphthalene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Acenaphthene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Acenaphthylene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Anthracene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Benz(a)anthracene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Benzo(a)pyrene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Benzo(b)fluoranthene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Benzo(g,h,i)perylene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Benzo(k)fluoranthene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Chrysene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Dibenz(a,h)anthracene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Dibenzofuran	U	H	0.0314	0.105	ug/L	1	01-Dec-2021 18:10
Fluoranthene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Fluorene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Indeno(1,2,3-cd)pyrene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Naphthalene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Phenanthrene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Pyrene	U	H	0.0209	0.105	ug/L	1	01-Dec-2021 18:10
Surr: 2-Fluorobiphenyl	*45.5*			*32-130*	*%REC*	*1*	*01-Dec-2021 18:10*
Surr: 4-Terphenyl-d14	*71.4*			*40-135*	*%REC*	*1*	*01-Dec-2021 18:10*
Surr: Nitrobenzene-d5	*92.5*			*45-142*	*%REC*	*1*	*01-Dec-2021 18:10*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 23-Nov-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	23-Nov-2021 23:50
Arsenic	**0.00173**	J	**0.000400**	**0.00200**	**mg/L**	1	23-Nov-2021 23:50
Beryllium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:50
Cadmium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:50
Chromium	**0.00141**	J	**0.000400**	**0.00400**	**mg/L**	1	23-Nov-2021 23:50
Copper	**0.00220**		**0.00100**	**0.00200**	**mg/L**	1	23-Nov-2021 23:50
Iron	**2.19**		**0.0120**	**0.200**	**mg/L**	1	23-Nov-2021 23:50
Lead	**0.000869**	J	**0.000600**	**0.00200**	**mg/L**	1	23-Nov-2021 23:50
Manganese	**0.0872**		**0.000700**	**0.00500**	**mg/L**	1	23-Nov-2021 23:50
Nickel	**0.00130**	J	**0.000600**	**0.00200**	**mg/L**	1	23-Nov-2021 23:50
Potassium	**13.1**		**0.0180**	**0.200**	**mg/L**	1	23-Nov-2021 23:50
Selenium	U		0.00110	0.00200	mg/L	1	23-Nov-2021 23:50
Silver	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:50
Thallium	U		0.000200	0.00200	mg/L	1	23-Nov-2021 23:50
Zinc	**0.00767**		**0.00200**	**0.00400**	**mg/L**	1	23-Nov-2021 23:50

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
Sample ID: S14
Collection Date: 28-Oct-2021 14:00

ANALYTICAL REPORT
WorkOrder:HS21110712
Lab ID:HS21110712-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 22-Nov-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	22-Nov-2021 16:52
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**0.99**	H	**0.10**	**0.50**	**mg/L**	1	14-Dec-2021 14:51
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	23-Nov-2021 14:15
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.443**	JH	**0.150**	**1.00**	**mg/L**	5	10-Dec-2021 05:55
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 23-Nov-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	23-Nov-2021 16:04
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**1,300**	H	**5.00**	**10.0**	**mg/L**	1	11-Nov-2021 14:30
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**1,140**	H	**5.00**	**10.0**	**mg/L**	1	12-Nov-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**28.0**	H	**2.50**	**2.50**	**mg/L**	1	16-Nov-2021 09:30
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.55**	H	**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**7.06**	H	**1.00**	**1.00**	**mg/L**	1	12-Nov-2021 17:54
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**	H	**2.00**	**2.00**	**ppt**	1	29-Nov-2021 10:42
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**6.28**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**24.1**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

Batch ID: 172448 **Start Date:** 12 Nov 2021 08:30 **End Date:** 12 Nov 2021 14:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21110712-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21110712-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21110712-04	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 172493 **Start Date:** 13 Nov 2021 11:43 **End Date:** 13 Nov 2021 14:30
Method: SW3511 **Prep Code:** 3511_PAH

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21110712-03	1	30.73 (mL)	2 (mL)	0.06508	40 mL Amber
HS21110712-05	1	31.54 (mL)	2 (mL)	0.06341	40 mL Amber

Batch ID: 172794 **Start Date:** 22 Nov 2021 08:30 **End Date:** 22 Nov 2021 11:30
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21110712-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21110712-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21110712-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21110712-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21110712-05		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 172862 **Start Date:** 23 Nov 2021 12:30 **End Date:** 23 Nov 2021 16:30
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21110712-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21110712-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21110712-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21110712-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21110712-05		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 172880 **Start Date:** 23 Nov 2021 10:00 **End Date:** 23 Nov 2021 12:30
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21110712-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21110712-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21110712-03		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21110712-04		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21110712-05		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

Batch ID: 173490 **Start Date:** 13 Dec 2021 10:00 **End Date:** 13 Dec 2021 14:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21110712-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21110712-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21110712-03		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21110712-04		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21110712-05		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 172448 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10		12 Nov 2021 12:06	23 Nov 2021 21:32	1
HS21110712-02	R2	28 Oct 2021 09:05		12 Nov 2021 12:06	23 Nov 2021 21:51	1
HS21110712-04	S13	28 Oct 2021 09:22		12 Nov 2021 12:06	23 Nov 2021 22:11	1
Batch ID: 172493 (0)	**Test Name :** LOW-LEVEL PAHS - 8270D				**Matrix:** Water	
HS21110712-03	R3	28 Oct 2021 13:25		13 Nov 2021 11:43	01 Dec 2021 17:50	1
HS21110712-05	S14	28 Oct 2021 14:00		13 Nov 2021 11:43	01 Dec 2021 18:10	1
Batch ID: 172794 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10		22 Nov 2021 08:30	22 Nov 2021 16:45	1
HS21110712-02	R2	28 Oct 2021 09:05		22 Nov 2021 08:30	22 Nov 2021 16:46	1
HS21110712-03	R3	28 Oct 2021 13:25		22 Nov 2021 08:30	22 Nov 2021 16:48	1
HS21110712-04	S13	28 Oct 2021 09:22		22 Nov 2021 08:30	22 Nov 2021 16:50	1
HS21110712-05	S14	28 Oct 2021 14:00		22 Nov 2021 08:30	22 Nov 2021 16:52	1
Batch ID: 172862 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10		23 Nov 2021 16:30	23 Nov 2021 23:37	1
HS21110712-02	R2	28 Oct 2021 09:05		23 Nov 2021 16:30	23 Nov 2021 23:39	1
HS21110712-03	R3	28 Oct 2021 13:25		23 Nov 2021 16:30	23 Nov 2021 23:41	1
HS21110712-04	S13	28 Oct 2021 09:22		23 Nov 2021 16:30	23 Nov 2021 23:43	1
HS21110712-05	S14	28 Oct 2021 14:00		23 Nov 2021 16:30	23 Nov 2021 23:50	1
Batch ID: 172880 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10		23 Nov 2021 10:00	23 Nov 2021 16:04	1
HS21110712-02	R2	28 Oct 2021 09:05		23 Nov 2021 10:00	23 Nov 2021 16:04	1
HS21110712-03	R3	28 Oct 2021 13:25		23 Nov 2021 10:00	23 Nov 2021 16:04	1
HS21110712-04	S13	28 Oct 2021 09:22		23 Nov 2021 10:00	23 Nov 2021 16:04	1
HS21110712-05	S14	28 Oct 2021 14:00		23 Nov 2021 10:00	23 Nov 2021 16:04	1
Batch ID: 173490 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10		13 Dec 2021 10:00	13 Dec 2021 14:20	1
HS21110712-02	R2	28 Oct 2021 09:05		13 Dec 2021 10:00	13 Dec 2021 14:20	1
HS21110712-03	R3	28 Oct 2021 13:25		13 Dec 2021 10:00	13 Dec 2021 14:20	1
HS21110712-04	S13	28 Oct 2021 09:22		13 Dec 2021 10:00	13 Dec 2021 14:20	1
HS21110712-05	S14	28 Oct 2021 14:00		13 Dec 2021 10:00	13 Dec 2021 14:20	1
Batch ID: R395570 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10			11 Nov 2021 14:30	1
HS21110712-02	R2	28 Oct 2021 09:05			11 Nov 2021 14:30	1
HS21110712-03	R3	28 Oct 2021 13:25			11 Nov 2021 14:30	1
HS21110712-04	S13	28 Oct 2021 09:22			11 Nov 2021 14:30	1
HS21110712-05	S14	28 Oct 2021 14:00			11 Nov 2021 14:30	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R395579 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10			12 Nov 2021 17:54	1
HS21110712-02	R2	28 Oct 2021 09:05			12 Nov 2021 17:54	1
HS21110712-03	R3	28 Oct 2021 13:25			12 Nov 2021 17:54	1
HS21110712-04	S13	28 Oct 2021 09:22			12 Nov 2021 17:54	1
HS21110712-05	S14	28 Oct 2021 14:00			12 Nov 2021 17:54	1
Batch ID: R395655 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10			12 Nov 2021 17:20	1
HS21110712-02	R2	28 Oct 2021 09:05			12 Nov 2021 17:20	1
HS21110712-03	R3	28 Oct 2021 13:25			12 Nov 2021 17:20	1
HS21110712-04	S13	28 Oct 2021 09:22			12 Nov 2021 17:20	1
HS21110712-05	S14	28 Oct 2021 14:00			12 Nov 2021 17:20	1
Batch ID: R395800 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10			16 Nov 2021 09:30	1
HS21110712-02	R2	28 Oct 2021 09:05			16 Nov 2021 09:30	1
HS21110712-03	R3	28 Oct 2021 13:25			16 Nov 2021 09:30	1
HS21110712-04	S13	28 Oct 2021 09:22			16 Nov 2021 09:30	1
HS21110712-05	S14	28 Oct 2021 14:00			16 Nov 2021 09:30	1
Batch ID: R396326 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10			23 Nov 2021 14:15	1
HS21110712-02	R2	28 Oct 2021 09:05			23 Nov 2021 14:15	1
HS21110712-03	R3	28 Oct 2021 13:25			23 Nov 2021 14:15	1
HS21110712-04	S13	28 Oct 2021 09:22			23 Nov 2021 14:15	1
HS21110712-05	S14	28 Oct 2021 14:00			23 Nov 2021 14:15	1
Batch ID: R396506 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10			29 Nov 2021 10:42	1
HS21110712-02	R2	28 Oct 2021 09:05			29 Nov 2021 10:42	1
HS21110712-03	R3	28 Oct 2021 13:25			29 Nov 2021 10:42	1
HS21110712-04	S13	28 Oct 2021 09:22			29 Nov 2021 10:42	1
HS21110712-05	S14	28 Oct 2021 14:00			29 Nov 2021 10:42	1
Batch ID: R397369 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10			10 Dec 2021 05:09	5
HS21110712-02	R2	28 Oct 2021 09:05			10 Dec 2021 05:32	5
HS21110712-03	R3	28 Oct 2021 13:25			10 Dec 2021 05:40	5
HS21110712-04	S13	28 Oct 2021 09:22			10 Dec 2021 05:47	5
HS21110712-05	S14	28 Oct 2021 14:00			10 Dec 2021 05:55	5

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R397386 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10			10 Dec 2021 13:35	1
HS21110712-02	R2	28 Oct 2021 09:05			10 Dec 2021 13:35	1
HS21110712-03	R3	28 Oct 2021 13:25			10 Dec 2021 13:35	1
HS21110712-04	S13	28 Oct 2021 09:22			10 Dec 2021 13:35	1
HS21110712-05	S14	28 Oct 2021 14:00			10 Dec 2021 13:35	1
Batch ID: R397581 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS21110712-01	R1	28 Oct 2021 08:10			14 Dec 2021 14:51	1
HS21110712-02	R2	28 Oct 2021 09:05			14 Dec 2021 14:51	1
HS21110712-03	R3	28 Oct 2021 13:25			14 Dec 2021 14:51	1
HS21110712-04	S13	28 Oct 2021 09:22			14 Dec 2021 14:51	1
HS21110712-05	S14	28 Oct 2021 14:00			14 Dec 2021 14:51	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172794 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-172794** Units: **mg/L** Analysis Date: **22-Nov-2021 15:50**
Client ID: Run ID: **HG03_396210** SeqNo: **6387392** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U		0.000200								

LCS Sample ID: **LCS-172794** Units: **mg/L** Analysis Date: **22-Nov-2021 15:58**
Client ID: Run ID: **HG03_396210** SeqNo: **6387393** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.0051		0.000200	0.005	0	102	80 - 120				

MS Sample ID: **HS21110622-12MS** Units: **mg/L** Analysis Date: **22-Nov-2021 16:01**
Client ID: Run ID: **HG03_396210** SeqNo: **6387395** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00435		0.000200	0.005	0.000005	86.9	75 - 125				

MSD Sample ID: **HS21110622-12MSD** Units: **mg/L** Analysis Date: **22-Nov-2021 16:08**
Client ID: Run ID: **HG03_396210** SeqNo: **6387398** PrepDate: **22-Nov-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00465		0.000200	0.005	0.000005	92.9	75 - 125	0.00435	6.67	20	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172862 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-172862** Units: **mg/L** Analysis Date: **23-Nov-2021 22:29**
Client ID: Run ID: **ICPMS06_396318** SeqNo: **6390527** PrepDate: **23-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Copper	U	0.00200								
Iron	U	0.200								
Lead	U	0.00200								
Manganese	U	0.00500								
Nickel	U	0.00200								
Potassium	U	0.200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172862 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-172862** Units: **mg/L** Analysis Date: **23-Nov-2021 22:31**
Client ID: Run ID: **ICPMS06_396318** SeqNo: **6390528** PrepDate: **23-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05106	0.00200	0.05	0	102	80 - 120				
Arsenic	0.05173	0.00200	0.05	0	103	80 - 120				
Beryllium	0.04969	0.00200	0.05	0	99.4	80 - 120				
Cadmium	0.05206	0.00200	0.05	0	104	80 - 120				
Chromium	0.05101	0.00400	0.05	0	102	80 - 120				
Copper	0.05274	0.00200	0.05	0	105	80 - 120				
Iron	5.028	0.200	5	0	101	80 - 120				
Lead	0.05093	0.00200	0.05	0	102	80 - 120				
Manganese	0.0527	0.00500	0.05	0	105	80 - 120				
Nickel	0.05301	0.00200	0.05	0	106	80 - 120				
Potassium	5.226	0.200	5	0	105	80 - 120				
Selenium	0.05224	0.00200	0.05	0	104	80 - 120				
Silver	0.04984	0.00200	0.05	0	99.7	80 - 120				
Thallium	0.05263	0.00200	0.05	0	105	80 - 120				
Zinc	0.05392	0.00400	0.05	0	108	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172862 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21110622-12MS** Units: **mg/L** Analysis Date: **23-Nov-2021 22:51**
Client ID: Run ID: **ICPMS06_396318** SeqNo: **6390538** PrepDate: **23-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04819	0.00200	0.05	0.00019	96.0	80 - 120				
Arsenic	0.07595	0.00200	0.05	0.0212	109	80 - 120				
Beryllium	0.05287	0.00200	0.05	0.000234	105	80 - 120				
Cadmium	0.0539	0.00200	0.05	0.000067	108	80 - 120				
Chromium	0.05533	0.00400	0.05	0.002981	105	80 - 120				
Copper	0.05453	0.00200	0.05	0.003074	103	80 - 120				
Iron	11.23	0.200	5	6.082	103	80 - 120				
Lead	0.05318	0.00200	0.05	0.002204	102	80 - 120				
Manganese	2.63	0.00500	0.05	2.52	219	80 - 120				SEO
Nickel	0.05559	0.00200	0.05	0.003807	104	80 - 120				
Potassium	6.302	0.200	5	1.248	101	80 - 120				
Selenium	0.05244	0.00200	0.05	0.000437	104	80 - 120				
Silver	0.05052	0.00200	0.05	0.000017	101	80 - 120				
Thallium	0.05135	0.00200	0.05	0.000063	103	80 - 120				
Zinc	0.06533	0.00400	0.05	0.01194	107	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172862 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21110622-01MS** Units: **mg/L** Analysis Date: **23-Nov-2021 22:37**
Client ID: Run ID: **ICPMS06_396318** SeqNo: **6390531** PrepDate: **23-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04996	0.00200	0.05	0.000361	99.2	80 - 120				
Arsenic	0.4694	0.00200	0.05	0.4252	88.4	80 - 120				O
Beryllium	0.05053	0.00200	0.05	0.000115	101	80 - 120				
Cadmium	0.0536	0.00200	0.05	0.000059	107	80 - 120				
Chromium	0.05262	0.00400	0.05	0.001337	103	80 - 120				
Copper	0.05641	0.00200	0.05	0.005973	101	80 - 120				
Iron	23.87	0.200	5	19.31	91.2	80 - 120				
Lead	0.05219	0.00200	0.05	0.000941	102	80 - 120				
Manganese	13.64	0.00500	0.05	13.91	-540	80 - 120				SEO
Nickel	0.06001	0.00200	0.05	0.009695	101	80 - 120				
Potassium	5.721	0.200	5	0.6933	101	80 - 120				
Selenium	0.05301	0.00200	0.05	0.000747	105	80 - 120				
Silver	0.0499	0.00200	0.05	0.000013	99.8	80 - 120				
Thallium	0.05234	0.00200	0.05	0.000146	104	80 - 120				
Zinc	0.09977	0.00400	0.05	0.04963	100	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172862 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21110622-12MSD** Units: **mg/L** Analysis Date: **23-Nov-2021 22:53**
Client ID: Run ID: **ICPMS06_396318** SeqNo: **6390539** PrepDate: **23-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04937	0.00200	0.05	0.00019	98.4	80 - 120	0.04819	2.43	20	
Arsenic	0.07667	0.00200	0.05	0.0212	111	80 - 120	0.07595	0.955	20	
Beryllium	0.05317	0.00200	0.05	0.000234	106	80 - 120	0.05287	0.558	20	
Cadmium	0.05356	0.00200	0.05	0.000067	107	80 - 120	0.0539	0.637	20	
Chromium	0.05579	0.00400	0.05	0.002981	106	80 - 120	0.05533	0.837	20	
Copper	0.05606	0.00200	0.05	0.003074	106	80 - 120	0.05453	2.76	20	
Iron	11.49	0.200	5	6.082	108	80 - 120	11.23	2.31	20	
Lead	0.05467	0.00200	0.05	0.002204	105	80 - 120	0.05318	2.76	20	
Manganese	2.636	0.00500	0.05	2.52	233	80 - 120	2.63	0.252	20	SEO
Nickel	0.05577	0.00200	0.05	0.003807	104	80 - 120	0.05559	0.318	20	
Potassium	6.488	0.200	5	1.248	105	80 - 120	6.302	2.91	20	
Selenium	0.05373	0.00200	0.05	0.000437	107	80 - 120	0.05244	2.43	20	
Silver	0.05042	0.00200	0.05	0.000017	101	80 - 120	0.05052	0.194	20	
Thallium	0.05363	0.00200	0.05	0.000063	107	80 - 120	0.05135	4.35	20	
Zinc	0.06656	0.00400	0.05	0.01194	109	80 - 120	0.06533	1.87	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172862 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21110622-01MSD** Units: **mg/L** Analysis Date: **23-Nov-2021 22:39**
Client ID: Run ID: **ICPMS06_396318** SeqNo: **6390532** PrepDate: **23-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05076	0.00200	0.05	0.000361	101	80 - 120	0.04996	1.59	20	
Arsenic	0.4795	0.00200	0.05	0.4252	108	80 - 120	0.4694	2.11	20	O
Beryllium	0.05281	0.00200	0.05	0.000115	105	80 - 120	0.05053	4.42	20	
Cadmium	0.05442	0.00200	0.05	0.000059	109	80 - 120	0.0536	1.52	20	
Chromium	0.05319	0.00400	0.05	0.001337	104	80 - 120	0.05262	1.09	20	
Copper	0.05738	0.00200	0.05	0.005973	103	80 - 120	0.05641	1.71	20	
Iron	23.66	0.200	5	19.31	87.0	80 - 120	23.87	0.887	20	
Lead	0.05296	0.00200	0.05	0.000941	104	80 - 120	0.05219	1.47	20	
Manganese	13.66	0.00500	0.05	13.91	-507	80 - 120	13.64	0.119	20	SEO
Nickel	0.05968	0.00200	0.05	0.009695	100.0	80 - 120	0.06001	0.551	20	
Potassium	5.899	0.200	5	0.6933	104	80 - 120	5.721	3.07	20	
Selenium	0.05449	0.00200	0.05	0.000747	107	80 - 120	0.05301	2.75	20	
Silver	0.05071	0.00200	0.05	0.000013	101	80 - 120	0.0499	1.61	20	
Thallium	0.05256	0.00200	0.05	0.000146	105	80 - 120	0.05234	0.419	20	
Zinc	0.1018	0.00400	0.05	0.04963	104	80 - 120	0.09977	1.99	20	

PDS Sample ID: **HS21110622-12PDS** Units: **mg/L** Analysis Date: **24-Nov-2021 12:52**
Client ID: Run ID: **ICPMS06_396420** SeqNo: **6392362** PrepDate: **23-Nov-2021** DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.836	0.100	2	2.605	112	75 - 125				

PDS Sample ID: **HS21110622-01PDS** Units: **mg/L** Analysis Date: **24-Nov-2021 12:19**
Client ID: Run ID: **ICPMS06_396420** SeqNo: **6392349** PrepDate: **23-Nov-2021** DF: **100**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	25.19	0.500	10	14.19	110	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172862 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21110622-12SD** Units: **mg/L** Analysis Date: **23-Nov-2021 22:49**
Client ID: Run ID: **ICPMS06_396318** SeqNo: **6390537** PrepDate: **23-Nov-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.00019	0	10	
Arsenic	0.02165	0.0100					0.0212	2.13	10	
Beryllium	U	0.0100					0.000234	0	10	
Cadmium	U	0.0100					0.000067	0	10	
Chromium	0.002281	0.0200					0.002981	0	10	J
Copper	U	0.0100					0.003074	0	10	
Iron	6.096	1.00					6.082	0.236	10	
Lead	U	0.0100					0.002204	0	10	
Nickel	0.003795	0.0100					0.003807	0	10	J
Potassium	1.195	1.00					1.248	4.24	10	
Selenium	U	0.0100					0.000437	0	10	
Silver	U	0.0100					0.000017	0	10	
Thallium	U	0.0100					0.000063	0	10	
Zinc	0.01	0.0200					0.01194	0	10	J

SD Sample ID: **HS21110622-01SD** Units: **mg/L** Analysis Date: **23-Nov-2021 22:35**
Client ID: Run ID: **ICPMS06_396318** SeqNo: **6390530** PrepDate: **23-Nov-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000361	0	10	
Arsenic	0.4225	0.0100					0.4252	0.636	10	
Beryllium	U	0.0100					0.000115	0	10	
Cadmium	U	0.0100					0.000059	0	10	
Chromium	U	0.0200					0.001337	0	10	
Copper	U	0.0100					0.005973	0	10	
Iron	19.44	1.00					19.31	0.647	10	
Lead	U	0.0100					0.000941	0	10	
Nickel	0.009697	0.0100					0.009695	0	10	J
Potassium	0.5688	1.00					0.6933	0	10	J
Selenium	U	0.0100					0.000747	0	10	
Silver	U	0.0100					0.000013	0	10	
Thallium	U	0.0100					0.000146	0	10	
Zinc	0.05	0.0200					0.04963	0.745	10	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172862 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21110622-12SD** Units: **mg/L** Analysis Date: **24-Nov-2021 12:22**
Client ID: Run ID: **ICPMS06_396420** SeqNo: **6392351** PrepDate: **23-Nov-2021** DF: **100**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Manganese	2.578	0.500					2.605	1.05	10	

SD Sample ID: **HS21110622-01SD** Units: **mg/L** Analysis Date: **24-Nov-2021 12:17**
Client ID: Run ID: **ICPMS06_396420** SeqNo: **6392348** PrepDate: **23-Nov-2021** DF: **500**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Manganese	13.87	2.50					14.19	2.22	10	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172448 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-172448** Units: **ug/L** Analysis Date: **18-Nov-2021 12:44**
Client ID: Run ID: **SV-7_396034** SeqNo: **6383371** PrepDate: **12-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.10								
2-Methylnaphthalene	U	0.10								
Acenaphthene	U	0.10								
Acenaphthylene	U	0.10								
Anthracene	U	0.10								
Benz(a)anthracene	U	0.10								
Benzo(a)pyrene	U	0.10								
Benzo(b)fluoranthene	U	0.10								
Benzo(g,h,i)perylene	U	0.10								
Benzo(k)fluoranthene	U	0.10								
Chrysene	U	0.10								
Dibenz(a,h)anthracene	U	0.10								
Fluoranthene	U	0.10								
Fluorene	U	0.10								
Indeno(1,2,3-cd)pyrene	U	0.10								
Isophorone	U	0.20								
Naphthalene	U	0.10								
Phenanthrene	U	0.10								
Pyrene	U	0.10								
Surr: 2,4,6-Tribromophenol	*6.412*	*0.20*	*5*	*0*	*128*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*5.2*	*0.20*	*5*	*0*	*104*	*40 - 125*				
Surr: 2-Fluorophenol	*5.413*	*0.20*	*5*	*0*	*108*	*20 - 120*				
Surr: 4-Terphenyl-d14	*5.992*	*0.20*	*5*	*0*	*120*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.348*	*0.20*	*5*	*0*	*87.0*	*41 - 120*				
Surr: Phenol-d6	*4.689*	*0.20*	*5*	*0*	*93.8*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172448 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCS Sample ID: **LCS-172448** Units: **ug/L** Analysis Date: **18-Nov-2021 15:21**
Client ID: Run ID: **SV-7_396034** SeqNo: **6383373** PrepDate: **12-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	5.212	0.10	5	0	104	45 - 120				
2-Methylnaphthalene	5.306	0.10	5	0	106	50 - 120				
Acenaphthene	4.599	0.10	5	0	92.0	45 - 120				
Acenaphthylene	5.15	0.10	5	0	103	47 - 120				
Anthracene	5.442	0.10	5	0	109	45 - 120				
Benz(a)anthracene	5.594	0.10	5	0	112	40 - 120				
Benzo(a)pyrene	5.929	0.10	5	0	119	45 - 120				
Benzo(b)fluoranthene	5.616	0.10	5	0	112	50 - 120				
Benzo(g,h,i)perylene	5.825	0.10	5	0	117	42 - 127				
Benzo(k)fluoranthene	5.415	0.10	5	0	108	45 - 127				
Chrysene	5.335	0.10	5	0	107	43 - 120				
Dibenz(a,h)anthracene	5.871	0.10	5	0	117	45 - 125				
Fluoranthene	5.901	0.10	5	0	118	45 - 125				
Fluorene	5.102	0.10	5	0	102	49 - 120				
Indeno(1,2,3-cd)pyrene	5.919	0.10	5	0	118	41 - 128				
Isophorone	4.599	0.20	5	0	92.0	40 - 121				
Naphthalene	4.856	0.10	5	0	97.1	45 - 120				
Phenanthrene	5.281	0.10	5	0	106	45 - 121				
Pyrene	5.329	0.10	5	0	107	40 - 130				
Surr: 2,4,6-Tribromophenol	*5.87*	*0.20*	*5*	*0*	*117*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*5.517*	*0.20*	*5*	*0*	*110*	*40 - 125*				
Surr: 2-Fluorophenol	*4.231*	*0.20*	*5*	*0*	*84.6*	*20 - 120*				
Surr: 4-Terphenyl-d14	*5.997*	*0.20*	*5*	*0*	*120*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.688*	*0.20*	*5*	*0*	*93.8*	*41 - 120*				
Surr: Phenol-d6	*4.984*	*0.20*	*5*	*0*	*99.7*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172448 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCSD Sample ID: **LCSD-172448** Units: **ug/L** Analysis Date: **18-Nov-2021 13:23**
Client ID: Run ID: **SV-7_396034** SeqNo: **6383372** PrepDate: **12-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	5.025	0.10	5	0	101	45 - 120	5.212	3.65	20	
2-Methylnaphthalene	4.994	0.10	5	0	99.9	50 - 120	5.306	6.07	20	
Acenaphthene	4.683	0.10	5	0	93.7	45 - 120	4.599	1.82	20	
Acenaphthylene	5.16	0.10	5	0	103	47 - 120	5.15	0.19	20	
Anthracene	5.411	0.10	5	0	108	45 - 120	5.442	0.577	20	
Benz(a)anthracene	5.261	0.10	5	0	105	40 - 120	5.594	6.14	20	
Benzo(a)pyrene	5.805	0.10	5	0	116	45 - 120	5.929	2.12	20	
Benzo(b)fluoranthene	5.568	0.10	5	0	111	50 - 120	5.616	0.858	20	
Benzo(g,h,i)perylene	5.986	0.10	5	0	120	42 - 127	5.825	2.71	20	
Benzo(k)fluoranthene	5.9	0.10	5	0	118	45 - 127	5.415	8.58	20	
Chrysene	5.254	0.10	5	0	105	43 - 120	5.335	1.54	20	
Dibenz(a,h)anthracene	5.807	0.10	5	0	116	45 - 125	5.871	1.1	20	
Fluoranthene	6.049	0.10	5	0	121	45 - 125	5.901	2.48	20	
Fluorene	5.292	0.10	5	0	106	49 - 120	5.102	3.66	20	
Indeno(1,2,3-cd)pyrene	5.713	0.10	5	0	114	41 - 128	5.919	3.53	20	
Isophorone	4.041	0.20	5	0	80.8	40 - 121	4.599	12.9	20	
Naphthalene	4.64	0.10	5	0	92.8	45 - 120	4.856	4.54	20	
Phenanthrene	5.405	0.10	5	0	108	45 - 121	5.281	2.32	20	
Pyrene	5.163	0.10	5	0	103	40 - 130	5.329	3.16	20	
Surr: 2,4,6-Tribromophenol	*6.24*	*0.20*	*5*	*0*	*125*	*34 - 129*	*5.87*	*6.11*	*20*	
Surr: 2-Fluorobiphenyl	*5.655*	*0.20*	*5*	*0*	*113*	*40 - 125*	*5.517*	*2.47*	*20*	
Surr: 2-Fluorophenol	*5.094*	*0.20*	*5*	*0*	*102*	*20 - 120*	*4.231*	*18.5*	*20*	
Surr: 4-Terphenyl-d14	*5.85*	*0.20*	*5*	*0*	*117*	*40 - 135*	*5.997*	*2.48*	*20*	
Surr: Nitrobenzene-d5	*4.431*	*0.20*	*5*	*0*	*88.6*	*41 - 120*	*4.688*	*5.63*	*20*	
Surr: Phenol-d6	*4.862*	*0.20*	*5*	*0*	*97.2*	*20 - 120*	*4.984*	*2.49*	*20*	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172493 (0) **Instrument: SV-6** **Method: LOW-LEVEL PAHS - 8270D**

MBLK Sample ID: **MBLK-172493** Units: **ug/L** Analysis Date: **18-Nov-2021 16:43**
Client ID: Run ID: **SV-6_396114** SeqNo: **6388618** PrepDate: **13-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.100								
2-Methylnaphthalene	U	0.100								
Acenaphthene	U	0.100								
Acenaphthylene	U	0.100								
Anthracene	U	0.100								
Benz(a)anthracene	U	0.100								
Benzo(a)pyrene	U	0.100								
Benzo(b)fluoranthene	U	0.100								
Benzo(g,h,i)perylene	U	0.100								
Benzo(k)fluoranthene	U	0.100								
Chrysene	U	0.100								
Dibenz(a,h)anthracene	U	0.100								
Dibenzofuran	U	0.100								
Fluoranthene	U	0.100								
Fluorene	U	0.100								
Indeno(1,2,3-cd)pyrene	U	0.100								
Naphthalene	U	0.100								
Phenanthrene	U	0.100								
Pyrene	U	0.100								
Surr: 2-Fluorobiphenyl	*2.788*	*0.100*	*3.03*	*0*	*92.0*	*32 - 130*				
Surr: 4-Terphenyl-d14	*3.13*	*0.100*	*3.03*	*0*	*103*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.055*	*0.100*	*3.03*	*0*	*134*	*45 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172493 (0) **Instrument: SV-6** **Method: LOW-LEVEL PAHS - 8270D**

LCS Sample ID: **LCS-172493** Units: **ug/L** Analysis Date: **18-Nov-2021 17:03**
Client ID: Run ID: **SV-6_396114** SeqNo: **6388619** PrepDate: **13-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	2.722	0.100	3.03	0	89.8	40 - 140				
2-Methylnaphthalene	2.313	0.100	3.03	0	76.3	40 - 140				
Acenaphthene	1.721	0.100	3.03	0	56.8	40 - 140				
Acenaphthylene	2.941	0.100	3.03	0	97.1	40 - 140				
Anthracene	3.04	0.100	3.03	0	100	40 - 140				
Benz(a)anthracene	2.756	0.100	3.03	0	90.9	40 - 140				
Benzo(a)pyrene	3.404	0.100	3.03	0	112	40 - 140				
Benzo(b)fluoranthene	3.483	0.100	3.03	0	115	40 - 140				
Benzo(g,h,i)perylene	4.008	0.100	3.03	0	132	40 - 140				
Benzo(k)fluoranthene	4.137	0.100	3.03	0	137	40 - 140				
Chrysene	3.611	0.100	3.03	0	119	40 - 140				
Dibenz(a,h)anthracene	3.226	0.100	3.03	0	106	40 - 140				
Dibenzofuran	3.171	0.100	3.03	0	105	40 - 140				
Fluoranthene	2.377	0.100	3.03	0	78.4	40 - 140				
Fluorene	2.968	0.100	3.03	0	97.9	40 - 140				
Indeno(1,2,3-cd)pyrene	4.048	0.100	3.03	0	134	40 - 140				
Naphthalene	2.62	0.100	3.03	0	86.5	40 - 140				
Phenanthrene	2.371	0.100	3.03	0	78.3	40 - 140				
Pyrene	3.678	0.100	3.03	0	121	40 - 140				
Surr: 2-Fluorobiphenyl	*2.705*	*0.100*	*3.03*	*0*	*89.3*	*32 - 130*				
Surr: 4-Terphenyl-d14	*3.271*	*0.100*	*3.03*	*0*	*108*	*40 - 135*				
Surr: Nitrobenzene-d5	*2.576*	*0.100*	*3.03*	*0*	*85.0*	*45 - 142*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172493 (0) **Instrument: SV-6** **Method: LOW-LEVEL PAHS - 8270D**

LCSD Sample ID: **LCSD-172493** Units: **ug/L** Analysis Date: **18-Nov-2021 17:24**
Client ID: Run ID: **SV-6_396114** SeqNo: **6388620** PrepDate: **13-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	2.673	0.100	3.03	0	88.2	40 - 140	2.722	1.81	25	
2-Methylnaphthalene	2.325	0.100	3.03	0	76.7	40 - 140	2.313	0.486	25	
Acenaphthene	1.882	0.100	3.03	0	62.1	40 - 140	1.721	8.91	25	
Acenaphthylene	3.427	0.100	3.03	0	113	40 - 140	2.941	15.3	25	
Anthracene	3.593	0.100	3.03	0	119	40 - 140	3.04	16.7	25	
Benz(a)anthracene	2.134	0.100	3.03	0	70.4	40 - 140	2.756	25.4	25	R
Benzo(a)pyrene	2.381	0.100	3.03	0	78.6	40 - 140	3.404	35.4	25	R
Benzo(b)fluoranthene	2.139	0.100	3.03	0	70.6	40 - 140	3.483	47.8	25	R
Benzo(g,h,i)perylene	2.502	0.100	3.03	0	82.6	40 - 140	4.008	46.3	25	R
Benzo(k)fluoranthene	2.641	0.100	3.03	0	87.2	40 - 140	4.137	44.1	25	R
Chrysene	2.854	0.100	3.03	0	94.2	40 - 140	3.611	23.4	25	
Dibenz(a,h)anthracene	2.106	0.100	3.03	0	69.5	40 - 140	3.226	42	25	R
Dibenzofuran	3.68	0.100	3.03	0	121	40 - 140	3.171	14.9	25	
Fluoranthene	2.897	0.100	3.03	0	95.6	40 - 140	2.377	19.7	25	
Fluorene	3.443	0.100	3.03	0	114	40 - 140	2.968	14.8	25	
Indeno(1,2,3-cd)pyrene	2.625	0.100	3.03	0	86.6	40 - 140	4.048	42.6	25	R
Naphthalene	2.628	0.100	3.03	0	86.7	40 - 140	2.62	0.303	25	
Phenanthrene	2.893	0.100	3.03	0	95.5	40 - 140	2.371	19.8	25	
Pyrene	3.11	0.100	3.03	0	103	40 - 140	3.678	16.7	25	
Surr: 2-Fluorobiphenyl	*3.181*	*0.100*	*3.03*	*0*	*105*	*32 - 130*	*2.705*	*16.2*	*25*	
Surr: 4-Terphenyl-d14	*2.534*	*0.100*	*3.03*	*0*	*83.6*	*40 - 135*	*3.271*	*25.4*	*25*	R
Surr: Nitrobenzene-d5	*2.878*	*0.100*	*3.03*	*0*	*95.0*	*45 - 142*	*2.576*	*11.1*	*25*	

The following samples were analyzed in this batch: HS21110712-03 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 172880 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-172880** Units: **mg/L** Analysis Date: **23-Nov-2021 16:04**
Client ID: Run ID: **UV-2450_396321** SeqNo: **6389726** PrepDate: **23-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-172880** Units: **mg/L** Analysis Date: **23-Nov-2021 16:04**
Client ID: Run ID: **UV-2450_396321** SeqNo: **6389725** PrepDate: **23-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.24	0.0500	0.25	0	96.0	80 - 120				

MS Sample ID: **HS21111091-01MS** Units: **mg/L** Analysis Date: **23-Nov-2021 16:04**
Client ID: Run ID: **UV-2450_396321** SeqNo: **6389723** PrepDate: **23-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.263	0.0500	0.25	0.037	90.4	80 - 120				

MSD Sample ID: **HS21111091-01MSD** Units: **mg/L** Analysis Date: **23-Nov-2021 16:04**
Client ID: Run ID: **UV-2450_396321** SeqNo: **6389724** PrepDate: **23-Nov-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.263	0.0500	0.25	0.037	90.4	80 - 120	0.263	0	20	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: 173490 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-173490** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: Run ID: **WetChem_HS_397495** SeqNo: **6418454** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-173490** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: Run ID: **WetChem_HS_397495** SeqNo: **6418453** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.03	0.50	20	0	95.2	85 - 115				

MS Sample ID: **HS21120085-02MS** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: Run ID: **WetChem_HS_397495** SeqNo: **6418451** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.98	0.50	20	0.442	97.7	75 - 125				

MSD Sample ID: **HS21120085-02MSD** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: Run ID: **WetChem_HS_397495** SeqNo: **6418452** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20	0.50	20	0.442	97.8	75 - 125	19.98	0.07	20	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: R395570 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R395570** Units: **mg/L** Analysis Date: **11-Nov-2021 14:30**
Client ID: Run ID: **Balance1_395570** SeqNo: **6369878** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R395570** Units: **mg/L** Analysis Date: **11-Nov-2021 14:30**
Client ID: Run ID: **Balance1_395570** SeqNo: **6369877** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	980	10.0	1000	0	98.0	85 - 115				

DUP Sample ID: **HS21110491-01DUP** Units: **mg/L** Analysis Date: **11-Nov-2021 14:30**
Client ID: Run ID: **Balance1_395570** SeqNo: **6369879** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0					0	0	20	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: **R395579 (0)** **Instrument:** **ManTech01** **Method:** **DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS21110712-01DUP** Units: **mg/L** Analysis Date: **12-Nov-2021 17:54**
Client ID: **R1** Run ID: **ManTech01_395579** SeqNo: **6369967** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	7.39	1.00					7.37	0.271	20	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: R395655 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-111221** Units: **mg/L** Analysis Date: **12-Nov-2021 17:20**
Client ID: Run ID: **Balance1_395655** SeqNo: **6372249** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-111221** Units: **mg/L** Analysis Date: **12-Nov-2021 17:20**
Client ID: Run ID: **Balance1_395655** SeqNo: **6372250** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1024	10.0	1000	0	102	85 - 115				

DUP Sample ID: **HS21110762-01DUP** Units: **mg/L** Analysis Date: **12-Nov-2021 17:20**
Client ID: Run ID: **Balance1_395655** SeqNo: **6372242** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	208	10.0					202	2.93	5	

DUP Sample ID: **HS21110451-04DUP** Units: **mg/L** Analysis Date: **12-Nov-2021 17:20**
Client ID: Run ID: **Balance1_395655** SeqNo: **6372233** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1068	10.0					1072	0.374	5	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: R395800 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-111621** Units: **mg/L** Analysis Date: **16-Nov-2021 09:30**
Client ID: Run ID: **Balance1_395800** SeqNo: **6375819** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-111621** Units: **mg/L** Analysis Date: **16-Nov-2021 09:30**
Client ID: Run ID: **Balance1_395800** SeqNo: **6375820** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	91	2.50	100	0	91.0	85 - 115				

DUP Sample ID: **HS21110690-01DUP** Units: **mg/L** Analysis Date: **16-Nov-2021 09:30**
Client ID: Run ID: **Balance1_395800** SeqNo: **6375807** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	54.8	2.50					54	1.47	5	

DUP Sample ID: **HS21110571-01DUP** Units: **mg/L** Analysis Date: **16-Nov-2021 09:30**
Client ID: Run ID: **Balance1_395800** SeqNo: **6375804** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	22.8	2.50					22.8	0	5	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: R396326 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-112321** Units: **mg/L** Analysis Date: **23-Nov-2021 14:15**
Client ID: Run ID: **Balance1_396326** SeqNo: **6389927** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-112321** Units: **mg/L** Analysis Date: **23-Nov-2021 14:15**
Client ID: Run ID: **Balance1_396326** SeqNo: **6389929** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37.1	2.00	40	0	92.8	78 - 114				

LCSD Sample ID: **WLCSDW-112321** Units: **mg/L** Analysis Date: **23-Nov-2021 14:15**
Client ID: Run ID: **Balance1_396326** SeqNo: **6389928** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37	2.00	40	0	92.5	78 - 114	37.1	0.27	18	

MS Sample ID: **HS21110996-01MS** Units: **mg/L** Analysis Date: **23-Nov-2021 14:15**
Client ID: Run ID: **Balance1_396326** SeqNo: **6389922** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37.2	2.00	40	3.629	83.9	78 - 114				

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: **R396506 (0)** **Instrument:** **WetChem_HS** **Method:** **SALINITY**

DUP Sample ID: **HS21110712-02DUP** Units: **ppt** Analysis Date: **29-Nov-2021 10:42**
Client ID: **R2** Run ID: **WetChem_HS_396506** SeqNo: **6394788** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: R397369 (0) **Instrument:** ICS-Integrion **Method:** NITRATE/NITRITE BY E300.0, REV 2.1, 1993

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **09-Dec-2021 23:59**
Client ID: Run ID: **ICS-Integrion_397369** SeqNo: **6415174** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **10-Dec-2021 00:06**
Client ID: Run ID: **ICS-Integrion_397369** SeqNo: **6415175** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	7.71	0.200	8	0	96.4	90 - 110				

MS Sample ID: **HS21110712-01MS** Units: **mg/L** Analysis Date: **10-Dec-2021 05:17**
Client ID: **R1** Run ID: **ICS-Integrion_397369** SeqNo: **6415181** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.39	1.00	20	0.444	94.7	80 - 120				

MSD Sample ID: **HS21110712-01MSD** Units: **mg/L** Analysis Date: **10-Dec-2021 05:24**
Client ID: **R1** Run ID: **ICS-Integrion_397369** SeqNo: **6415182** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	20.03	1.00	20	0.444	97.9	80 - 120	19.39	3.21	20	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: HS21110712

QC BATCH REPORT

Batch ID: **R397386 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS21110712-01DUP** Units: **pH Units** Analysis Date: **10-Dec-2021 13:35**
Client ID: **R1** Run ID: **WetChem_HS_397386** SeqNo: **6415538** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	6.57	0.100					6.53	0.611	10	
Temp Deg C @pH	23.7	0					23.7	0	10	

The following samples were analyzed in this batch: HS21110712-01 HS21110712-02 HS21110712-03 HS21110712-04 HS21110712-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13, S14
WorkOrder: **HS21110712**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

RIGHT SOLUTIONS | RIGHT PARTNER

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Dept of Defense	PJLA L20-507-R2	22-Dec-2021
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS21110712 **Date/Time Received:** 10-Nov-2021 12:00

Client Name: ERM NC **Received by:** Jared R. Makan

Completed By: /S/ Nilesh D. Ranchod (eSignature) 11-Nov-2021 21:39 (Date/Time) **Reviewed by:** (eSignature) (Date/Time)

Matrices: **Water** Carrier name: **Client**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☐	No ☑	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s):	23.2c , 22.6c UC/C	IR #31
Cooler(s)/Kit(s):	47229/ 47152	
Date/Time sample(s) sent to storage:	11/10/2021 20:00	

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: Sx R3 & R5 PAH container received broken , Split off sample into 2x Neat vials for 8270_LVI PAHs .

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

RIGHT SOLUTIONS | RIGHT PARTNER

Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 253016

HS21110712

ERM

R1, R2, R3, S13, S14

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	
Work Order		Project Number	
Company Name	ERM	Bill To Company	ERM
Send Report To	Selina Pradhan	Invoice Attn	AP
Address	300 West Summit Avenue	Address	300 West Summit Avenue
City/State/Zip	Charlotte NC 28203	City/State/Zip	Charlotte NC 28203
Phone	507-304-2187	Phone	(
Fax		Fax	
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	R1	23/10/21	09:40														
2	R2	23/10/21	11:05														
3	R3	23/10/21	13:25														
4	S13	23/10/21	09:22														
5	S14	23/10/21	10:55														
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other ____

Results Due Date:

	Date:	Time:	
Relinquished by:			Received by:
Relinquished by:	Date: 11/10/21	Time: 12:30	Received by (Laboratory):
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
	UCC
47224	23.2
47152	22.6

QC Package: (Check One Box Below)

- [X] Level II Std QC
- [ ] Level III Std QC/Raw Data
- [ ] Level IV SW846/CLP
- [ ] Other
- [ ] TRRP Checklist
- [ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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RIGHT SOLUTIONS | RIGHT PARTNER

Consignee: Amerijet Intl - Iah
19345 Kenseick Dr

47152
ND
Nov 14 24

MAWB: 81056286613
HAWB: 81090548043

Total Pieces: 44, Total Weight: 1239

3918590

IAH

RIGHT SOLUTIONS | RIGHT PARTNER

RIGHT SOLUTIONS | RIGHT PARTNER

ACCELERATED

Consignee: Amerijet Intl - Iah
19345 Kenseick Dr

47229
Nov11/24
ND

MAWB: 81056286613
HAWB: 81090548043

Total Pieces: 44, Total Weight: 1239

3918590

IAH

SHIPPER:

GUYANA LOGISTICS & SUPPORT SERVICES
LOT 110 DUKE & BARRACK ST
KINGSTOWN GEORGETOWN
GUYANA.
PHONE: +592-226-4090 / +592-640-0651

47229
Nov11/24
ND

ERM

CONSIGNEE:
TROY JEFFREY
GEORGETOWN OIL FIELD PARTHNERS LLC
1302 WAUGH DRIVE,
1351 HOUSTON TX, 77019 USA.
+1 512-688-6348

AMERIJET INTERNATIONAL, INC.

MIA M6
IAH 12

IAH

ERM

810-56286613 7

HOUSTON 11/01/21 11.04

0002	2128011	0001
CONTROL NO.	WH RECEIPT NO.	PIECE NO.

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

December 14, 2021

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS21120085**

Laboratory Results for: **S14, C1, R3, S13**

Dear Selina Pradhan,

ALS Environmental received 4 sample(s) on Dec 01, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: S14, C1, R3, S13
Work Order: HS21120085

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21120085-01	S14	Water		24-Nov-2021 07:35	01-Dec-2021 17:15	☐
HS21120085-02	C1	Water		24-Nov-2021 08:20	01-Dec-2021 17:15	☐
HS21120085-03	R3	Water		24-Nov-2021 07:05	01-Dec-2021 17:15	☐
HS21120085-04	S13	Water		24-Nov-2021 07:25	01-Dec-2021 17:15	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: S14, C1, R3, S13
Work Order: HS21120085

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

GCMS Semivolatiles by Method SW8270

Batch ID: 173242

Sample ID: C1 (HS21120085-02)

• Sample extracted or prepared outside of hold time.

Sample ID: R3 (HS21120085-03)

• Sample extracted or prepared outside of hold time.

Sample ID: S13 (HS21120085-04)

• Sample extracted or prepared outside of hold time.

Sample ID: S14 (HS21120085-01)

• Sample extracted or prepared outside of hold time.

Metals by Method SW6020A

Batch ID: 173410

Sample ID: C1 (HS21120085-02)

• Lead and Thallium reported at 2x due to high concentration of Sodium.

Sample ID: HS21120431-01MS

• MS and MSD are for an unrelated sample (Manganese)

Metals by Method SW7470A

Batch ID: 173295

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E300

Batch ID: R397369

Sample ID: C1 (HS21120085-02)

• The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Sample ID: S14 (HS21120085-01)

• The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: S14, C1, R3, S13
Work Order: HS21120085

WetChemistry by Method E1664A

Batch ID: R397407

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method Calculation

Batch ID: R397595

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R397452

• Samples received outside method holding time for Dissolved Oxygen which is a field parameter. Sample results are flagged with an "H" qualifier.

WetChemistry by Method SW9040C

Batch ID: R397386

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2520

Batch ID: R397258

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540D

Batch ID: R396846

Sample ID: C1 (HS21120085-02)

• Sample was analyzed outside of the holding time, results should be considered estimated.

• **Sample ID: R3 (HS21120085-03)**

• Sample was analyzed outside of the holding time, results should be considered estimated.

• **Sample ID: S13 (HS21120085-04)**

• Sample was analyzed outside of the holding time, results should be considered estimated.

• **Sample ID: S14 (HS21120085-01)**

• Sample was analyzed outside of the holding time, results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: S14, C1, R3, S13
Work Order: HS21120085

WetChemistry by Method M2540B

Batch ID: R397211

Sample ID: C1 (HS21120085-02)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: R3 (HS21120085-03)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: S13 (HS21120085-04)

- Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: S14 (HS21120085-01)

- Sample was analyzed outside of the holding time, results should be considered estimated.

WetChemistry by Method M2540C

Batch ID: R397024

Sample ID: C1 (HS21120085-02)

- Sample was analyzed outside of the holding time, results should be considered estimated.

- **Sample ID: R3 (HS21120085-03)**

- Sample was analyzed outside of the holding time, results should be considered estimated.

- **Sample ID: S13 (HS21120085-04)**

- Sample was analyzed outside of the holding time, results should be considered estimated.

- **Sample ID: S14 (HS21120085-01)**

- Sample was analyzed outside of the holding time, results should be considered estimated.

WetChemistry by Method E365.3

Batch ID: 173493

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 173490

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Sample ID: S14
Collection Date: 24-Nov-2021 07:35

ANALYTICAL REPORT
WorkOrder:HS21120085
Lab ID:HS21120085-01
Matrix:Water

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**					Prep:SW3510 / 07-Dec-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	08-Dec-2021 22:28
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	08-Dec-2021 22:28
Acenaphthene	U	H		0.027	0.10	ug/L	1	08-Dec-2021 22:28
Acenaphthylene	U	H		0.015	0.10	ug/L	1	08-Dec-2021 22:28
Anthracene	U	H		0.014	0.10	ug/L	1	08-Dec-2021 22:28
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	08-Dec-2021 22:28
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	08-Dec-2021 22:28
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	08-Dec-2021 22:28
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	08-Dec-2021 22:28
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	08-Dec-2021 22:28
Chrysene	U	H		0.021	0.10	ug/L	1	08-Dec-2021 22:28
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	08-Dec-2021 22:28
Fluoranthene	U	H		0.010	0.10	ug/L	1	08-Dec-2021 22:28
Fluorene	U	H		0.030	0.10	ug/L	1	08-Dec-2021 22:28
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	08-Dec-2021 22:28
Isophorone	U	H		0.025	0.20	ug/L	1	08-Dec-2021 22:28
Naphthalene	U	H		0.020	0.10	ug/L	1	08-Dec-2021 22:28
Phenanthrene	U	H		0.021	0.10	ug/L	1	08-Dec-2021 22:28
Pyrene	U	H		0.019	0.10	ug/L	1	08-Dec-2021 22:28
Surr: 2,4,6-Tribromophenol	*49.7*				*34-129*	*%REC*	*1*	*08-Dec-2021 22:28*
Surr: 2-Fluorobiphenyl	*74.3*				*40-125*	*%REC*	*1*	*08-Dec-2021 22:28*
Surr: 2-Fluorophenol	*72.1*				*20-120*	*%REC*	*1*	*08-Dec-2021 22:28*
Surr: 4-Terphenyl-d14	*87.9*				*40-135*	*%REC*	*1*	*08-Dec-2021 22:28*
Surr: Nitrobenzene-d5	*72.0*				*41-120*	*%REC*	*1*	*08-Dec-2021 22:28*
Surr: Phenol-d6	*59.5*				*20-120*	*%REC*	*1*	*08-Dec-2021 22:28*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Sample ID: S14
Collection Date: 24-Nov-2021 07:35

ANALYTICAL REPORT
WorkOrder:HS21120085
Lab ID:HS21120085-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 10-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	10-Dec-2021 22:38
Arsenic	**0.00309**		**0.000400**	**0.00200**	**mg/L**	1	10-Dec-2021 22:38
Beryllium	**0.000280**	J	**0.000200**	**0.00200**	**mg/L**	1	10-Dec-2021 22:38
Cadmium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:38
Chromium	**0.00419**		**0.000400**	**0.00400**	**mg/L**	1	10-Dec-2021 22:38
Copper	**0.00252**		**0.00100**	**0.00200**	**mg/L**	1	10-Dec-2021 22:38
Iron	**6.89**		**0.0120**	**0.200**	**mg/L**	1	10-Dec-2021 22:38
Lead	**0.00476**		**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:38
Manganese	**0.191**		**0.000700**	**0.00500**	**mg/L**	1	10-Dec-2021 22:38
Nickel	**0.00373**		**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:38
Potassium	**1.03**		**0.0180**	**0.200**	**mg/L**	1	10-Dec-2021 22:38
Selenium	U		0.00110	0.00200	mg/L	1	10-Dec-2021 22:38
Silver	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:38
Thallium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:38
Zinc	**0.0493**		**0.00200**	**0.00400**	**mg/L**	1	10-Dec-2021 22:38
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 08-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	08-Dec-2021 12:18
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	U		0.10	0.50	mg/L	1	14-Dec-2021 16:44
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	10-Dec-2021 13:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.668**	J	**0.150**	**1.00**	**mg/L**	5	10-Dec-2021 06:40
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 13-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**0.253**		**0.0200**	**0.0500**	**mg/L**	1	13-Dec-2021 15:20
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**290**	H	**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**104**	H	**5.00**	**10.0**	**mg/L**	1	03-Dec-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**298**	H	**2.50**	**2.50**	**mg/L**	1	02-Dec-2021 13:15
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**1.2**		**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**9.87**	H	**1.00**	**1.00**	**mg/L**	1	11-Dec-2021 11:10

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Sample ID: S14
Collection Date: 24-Nov-2021 07:35

ANALYTICAL REPORT
WorkOrder:HS21120085
Lab ID:HS21120085-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SALINITY	**Method:SM2520**						Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	09-Dec-2021 10:00
PH BY SW9040C	**Method:SW9040C**						Analyst: CWG
pH	**5.44**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**24.2**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Sample ID: C1
Collection Date: 24-Nov-2021 08:20

ANALYTICAL REPORT
WorkOrder:HS21120085
Lab ID:HS21120085-02
Matrix:Water

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**					Prep:SW3510 / 07-Dec-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	08-Dec-2021 22:48
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	08-Dec-2021 22:48
Acenaphthene	U	H		0.027	0.10	ug/L	1	08-Dec-2021 22:48
Acenaphthylene	U	H		0.015	0.10	ug/L	1	08-Dec-2021 22:48
Anthracene	U	H		0.014	0.10	ug/L	1	08-Dec-2021 22:48
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	08-Dec-2021 22:48
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	08-Dec-2021 22:48
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	08-Dec-2021 22:48
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	08-Dec-2021 22:48
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	08-Dec-2021 22:48
Chrysene	U	H		0.021	0.10	ug/L	1	08-Dec-2021 22:48
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	08-Dec-2021 22:48
Fluoranthene	U	H		0.010	0.10	ug/L	1	08-Dec-2021 22:48
Fluorene	U	H		0.030	0.10	ug/L	1	08-Dec-2021 22:48
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	08-Dec-2021 22:48
Isophorone	U	H		0.025	0.20	ug/L	1	08-Dec-2021 22:48
Naphthalene	U	H		0.020	0.10	ug/L	1	08-Dec-2021 22:48
Phenanthrene	U	H		0.021	0.10	ug/L	1	08-Dec-2021 22:48
Pyrene	U	H		0.019	0.10	ug/L	1	08-Dec-2021 22:48
Surr: 2,4,6-Tribromophenol	*70.5*				*34-129*	*%REC*	*1*	*08-Dec-2021 22:48*
Surr: 2-Fluorobiphenyl	*74.3*				*40-125*	*%REC*	*1*	*08-Dec-2021 22:48*
Surr: 2-Fluorophenol	*76.0*				*20-120*	*%REC*	*1*	*08-Dec-2021 22:48*
Surr: 4-Terphenyl-d14	*89.1*				*40-135*	*%REC*	*1*	*08-Dec-2021 22:48*
Surr: Nitrobenzene-d5	*67.0*				*41-120*	*%REC*	*1*	*08-Dec-2021 22:48*
Surr: Phenol-d6	*51.0*				*20-120*	*%REC*	*1*	*08-Dec-2021 22:48*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Sample ID: C1
Collection Date: 24-Nov-2021 08:20

ANALYTICAL REPORT
WorkOrder:HS21120085
Lab ID:HS21120085-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 10-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	10-Dec-2021 22:40
Arsenic	**0.00192**	J	**0.000400**	**0.00200**	**mg/L**	1	10-Dec-2021 22:40
Beryllium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:40
Cadmium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:40
Chromium	**0.00400**		**0.000400**	**0.00400**	**mg/L**	1	10-Dec-2021 22:40
Copper	**0.00101**	J	**0.00100**	**0.00200**	**mg/L**	1	10-Dec-2021 22:40
Iron	**0.876**		**0.0120**	**0.200**	**mg/L**	1	10-Dec-2021 22:40
Lead	U		0.00120	0.00400	mg/L	2	13-Dec-2021 12:29
Manganese	**0.0198**		**0.000700**	**0.00500**	**mg/L**	1	10-Dec-2021 22:40
Nickel	**0.00131**	J	**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:40
Potassium	**236**		**0.360**	**4.00**	**mg/L**	20	13-Dec-2021 12:31
Selenium	**0.00129**	J	**0.00110**	**0.00200**	**mg/L**	1	10-Dec-2021 22:40
Silver	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:40
Thallium	U		0.000400	0.00400	mg/L	2	13-Dec-2021 12:29
Zinc	**0.0367**		**0.00200**	**0.00400**	**mg/L**	1	10-Dec-2021 22:40
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 08-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	08-Dec-2021 12:20
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	U		0.10	0.50	mg/L	1	14-Dec-2021 16:44
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	10-Dec-2021 13:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.492**	J	**0.150**	**1.00**	**mg/L**	5	10-Dec-2021 06:48
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 13-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**0.0650**		**0.0200**	**0.0500**	**mg/L**	1	13-Dec-2021 15:20
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**22,200**	H	**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**20,800**	H	**5.00**	**10.0**	**mg/L**	1	03-Dec-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**22.3**	H	**2.50**	**2.50**	**mg/L**	1	02-Dec-2021 13:15
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.44**	J	**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.5**	H	**1.00**	**1.00**	**mg/L**	1	11-Dec-2021 11:10

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Sample ID: C1
Collection Date: 24-Nov-2021 08:20

ANALYTICAL REPORT
WorkOrder:HS21120085
Lab ID:HS21120085-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SALINITY	**Method:SM2520**						Analyst: MZD
Salinity	**28.2**		**2.00**	**2.00**	**ppt**	1	09-Dec-2021 10:00
PH BY SW9040C	**Method:SW9040C**						Analyst: CWG
pH	**7.70**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**23.4**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Sample ID: R3
Collection Date: 24-Nov-2021 07:05

ANALYTICAL REPORT
WorkOrder:HS21120085
Lab ID:HS21120085-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D		**Method:SW8270**			Prep:SW3510 / 07-Dec-2021		Analyst: GEY
1-Methylnaphthalene	U	H	0.010	0.10	ug/L	1	08-Dec-2021 23:08
2-Methylnaphthalene	U	H	0.019	0.10	ug/L	1	08-Dec-2021 23:08
Acenaphthene	U	H	0.027	0.10	ug/L	1	08-Dec-2021 23:08
Acenaphthylene	U	H	0.015	0.10	ug/L	1	08-Dec-2021 23:08
Anthracene	U	H	0.014	0.10	ug/L	1	08-Dec-2021 23:08
Benz(a)anthracene	U	H	0.050	0.10	ug/L	1	08-Dec-2021 23:08
Benzo(a)pyrene	U	H	0.020	0.10	ug/L	1	08-Dec-2021 23:08
Benzo(b)fluoranthene	U	H	0.023	0.10	ug/L	1	08-Dec-2021 23:08
Benzo(g,h,i)perylene	U	H	0.014	0.10	ug/L	1	08-Dec-2021 23:08
Benzo(k)fluoranthene	U	H	0.019	0.10	ug/L	1	08-Dec-2021 23:08
Chrysene	U	H	0.021	0.10	ug/L	1	08-Dec-2021 23:08
Dibenz(a,h)anthracene	U	H	0.024	0.10	ug/L	1	08-Dec-2021 23:08
Fluoranthene	U	H	0.010	0.10	ug/L	1	08-Dec-2021 23:08
Fluorene	U	H	0.030	0.10	ug/L	1	08-Dec-2021 23:08
Indeno(1,2,3-cd)pyrene	U	H	0.022	0.10	ug/L	1	08-Dec-2021 23:08
Isophorone	U	H	0.025	0.20	ug/L	1	08-Dec-2021 23:08
Naphthalene	U	H	0.020	0.10	ug/L	1	08-Dec-2021 23:08
Phenanthrene	U	H	0.021	0.10	ug/L	1	08-Dec-2021 23:08
Pyrene	U	H	0.019	0.10	ug/L	1	08-Dec-2021 23:08
Surr: 2,4,6-Tribromophenol	*65.9*			*34-129*	*%REC*	*1*	*08-Dec-2021 23:08*
Surr: 2-Fluorobiphenyl	*76.3*			*40-125*	*%REC*	*1*	*08-Dec-2021 23:08*
Surr: 2-Fluorophenol	*82.1*			*20-120*	*%REC*	*1*	*08-Dec-2021 23:08*
Surr: 4-Terphenyl-d14	*93.5*			*40-135*	*%REC*	*1*	*08-Dec-2021 23:08*
Surr: Nitrobenzene-d5	*71.0*			*41-120*	*%REC*	*1*	*08-Dec-2021 23:08*
Surr: Phenol-d6	*57.9*			*20-120*	*%REC*	*1*	*08-Dec-2021 23:08*
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**130**	H	**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**62.0**	H	**5.00**	**10.0**	**mg/L**	1	03-Dec-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**44.0**	H	**2.50**	**2.50**	**mg/L**	1	02-Dec-2021 13:15
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.9**	H	**1.00**	**1.00**	**mg/L**	1	11-Dec-2021 11:10
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	09-Dec-2021 10:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Sample ID: R3
Collection Date: 24-Nov-2021 07:05

ANALYTICAL REPORT
WorkOrder:HS21120085
Lab ID:HS21120085-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
PH BY SW9040C	**Method:SW9040C**						Analyst: CWG
pH	**4.87**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**24.2**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Sample ID: S13
Collection Date: 24-Nov-2021 07:25

ANALYTICAL REPORT
WorkOrder:HS21120085
Lab ID:HS21120085-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D		**Method:SW8270**			Prep:SW3510 / 07-Dec-2021		Analyst: GEY
1-Methylnaphthalene	U	H	0.010	0.10	ug/L	1	08-Dec-2021 23:27
2-Methylnaphthalene	U	H	0.019	0.10	ug/L	1	08-Dec-2021 23:27
Acenaphthene	U	H	0.027	0.10	ug/L	1	08-Dec-2021 23:27
Acenaphthylene	U	H	0.015	0.10	ug/L	1	08-Dec-2021 23:27
Anthracene	U	H	0.014	0.10	ug/L	1	08-Dec-2021 23:27
Benz(a)anthracene	U	H	0.050	0.10	ug/L	1	08-Dec-2021 23:27
Benzo(a)pyrene	U	H	0.020	0.10	ug/L	1	08-Dec-2021 23:27
Benzo(b)fluoranthene	U	H	0.023	0.10	ug/L	1	08-Dec-2021 23:27
Benzo(g,h,i)perylene	U	H	0.014	0.10	ug/L	1	08-Dec-2021 23:27
Benzo(k)fluoranthene	U	H	0.019	0.10	ug/L	1	08-Dec-2021 23:27
Chrysene	U	H	0.021	0.10	ug/L	1	08-Dec-2021 23:27
Dibenz(a,h)anthracene	U	H	0.024	0.10	ug/L	1	08-Dec-2021 23:27
Fluoranthene	U	H	0.010	0.10	ug/L	1	08-Dec-2021 23:27
Fluorene	U	H	0.030	0.10	ug/L	1	08-Dec-2021 23:27
Indeno(1,2,3-cd)pyrene	U	H	0.022	0.10	ug/L	1	08-Dec-2021 23:27
Isophorone	U	H	0.025	0.20	ug/L	1	08-Dec-2021 23:27
Naphthalene	U	H	0.020	0.10	ug/L	1	08-Dec-2021 23:27
Phenanthrene	U	H	0.021	0.10	ug/L	1	08-Dec-2021 23:27
Pyrene	U	H	0.019	0.10	ug/L	1	08-Dec-2021 23:27
Surr: 2,4,6-Tribromophenol	*68.3*			*34-129*	*%REC*	*1*	*08-Dec-2021 23:27*
Surr: 2-Fluorobiphenyl	*72.3*			*40-125*	*%REC*	*1*	*08-Dec-2021 23:27*
Surr: 2-Fluorophenol	*72.6*			*20-120*	*%REC*	*1*	*08-Dec-2021 23:27*
Surr: 4-Terphenyl-d14	*88.3*			*40-135*	*%REC*	*1*	*08-Dec-2021 23:27*
Surr: Nitrobenzene-d5	*87.9*			*41-120*	*%REC*	*1*	*08-Dec-2021 23:27*
Surr: Phenol-d6	*61.3*			*20-120*	*%REC*	*1*	*08-Dec-2021 23:27*
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**420**	H	**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**114**	H	**5.00**	**10.0**	**mg/L**	1	03-Dec-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**286**	H	**2.50**	**2.50**	**mg/L**	1	02-Dec-2021 13:15
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**9.79**	H	**1.00**	**1.00**	**mg/L**	1	11-Dec-2021 11:10
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	09-Dec-2021 10:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Sample ID: S13
Collection Date: 24-Nov-2021 07:25

ANALYTICAL REPORT
WorkOrder:HS21120085
Lab ID:HS21120085-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
PH BY SW9040C	**Method:SW9040C**						Analyst: CWG
pH	**5.42**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**23.9**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

Batch ID: 173242 **Start Date:** 07 Dec 2021 07:00 **End Date:** 07 Dec 2021 12:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120085-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120085-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120085-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120085-04	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173295 **Start Date:** 08 Dec 2021 08:00 **End Date:** 08 Dec 2021 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120085-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120085-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173410 **Start Date:** 10 Dec 2021 12:00 **End Date:** 10 Dec 2021 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120085-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120085-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173490 **Start Date:** 13 Dec 2021 10:00 **End Date:** 13 Dec 2021 14:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120085-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120085-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 173493 **Start Date:** 13 Dec 2021 10:00 **End Date:** 13 Dec 2021 12:30
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120085-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120085-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173242 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35		07 Dec 2021 09:02	08 Dec 2021 22:28	1
HS21120085-02	C1	24 Nov 2021 08:20		07 Dec 2021 09:02	08 Dec 2021 22:48	1
HS21120085-03	R3	24 Nov 2021 07:05		07 Dec 2021 09:02	08 Dec 2021 23:08	1
HS21120085-04	S13	24 Nov 2021 07:25		07 Dec 2021 09:02	08 Dec 2021 23:27	1
Batch ID: 173295 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35		08 Dec 2021 08:00	08 Dec 2021 12:18	1
HS21120085-02	C1	24 Nov 2021 08:20		08 Dec 2021 08:00	08 Dec 2021 12:20	1
Batch ID: 173410 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35		10 Dec 2021 16:00	10 Dec 2021 22:38	1
HS21120085-02	C1	24 Nov 2021 08:20		10 Dec 2021 16:00	13 Dec 2021 12:31	20
HS21120085-02	C1	24 Nov 2021 08:20		10 Dec 2021 16:00	13 Dec 2021 12:29	2
HS21120085-02	C1	24 Nov 2021 08:20		10 Dec 2021 16:00	10 Dec 2021 22:40	1
Batch ID: 173490 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35		13 Dec 2021 10:00	13 Dec 2021 14:20	1
HS21120085-02	C1	24 Nov 2021 08:20		13 Dec 2021 10:00	13 Dec 2021 14:20	1
Batch ID: 173493 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35		13 Dec 2021 10:00	13 Dec 2021 15:20	1
HS21120085-02	C1	24 Nov 2021 08:20		13 Dec 2021 10:00	13 Dec 2021 15:20	1
Batch ID: R396846 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35			02 Dec 2021 13:15	1
HS21120085-02	C1	24 Nov 2021 08:20			02 Dec 2021 13:15	1
HS21120085-03	R3	24 Nov 2021 07:05			02 Dec 2021 13:15	1
HS21120085-04	S13	24 Nov 2021 07:25			02 Dec 2021 13:15	1
Batch ID: R397024 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35			03 Dec 2021 17:20	1
HS21120085-02	C1	24 Nov 2021 08:20			03 Dec 2021 17:20	1
HS21120085-03	R3	24 Nov 2021 07:05			03 Dec 2021 17:20	1
HS21120085-04	S13	24 Nov 2021 07:25			03 Dec 2021 17:20	1
Batch ID: R397211 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35			06 Dec 2021 18:00	1
HS21120085-02	C1	24 Nov 2021 08:20			06 Dec 2021 18:00	1
HS21120085-03	R3	24 Nov 2021 07:05			06 Dec 2021 18:00	1
HS21120085-04	S13	24 Nov 2021 07:25			06 Dec 2021 18:00	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R397258 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35			09 Dec 2021 10:00	1
HS21120085-02	C1	24 Nov 2021 08:20			09 Dec 2021 10:00	1
HS21120085-03	R3	24 Nov 2021 07:05			09 Dec 2021 10:00	1
HS21120085-04	S13	24 Nov 2021 07:25			09 Dec 2021 10:00	1
Batch ID: R397369 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35			10 Dec 2021 06:40	5
HS21120085-02	C1	24 Nov 2021 08:20			10 Dec 2021 06:48	5
Batch ID: R397386 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35			10 Dec 2021 13:35	1
HS21120085-02	C1	24 Nov 2021 08:20			10 Dec 2021 13:35	1
HS21120085-03	R3	24 Nov 2021 07:05			10 Dec 2021 13:35	1
HS21120085-04	S13	24 Nov 2021 07:25			10 Dec 2021 13:35	1
Batch ID: R397407 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35			10 Dec 2021 13:50	1
HS21120085-02	C1	24 Nov 2021 08:20			10 Dec 2021 13:50	1
Batch ID: R397452 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35			11 Dec 2021 11:10	1
HS21120085-02	C1	24 Nov 2021 08:20			11 Dec 2021 11:10	1
HS21120085-03	R3	24 Nov 2021 07:05			11 Dec 2021 11:10	1
HS21120085-04	S13	24 Nov 2021 07:25			11 Dec 2021 11:10	1
Batch ID: R397595 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS21120085-01	S14	24 Nov 2021 07:35			14 Dec 2021 16:44	1
HS21120085-02	C1	24 Nov 2021 08:20			14 Dec 2021 16:44	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173295 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-173295** Units: **mg/L** Analysis Date: **08-Dec-2021 11:54**
Client ID: Run ID: **HG03_397205** SeqNo: **6411307** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U		0.000200								

LCS Sample ID: **LCS-173295** Units: **mg/L** Analysis Date: **08-Dec-2021 11:56**
Client ID: Run ID: **HG03_397205** SeqNo: **6411308** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00526		0.000200	0.005	0	105	80 - 120				

MS Sample ID: **HS21120054-02MS** Units: **mg/L** Analysis Date: **08-Dec-2021 12:03**
Client ID: Run ID: **HG03_397205** SeqNo: **6411310** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00477		0.000200	0.005	0.000095	93.5	75 - 125				

MSD Sample ID: **HS21120054-02MSD** Units: **mg/L** Analysis Date: **08-Dec-2021 12:06**
Client ID: Run ID: **HG03_397205** SeqNo: **6411311** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00439		0.000200	0.005	0.000095	85.9	75 - 125	0.00477	8.3	20	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-173410** Units: **mg/L** Analysis Date: **13-Dec-2021 12:04**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6418178** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Copper	U	0.00200								
Iron	U	0.200								
Lead	U	0.00200								
Manganese	U	0.00500								
Nickel	U	0.00200								
Potassium	U	0.200								
Selenium	U	0.00200								
Silver	0.000219	0.00200								J
Thallium	U	0.00200								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-173410** Units: **mg/L** Analysis Date: **10-Dec-2021 22:18**
Client ID: Run ID: **ICPMS06_397400** SeqNo: **6416765** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0508	0.00200	0.05	0	102	80 - 120				
Arsenic	0.04903	0.00200	0.05	0	98.1	80 - 120				
Beryllium	0.04831	0.00200	0.05	0	96.6	80 - 120				
Cadmium	0.04958	0.00200	0.05	0	99.2	80 - 120				
Chromium	0.04859	0.00400	0.05	0	97.2	80 - 120				
Copper	0.04927	0.00200	0.05	0	98.5	80 - 120				
Iron	4.876	0.200	5	0	97.5	80 - 120				
Lead	0.04897	0.00200	0.05	0	97.9	80 - 120				
Manganese	0.04826	0.00500	0.05	0	96.5	80 - 120				
Nickel	0.04905	0.00200	0.05	0	98.1	80 - 120				
Potassium	4.794	0.200	5	0	95.9	80 - 120				
Selenium	0.04972	0.00200	0.05	0	99.4	80 - 120				
Silver	0.04768	0.00200	0.05	0	95.4	80 - 120				
Thallium	0.05045	0.00200	0.05	0	101	80 - 120				
Zinc	0.05176	0.00400	0.05	0	104	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21120431-01MS** Units: **mg/L** Analysis Date: **10-Dec-2021 22:26**
Client ID: Run ID: **ICPMS06_397400** SeqNo: **6416769** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05057	0.00200	0.05	0.000043	101	80 - 120				
Arsenic	0.0508	0.00200	0.05	0.001069	99.5	80 - 120				
Beryllium	0.05088	0.00200	0.05	0.000032	102	80 - 120				
Cadmium	0.04771	0.00200	0.05	0.000064	95.3	80 - 120				
Chromium	0.04865	0.00400	0.05	0.000332	96.6	80 - 120				
Copper	0.0467	0.00200	0.05	0.000445	92.5	80 - 120				
Iron	4.78	0.200	5	0.0429	94.7	80 - 120				
Lead	0.0503	0.00200	0.05	0.000036	101	80 - 120				
Manganese	0.3212	0.00500	0.05	0.286	70.4	80 - 120				SO
Nickel	0.0509	0.00200	0.05	0.003229	95.3	80 - 120				
Potassium	6.37	0.200	5	1.771	92.0	80 - 120				
Selenium	0.05078	0.00200	0.05	0.000545	100	80 - 120				
Silver	0.04466	0.00200	0.05	-0.000008	89.3	80 - 120				
Thallium	0.05013	0.00200	0.05	0.00001	100	80 - 120				
Zinc	0.05067	0.00400	0.05	0.001532	98.3	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21120431-01MSD** Units: **mg/L** Analysis Date: **10-Dec-2021 22:28**
Client ID: Run ID: **ICPMS06_397400** SeqNo: **6416770** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05175	0.00200	0.05	0.000043	103	80 - 120	0.05057	2.31	20	
Arsenic	0.0513	0.00200	0.05	0.001069	100	80 - 120	0.0508	0.991	20	
Beryllium	0.05151	0.00200	0.05	0.000032	103	80 - 120	0.05088	1.22	20	
Cadmium	0.04868	0.00200	0.05	0.000064	97.2	80 - 120	0.04771	1.99	20	
Chromium	0.04931	0.00400	0.05	0.000332	98.0	80 - 120	0.04865	1.35	20	
Copper	0.0468	0.00200	0.05	0.000445	92.7	80 - 120	0.0467	0.21	20	
Iron	4.822	0.200	5	0.0429	95.6	80 - 120	4.78	0.867	20	
Lead	0.05071	0.00200	0.05	0.000036	101	80 - 120	0.0503	0.81	20	
Manganese	0.3232	0.00500	0.05	0.286	74.4	80 - 120	0.3212	0.621	20	SO
Nickel	0.05012	0.00200	0.05	0.003229	93.8	80 - 120	0.0509	1.54	20	
Potassium	6.517	0.200	5	1.771	94.9	80 - 120	6.37	2.29	20	
Selenium	0.05166	0.00200	0.05	0.000545	102	80 - 120	0.05078	1.72	20	
Silver	0.04485	0.00200	0.05	-0.000008	89.7	80 - 120	0.04466	0.438	20	
Thallium	0.05098	0.00200	0.05	0.00001	102	80 - 120	0.05013	1.7	20	
Zinc	0.05115	0.00400	0.05	0.001532	99.2	80 - 120	0.05067	0.951	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

PDS Sample ID: **HS21120431-01PDS** Units: **mg/L** Analysis Date: **10-Dec-2021 22:30**
Client ID: Run ID: **ICPMS06_397400** SeqNo: **6416771** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1059	0.00200	0.1	0	106	75 - 125				
Arsenic	0.1054	0.00200	0.1	0.001069	104	75 - 125				
Beryllium	0.1059	0.00200	0.1	0	106	75 - 125				
Cadmium	0.0995	0.00200	0.1	0	99.5	75 - 125				
Chromium	0.1002	0.00400	0.1	0	100	75 - 125				
Copper	0.09656	0.00200	0.1	0	96.6	75 - 125				
Iron	9.89	0.200	10	0.0429	98.5	75 - 125				
Lead	0.1076	0.00200	0.1	0	108	75 - 125				
Manganese	0.3644	0.00500	0.1	0.286	78.4	75 - 125				
Nickel	0.1002	0.00200	0.1	0.003229	96.9	75 - 125				
Potassium	11.5	0.200	10	1.771	97.3	75 - 125				
Selenium	0.1051	0.00200	0.1	0	105	75 - 125				
Silver	0.08735	0.00200	0.1	0	87.4	75 - 125				
Thallium	0.11	0.00200	0.1	0	110	75 - 125				
Zinc	0.1034	0.00400	0.1	0	103	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21120431-01SD** Units: **mg/L** Analysis Date: **10-Dec-2021 22:24**
Client ID: Run ID: **ICPMS06_397400** SeqNo: **6416768** PrepDate: **10-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000043	0	10	
Arsenic	U	0.0100					0.001069	0	10	
Beryllium	U	0.0100					0.000032	0	10	
Cadmium	U	0.0100					0.000064	0	10	
Chromium	U	0.0200					0.000332	0	10	
Copper	U	0.0100					0.000445	0	10	
Iron	U	1.00					0.0429	0	10	
Lead	U	0.0100					0.000036	0	10	
Manganese	0.2782	0.0250					0.286	2.73	10	
Nickel	0.003057	0.0100					0.003229	0	10	J
Potassium	1.717	1.00					1.771	3.03	10	
Selenium	U	0.0100					0.000545	0	10	
Silver	U	0.0100					-0.000008	0	10	
Thallium	U	0.0100					0.00001	0	10	
Zinc	U	0.0200					0.001532	0	10	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 11:52**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415760** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.10								
2-Methylnaphthalene	U	0.10								
Acenaphthene	U	0.10								
Acenaphthylene	U	0.10								
Anthracene	U	0.10								
Benz(a)anthracene	U	0.10								
Benzo(a)pyrene	U	0.10								
Benzo(b)fluoranthene	U	0.10								
Benzo(g,h,i)perylene	U	0.10								
Benzo(k)fluoranthene	U	0.10								
Chrysene	U	0.10								
Dibenz(a,h)anthracene	U	0.10								
Fluoranthene	U	0.10								
Fluorene	U	0.10								
Indeno(1,2,3-cd)pyrene	U	0.10								
Isophorone	U	0.20								
Naphthalene	U	0.10								
Phenanthrene	U	0.10								
Pyrene	U	0.10								
Surr: 2,4,6-Tribromophenol	*4.056*	*0.20*	*5*	*0*	*81.1*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.197*	*0.20*	*5*	*0*	*83.9*	*40 - 125*				
Surr: 2-Fluorophenol	*4.81*	*0.20*	*5*	*0*	*96.2*	*20 - 120*				
Surr: 4-Terphenyl-d14	*5.105*	*0.20*	*5*	*0*	*102*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.041*	*0.20*	*5*	*0*	*80.8*	*41 - 120*				
Surr: Phenol-d6	*4.249*	*0.20*	*5*	*0*	*85.0*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCS Sample ID: **LCS-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 12:11**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415761** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	3.498	0.10	5	0	70.0	45 - 120				
2-Methylnaphthalene	3.437	0.10	5	0	68.7	50 - 120				
Acenaphthene	3.164	0.10	5	0	63.3	45 - 120				
Acenaphthylene	3.439	0.10	5	0	68.8	47 - 120				
Anthracene	3.694	0.10	5	0	73.9	45 - 120				
Benz(a)anthracene	4.17	0.10	5	0	83.4	40 - 120				
Benzo(a)pyrene	4.36	0.10	5	0	87.2	45 - 120				
Benzo(b)fluoranthene	3.998	0.10	5	0	80.0	50 - 120				
Benzo(g,h,i)perylene	4.078	0.10	5	0	81.6	42 - 127				
Benzo(k)fluoranthene	3.994	0.10	5	0	79.9	45 - 127				
Chrysene	3.905	0.10	5	0	78.1	43 - 120				
Dibenz(a,h)anthracene	3.887	0.10	5	0	77.7	45 - 125				
Fluoranthene	3.949	0.10	5	0	79.0	45 - 125				
Fluorene	3.485	0.10	5	0	69.7	49 - 120				
Indeno(1,2,3-cd)pyrene	4.072	0.10	5	0	81.4	41 - 128				
Isophorone	3.407	0.20	5	0	68.1	40 - 121				
Naphthalene	3.368	0.10	5	0	67.4	45 - 120				
Phenanthrene	3.593	0.10	5	0	71.9	45 - 121				
Pyrene	4.065	0.10	5	0	81.3	40 - 130				
Surr: 2,4,6-Tribromophenol	*3.536*	*0.20*	*5*	*0*	*70.7*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*3.226*	*0.20*	*5*	*0*	*64.5*	*40 - 125*				
Surr: 2-Fluorophenol	*3.309*	*0.20*	*5*	*0*	*66.2*	*20 - 120*				
Surr: 4-Terphenyl-d14	*4.125*	*0.20*	*5*	*0*	*82.5*	*40 - 135*				
Surr: Nitrobenzene-d5	*3.167*	*0.20*	*5*	*0*	*63.3*	*41 - 120*				
Surr: Phenol-d6	*3.164*	*0.20*	*5*	*0*	*63.3*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCSD Sample ID: **LCSD-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 13:29**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415764** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	3.718	0.10	5	0	74.4	45 - 120	3.498	6.09	20	
2-Methylnaphthalene	3.562	0.10	5	0	71.2	50 - 120	3.437	3.58	20	
Acenaphthene	3.034	0.10	5	0	60.7	45 - 120	3.164	4.18	20	
Acenaphthylene	3.434	0.10	5	0	68.7	47 - 120	3.439	0.163	20	
Anthracene	3.79	0.10	5	0	75.8	45 - 120	3.694	2.57	20	
Benz(a)anthracene	4.299	0.10	5	0	86.0	40 - 120	4.17	3.05	20	
Benzo(a)pyrene	4.456	0.10	5	0	89.1	45 - 120	4.36	2.17	20	
Benzo(b)fluoranthene	3.951	0.10	5	0	79.0	50 - 120	3.998	1.16	20	
Benzo(g,h,i)perylene	4.466	0.10	5	0	89.3	42 - 127	4.078	9.08	20	
Benzo(k)fluoranthene	3.923	0.10	5	0	78.5	45 - 127	3.994	1.78	20	
Chrysene	3.995	0.10	5	0	79.9	43 - 120	3.905	2.29	20	
Dibenz(a,h)anthracene	3.899	0.10	5	0	78.0	45 - 125	3.887	0.295	20	
Fluoranthene	4.116	0.10	5	0	82.3	45 - 125	3.949	4.15	20	
Fluorene	3.572	0.10	5	0	71.4	49 - 120	3.485	2.46	20	
Indeno(1,2,3-cd)pyrene	4.256	0.10	5	0	85.1	41 - 128	4.072	4.4	20	
Isophorone	3.85	0.20	5	0	77.0	40 - 121	3.407	12.2	20	
Naphthalene	3.346	0.10	5	0	66.9	45 - 120	3.368	0.64	20	
Phenanthrene	3.601	0.10	5	0	72.0	45 - 121	3.593	0.228	20	
Pyrene	4.245	0.10	5	0	84.9	40 - 130	4.065	4.34	20	
Surr: 2,4,6-Tribromophenol	*3.43*	*0.20*	*5*	*0*	*68.6*	*34 - 129*	*3.536*	*3.04*	*20*	
Surr: 2-Fluorobiphenyl	*3.142*	*0.20*	*5*	*0*	*62.8*	*40 - 125*	*3.226*	*2.63*	*20*	
Surr: 2-Fluorophenol	*3.516*	*0.20*	*5*	*0*	*70.3*	*20 - 120*	*3.309*	*6.07*	*20*	
Surr: 4-Terphenyl-d14	*4.434*	*0.20*	*5*	*0*	*88.7*	*40 - 135*	*4.125*	*7.24*	*20*	
Surr: Nitrobenzene-d5	*3.651*	*0.20*	*5*	*0*	*73.0*	*41 - 120*	*3.167*	*14.2*	*20*	
Surr: Phenol-d6	*3.285*	*0.20*	*5*	*0*	*65.7*	*20 - 120*	*3.164*	*3.74*	*20*	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02 HS21120085-03 HS21120085-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173490 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-173490** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: Run ID: **WetChem_HS_397495** SeqNo: **6418454** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-173490** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: Run ID: **WetChem_HS_397495** SeqNo: **6418453** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.03	0.50	20	0	95.2	85 - 115				

MS Sample ID: **HS21120085-02MS** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: **C1** Run ID: **WetChem_HS_397495** SeqNo: **6418451** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.98	0.50	20	0.442	97.7	75 - 125				

MSD Sample ID: **HS21120085-02MSD** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: **C1** Run ID: **WetChem_HS_397495** SeqNo: **6418452** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20	0.50	20	0.442	97.8	75 - 125	19.98	0.07	20	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: 173493 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173493** Units: **mg/L** Analysis Date: **13-Dec-2021 15:20**
Client ID: Run ID: **UV-2450_397506** SeqNo: **6418638** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-173493** Units: **mg/L** Analysis Date: **13-Dec-2021 15:20**
Client ID: Run ID: **UV-2450_397506** SeqNo: **6418637** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.261	0.0500	0.25	0	104	80 - 120				

MS Sample ID: **HS21120085-02MS** Units: **mg/L** Analysis Date: **13-Dec-2021 15:20**
Client ID: **C1** Run ID: **UV-2450_397506** SeqNo: **6418635** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.297	0.0500	0.25	0.065	92.8	80 - 120				

MSD Sample ID: **HS21120085-02MSD** Units: **mg/L** Analysis Date: **13-Dec-2021 15:20**
Client ID: **C1** Run ID: **UV-2450_397506** SeqNo: **6418636** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.302	0.0500	0.25	0.065	94.8	80 - 120	0.297	1.67	20	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: R396846 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-120121** Units: **mg/L** Analysis Date: **02-Dec-2021 13:15**
Client ID: Run ID: **Balance1_396846** SeqNo: **6402958** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-120121** Units: **mg/L** Analysis Date: **02-Dec-2021 13:15**
Client ID: Run ID: **Balance1_396846** SeqNo: **6402959** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	95	2.50	100	0	95.0	85 - 115				

DUP Sample ID: **HS21111602-01DUP** Units: **mg/L** Analysis Date: **02-Dec-2021 13:15**
Client ID: Run ID: **Balance1_396846** SeqNo: **6402957** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50					0	0	5	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02 HS21120085-03 HS21120085-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: R397024 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-120321** Units: **mg/L** Analysis Date: **03-Dec-2021 17:20**
Client ID: Run ID: **Balance1_397024** SeqNo: **6406869** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-120321** Units: **mg/L** Analysis Date: **03-Dec-2021 17:20**
Client ID: Run ID: **Balance1_397024** SeqNo: **6406870** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1016	10.0	1000	0	102	85 - 115				

DUP Sample ID: **HS21111378-01DUP** Units: **mg/L** Analysis Date: **03-Dec-2021 17:20**
Client ID: Run ID: **Balance1_397024** SeqNo: **6406862** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	210	10.0					212	0.948	5	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02 HS21120085-03 HS21120085-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: R397211 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R397211** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411617** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R397211** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411616** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	992	10.0	1000	0	99.2	85 - 115				

DUP Sample ID: **HS21120297-02DUP** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411618** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	142	10.0					140	1.42	20	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02 HS21120085-03 HS21120085-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: R397258 (0) **Instrument: WetChem_HS** **Method: SALINITY**

DUP Sample ID: **HS21111455-02DUP** Units: **ppt** Analysis Date: **09-Dec-2021 10:00**
Client ID: Run ID: **WetChem_HS_397258** SeqNo: **6412861** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02 HS21120085-03 HS21120085-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: R397369 (0) **Instrument:** ICS-Integrion **Method:** NITRATE/NITRITE BY E300.0, REV 2.1, 1993

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **09-Dec-2021 23:59**
Client ID: Run ID: **ICS-Integrion_397369** SeqNo: **6415174** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **10-Dec-2021 00:06**
Client ID: Run ID: **ICS-Integrion_397369** SeqNo: **6415175** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	7.71	0.200	8	0	96.4	90 - 110				

MS Sample ID: **HS21110712-01MS** Units: **mg/L** Analysis Date: **10-Dec-2021 05:17**
Client ID: Run ID: **ICS-Integrion_397369** SeqNo: **6415181** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.39	1.00	20	0.444	94.7	80 - 120				

MSD Sample ID: **HS21110712-01MSD** Units: **mg/L** Analysis Date: **10-Dec-2021 05:24**
Client ID: Run ID: **ICS-Integrion_397369** SeqNo: **6415182** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	20.03	1.00	20	0.444	97.9	80 - 120	19.39	3.21	20	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: R397386 (0) **Instrument:** WetChem_HS **Method:** PH BY SW9040C

DUP Sample ID: **HS21110712-01DUP** Units: **pH Units** Analysis Date: **10-Dec-2021 13:35**
Client ID: Run ID: **WetChem_HS_397386** SeqNo: **6415538** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	6.57	0.100					6.53	0.611	10	
Temp Deg C @pH	23.7	0					23.7	0	10	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02 HS21120085-03 HS21120085-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: R397407 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-121021** Units: **mg/L** Analysis Date: **10-Dec-2021 13:50**
Client ID: Run ID: **Balance1_397407** SeqNo: **6416205** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-121021** Units: **mg/L** Analysis Date: **10-Dec-2021 13:50**
Client ID: Run ID: **Balance1_397407** SeqNo: **6416207** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.9	2.00	40	0	92.2	78 - 114				

LCSD Sample ID: **WLCSDW-121021** Units: **mg/L** Analysis Date: **10-Dec-2021 13:50**
Client ID: Run ID: **Balance1_397407** SeqNo: **6416206** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38	2.00	40	0	95.0	78 - 114	36.9	2.94	18	

MS Sample ID: **HS21120300-01MS** Units: **mg/L** Analysis Date: **10-Dec-2021 13:50**
Client ID: Run ID: **Balance1_397407** SeqNo: **6416202** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.1	2.00	40	2.834	83.2	78 - 114				

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: HS21120085

QC BATCH REPORT

Batch ID: R397452 (0) **Instrument:** ManTech01 **Method:** DISSOLVED OXYGEN BY SM4500-O G

DUP Sample ID: **HS21120085-01DUP** Units: **mg/L** Analysis Date: **11-Dec-2021 11:10**
Client ID: **S14** Run ID: **ManTech01_397452** SeqNo: **6417205** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	9.77	1.00					9.87	1.02	20	

The following samples were analyzed in this batch: HS21120085-01 HS21120085-02 HS21120085-03 HS21120085-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
WorkOrder: **HS21120085**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Dept of Defense	PJLA L20-507-R2	22-Dec-2021
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: S14, C1, R3, S13
Work Order: HS21120085

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS21120085-01	S14	Login	12/2/2021 11:43:31 AM	NDR	MET103
HS21120085-01	S14	Login	12/2/2021 11:43:31 AM	NDR	EXT080
HS21120085-01	S14	Login	12/2/2021 11:43:31 AM	NDR	WET381
HS21120085-01	S14	Login	12/2/2021 11:43:31 AM	NDR	WET388
HS21120085-01	S14	Login	12/2/2021 11:43:31 AM	NDR	WET388
HS21120085-01	S14	Login	12/2/2021 11:43:31 AM	NDR	WET377
HS21120085-01	S14	Login	12/2/2021 11:43:31 AM	NDR	WET380
HS21120085-02	C1	Login	12/2/2021 11:43:31 AM	NDR	MET103
HS21120085-02	C1	Login	12/2/2021 11:43:31 AM	NDR	EXT080
HS21120085-02	C1	Login	12/2/2021 11:43:31 AM	NDR	WET381
HS21120085-02	C1	Login	12/2/2021 11:43:31 AM	NDR	WET388
HS21120085-02	C1	Login	12/2/2021 11:43:31 AM	NDR	WET388
HS21120085-02	C1	Login	12/2/2021 11:43:31 AM	NDR	WET377
HS21120085-02	C1	Login	12/2/2021 11:43:31 AM	NDR	WET380
HS21120085-03	R3	Login	12/2/2021 11:43:31 AM	NDR	MET103
HS21120085-03	R3	Login	12/2/2021 11:43:31 AM	NDR	WET381
HS21120085-03	R3	Login	12/2/2021 11:43:31 AM	NDR	WET388
HS21120085-03	R3	Login	12/2/2021 11:43:31 AM	NDR	WET388
HS21120085-03	R3	Login	12/2/2021 11:43:31 AM	NDR	WET377
HS21120085-03	R3	Login	12/2/2021 11:43:31 AM	NDR	WET380
HS21120085-03	R3	Login	12/2/2021 11:43:31 AM	NDR	LVI024
HS21120085-04	S13	Login	12/2/2021 11:43:31 AM	NDR	MET103
HS21120085-04	S13	Login	12/2/2021 11:43:31 AM	NDR	EXT080
HS21120085-04	S13	Login	12/2/2021 11:43:31 AM	NDR	WET381
HS21120085-04	S13	Login	12/2/2021 11:43:31 AM	NDR	WET388
HS21120085-04	S13	Login	12/2/2021 11:43:31 AM	NDR	WET388
HS21120085-04	S13	Login	12/2/2021 11:43:31 AM	NDR	WET377
HS21120085-04	S13	Login	12/2/2021 11:43:31 AM	NDR	WET380

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Sample Receipt Checklist

Work Order ID: HS21120085 **Date/Time Received:** 01-Dec-2021 17:15

Client Name: ERM NC **Received by:** Jared R. Makan

Completed By: /S/ Nilesh D. Ranchod (eSignature) 02-Dec-2021 12:09 (Date/Time) **Reviewed by:** (eSignature) (Date/Time)

Matrices: **Water** Carrier name: **Client**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:253019
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s):	20.1c UC/C	IR #31
Cooler(s)/Kit(s):	RED	
Date/Time sample(s) sent to storage:	12/02/2021 13:00	

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: Soil chain used for water samples , Logged per sample containers received .

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody Form

Page 1 of 1

COC ID: 253019

HS21120085

ERM

S14, C1, R3, S13

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name		
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte NC 28203	City/State/Zip	Charlotte NC 28203	
Phone	507-304-2187	Phone	(	
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	

A	8270SIM_Soil (PAHs)
B	8081 Pesticides
C	ICP_Soil_Low (6020/7471 Metals -16)
D	PCB_Soil_Total (8082 PCBs)
E	TS_S (Total Solids)
F	TOC_Soil (Total Organic Carbon)
G	Sub Sulfide 9030 ALS Holland MI
H	Sub ALS Kelso ASTM D422 - 15 Day TAT
I	
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	S14	24/11/21	7:35 am			8											
2	C1	24/11/21	8:20 am			8											
3	R3	24/11/21	7:05 am			3											
4	S13	24/11/21	7:25 am			3											
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Michael Lowe-CEMO

Shipment Method:

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by: Michael Lowe-CEMO Date: 11/25/2021 Time: 10:56 am

Received by: C Rodney

Relinquished by: C Rodney e.r. Date: 11/25/2021 Time:

Received by (Laboratory):

Logged by (Laboratory): Date: 12-1-21 Time: 17:15

Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
RED	20.1C
IR31	CFO

QC Package: (Check One Box Below)

[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SW846/CLP
[ ] Other
[ ] TRRP Checklist
[ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

Red

CUSTODY SEAL

Date: 11/5/2021 Time: 10:57 am
Name:
Company: Guyana Logistics

Seal Broken By:
Date: 12/01/21

Red

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

Reds

CUSTODY SEAL

Date: 11/25/2021 Time: 10:57am
Name: C. Rodney
Company: Guyana Logistics

Seal Broken By:
Date: 12/01/21

EXPRESS WORLDWIDE WPX DHL

77039 HOUSTON, UNITED STATES OF AMERICA

Origin: GEO

US – IAH – HOU

[redacted]

Ref Code: 954551200 Date: 2021-11-25 Peak/Total Weight: 191.0 LB Piece: 2/2

Freight Description

Red

WAYBILL 22 0751 1412

(2L)US77099+48000001

(J) J001 4040 0091 9520 8551

LB103S
(10/07) OMN

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

December 14, 2021

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS21120102**

Laboratory Results for: **R1, R2, R3, S13**

Dear Selina Pradhan,

ALS Environmental received 4 sample(s) on Dec 01, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: R1, R2, R3, S13
Work Order: HS21120102

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21120102-01	R1	Water		24-Nov-2021 08:10	01-Dec-2021 17:15	☐
HS21120102-02	R2	Water		24-Nov-2021 07:45	01-Dec-2021 17:15	☐
HS21120102-03	R3	Water		24-Nov-2021 07:05	01-Dec-2021 17:15	☐
HS21120102-04	S13	Water		24-Nov-2021 07:25	01-Dec-2021 17:15	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R1, R2, R3, S13
Work Order: HS21120102

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

GCMS Semivolatiles by Method SW8270

Batch ID: 173242

Sample ID: R1 (HS21120102-01)

• Sample extracted or prepared outside of hold time.

Sample ID: R2 (HS21120102-02)

• Sample extracted or prepared outside of hold time.

Metals by Method SW6020A

Batch ID: 173410

Sample ID: HS21120431-01MS

• MS and MSD are for an unrelated sample (Manganese)

Metals by Method SW7470A

Batch ID: 173295

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R397386

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R397452

• Samples received outside method holding time for Dissolved Oxygen which is a field parameter. Sample results are flagged with an "H" qualifier.

WetChemistry by Method Calculation

Batch ID: R397595

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R1, R2, R3, S13
Work Order: HS21120102

WetChemistry by Method E300

Batch ID: R397543

Sample ID: R3 (HS21120102-03)

• The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Sample ID: S13 (HS21120102-04)

• The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

WetChemistry by Method E1664A

Batch ID: R397407,R397587

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2520

Batch ID: R397258

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540D

Batch ID: R396846

Sample ID: R1 (HS21120102-01)

• Sample was analyzed outside of the holding time, results should be considered estimated.

• **Sample ID: R2 (HS21120102-02)**

• Sample was analyzed outside of the holding time, results should be considered estimated.

WetChemistry by Method M2540B

Batch ID: R397211

Sample ID: R1 (HS21120102-01)

• Sample was analyzed outside of the holding time, results should be considered estimated.

Sample ID: R2 (HS21120102-02)

• Sample was analyzed outside of the holding time, results should be considered estimated.

WetChemistry by Method M2540C

Batch ID: R397024

Sample ID: R1 (HS21120102-01)

• Sample was analyzed outside of the holding time, results should be considered estimated.

• **Sample ID: R2 (HS21120102-02)**

• Sample was analyzed outside of the holding time, results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R1, R2, R3, S13
Work Order: HS21120102

WetChemistry by Method E365.3

Batch ID: 173493

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 173490

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
Sample ID: R1
Collection Date: 24-Nov-2021 08:10

ANALYTICAL REPORT
WorkOrder:HS21120102
Lab ID:HS21120102-01
Matrix:Water

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**					Prep:SW3510 / 07-Dec-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	09-Dec-2021 16:04
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 16:04
Acenaphthene	U	H		0.027	0.10	ug/L	1	09-Dec-2021 16:04
Acenaphthylene	U	H		0.015	0.10	ug/L	1	09-Dec-2021 16:04
Anthracene	U	H		0.014	0.10	ug/L	1	09-Dec-2021 16:04
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	09-Dec-2021 16:04
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	09-Dec-2021 16:04
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	09-Dec-2021 16:04
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	09-Dec-2021 16:04
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 16:04
Chrysene	U	H		0.021	0.10	ug/L	1	09-Dec-2021 16:04
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	09-Dec-2021 16:04
Fluoranthene	U	H		0.010	0.10	ug/L	1	09-Dec-2021 16:04
Fluorene	U	H		0.030	0.10	ug/L	1	09-Dec-2021 16:04
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	09-Dec-2021 16:04
Isophorone	U	H		0.025	0.20	ug/L	1	09-Dec-2021 16:04
Naphthalene	U	H		0.020	0.10	ug/L	1	09-Dec-2021 16:04
Phenanthrene	U	H		0.021	0.10	ug/L	1	09-Dec-2021 16:04
Pyrene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 16:04
Surr: 2,4,6-Tribromophenol	*70.4*				*34-129*	*%REC*	*1*	*09-Dec-2021 16:04*
Surr: 2-Fluorobiphenyl	*76.2*				*40-125*	*%REC*	*1*	*09-Dec-2021 16:04*
Surr: 2-Fluorophenol	*86.2*				*20-120*	*%REC*	*1*	*09-Dec-2021 16:04*
Surr: 4-Terphenyl-d14	*93.2*				*40-135*	*%REC*	*1*	*09-Dec-2021 16:04*
Surr: Nitrobenzene-d5	*74.6*				*41-120*	*%REC*	*1*	*09-Dec-2021 16:04*
Surr: Phenol-d6	*75.0*				*20-120*	*%REC*	*1*	*09-Dec-2021 16:04*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
Sample ID: R1
Collection Date: 24-Nov-2021 08:10

ANALYTICAL REPORT
WorkOrder:HS21120102
Lab ID:HS21120102-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 10-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	10-Dec-2021 22:42
Arsenic	**0.00164**	J	**0.000400**	**0.00200**	**mg/L**	1	10-Dec-2021 22:42
Beryllium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:42
Cadmium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:42
Chromium	**0.00330**	J	**0.000400**	**0.00400**	**mg/L**	1	10-Dec-2021 22:42
Copper	**0.00439**		**0.00100**	**0.00200**	**mg/L**	1	10-Dec-2021 22:42
Iron	**1.50**		**0.0120**	**0.200**	**mg/L**	1	10-Dec-2021 22:42
Lead	**0.000831**	J	**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:42
Manganese	**0.0893**		**0.000700**	**0.00500**	**mg/L**	1	10-Dec-2021 22:42
Nickel	**0.00152**	J	**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:42
Potassium	**117**		**0.0180**	**0.200**	**mg/L**	1	10-Dec-2021 22:42
Selenium	**0.00119**	J	**0.00110**	**0.00200**	**mg/L**	1	10-Dec-2021 22:42
Silver	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:42
Thallium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:42
Zinc	**0.0197**		**0.00200**	**0.00400**	**mg/L**	1	10-Dec-2021 22:42
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 08-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	08-Dec-2021 12:22
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	U		0.10	0.50	mg/L	1	14-Dec-2021 16:44
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	10-Dec-2021 13:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.534**	J	**0.150**	**1.00**	**mg/L**	5	13-Dec-2021 20:33
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 13-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**0.0550**		**0.0200**	**0.0500**	**mg/L**	1	13-Dec-2021 15:20
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**11,200**	H	**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**10,500**	H	**5.00**	**10.0**	**mg/L**	1	03-Dec-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**43.5**	H	**2.50**	**2.50**	**mg/L**	1	02-Dec-2021 13:15
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.22**	J	**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**11.7**	H	**1.00**	**1.00**	**mg/L**	1	11-Dec-2021 11:10

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
Sample ID: R1
Collection Date: 24-Nov-2021 08:10

ANALYTICAL REPORT
WorkOrder:HS21120102
Lab ID:HS21120102-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SALINITY	**Method:SM2520**						Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	09-Dec-2021 10:00
PH BY SW9040C	**Method:SW9040C**						Analyst: CWG
pH	**7.08**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**23.5**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
Sample ID: R2
Collection Date: 24-Nov-2021 07:45

ANALYTICAL REPORT
WorkOrder:HS21120102
Lab ID:HS21120102-02
Matrix:Water

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW-LEVEL SEMIVOLATILES BY 8270D	**Method:SW8270**					Prep:SW3510 / 07-Dec-2021		Analyst: GEY
1-Methylnaphthalene	U	H		0.010	0.10	ug/L	1	09-Dec-2021 16:24
2-Methylnaphthalene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 16:24
Acenaphthene	U	H		0.027	0.10	ug/L	1	09-Dec-2021 16:24
Acenaphthylene	U	H		0.015	0.10	ug/L	1	09-Dec-2021 16:24
Anthracene	U	H		0.014	0.10	ug/L	1	09-Dec-2021 16:24
Benz(a)anthracene	U	H		0.050	0.10	ug/L	1	09-Dec-2021 16:24
Benzo(a)pyrene	U	H		0.020	0.10	ug/L	1	09-Dec-2021 16:24
Benzo(b)fluoranthene	U	H		0.023	0.10	ug/L	1	09-Dec-2021 16:24
Benzo(g,h,i)perylene	U	H		0.014	0.10	ug/L	1	09-Dec-2021 16:24
Benzo(k)fluoranthene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 16:24
Chrysene	U	H		0.021	0.10	ug/L	1	09-Dec-2021 16:24
Dibenz(a,h)anthracene	U	H		0.024	0.10	ug/L	1	09-Dec-2021 16:24
Fluoranthene	U	H		0.010	0.10	ug/L	1	09-Dec-2021 16:24
Fluorene	U	H		0.030	0.10	ug/L	1	09-Dec-2021 16:24
Indeno(1,2,3-cd)pyrene	U	H		0.022	0.10	ug/L	1	09-Dec-2021 16:24
Isophorone	U	H		0.025	0.20	ug/L	1	09-Dec-2021 16:24
Naphthalene	U	H		0.020	0.10	ug/L	1	09-Dec-2021 16:24
Phenanthrene	U	H		0.021	0.10	ug/L	1	09-Dec-2021 16:24
Pyrene	U	H		0.019	0.10	ug/L	1	09-Dec-2021 16:24
Surr: 2,4,6-Tribromophenol	*63.6*				*34-129*	*%REC*	*1*	*09-Dec-2021 16:24*
Surr: 2-Fluorobiphenyl	*74.0*				*40-125*	*%REC*	*1*	*09-Dec-2021 16:24*
Surr: 2-Fluorophenol	*65.1*				*20-120*	*%REC*	*1*	*09-Dec-2021 16:24*
Surr: 4-Terphenyl-d14	*90.4*				*40-135*	*%REC*	*1*	*09-Dec-2021 16:24*
Surr: Nitrobenzene-d5	*71.1*				*41-120*	*%REC*	*1*	*09-Dec-2021 16:24*
Surr: Phenol-d6	*68.4*				*20-120*	*%REC*	*1*	*09-Dec-2021 16:24*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
Sample ID: R2
Collection Date: 24-Nov-2021 07:45

ANALYTICAL REPORT
WorkOrder:HS21120102
Lab ID:HS21120102-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 10-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	10-Dec-2021 22:44
Arsenic	**0.00488**		**0.000400**	**0.00200**	**mg/L**	1	10-Dec-2021 22:44
Beryllium	**0.000468**	J	**0.000200**	**0.00200**	**mg/L**	1	10-Dec-2021 22:44
Cadmium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:44
Chromium	**0.00940**		**0.000400**	**0.00400**	**mg/L**	1	10-Dec-2021 22:44
Copper	**0.00362**		**0.00100**	**0.00200**	**mg/L**	1	10-Dec-2021 22:44
Iron	**11.4**		**0.0120**	**0.200**	**mg/L**	1	10-Dec-2021 22:44
Lead	**0.00730**		**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:44
Manganese	**0.292**		**0.000700**	**0.00500**	**mg/L**	1	10-Dec-2021 22:44
Nickel	**0.00694**		**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:44
Potassium	**2.50**		**0.0180**	**0.200**	**mg/L**	1	10-Dec-2021 22:44
Selenium	U		0.00110	0.00200	mg/L	1	10-Dec-2021 22:44
Silver	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:44
Thallium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:44
Zinc	**0.0427**		**0.00200**	**0.00400**	**mg/L**	1	10-Dec-2021 22:44
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 08-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	08-Dec-2021 12:23
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	U		0.10	0.50	mg/L	1	14-Dec-2021 16:44
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	10-Dec-2021 13:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.668**	J	**0.150**	**1.00**	**mg/L**	5	13-Dec-2021 20:41
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 13-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**0.183**		**0.0200**	**0.0500**	**mg/L**	1	13-Dec-2021 15:20
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**532**	H	**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**162**	H	**5.00**	**10.0**	**mg/L**	1	03-Dec-2021 17:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**319**	H	**2.50**	**2.50**	**mg/L**	1	02-Dec-2021 13:15
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.50**		**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.4**	H	**1.00**	**1.00**	**mg/L**	1	11-Dec-2021 11:10

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
Sample ID: R2
Collection Date: 24-Nov-2021 07:45

ANALYTICAL REPORT
WorkOrder:HS21120102
Lab ID:HS21120102-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SALINITY	**Method:SM2520**						Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	09-Dec-2021 10:00
PH BY SW9040C	**Method:SW9040C**						Analyst: CWG
pH	**5.68**	H	**0.100**	**0.100**	**pH Units**	1	10-Dec-2021 13:35
Temp Deg C @pH	**23.8**	H	**0**	**0**	**DEG C**	1	10-Dec-2021 13:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
Sample ID: R3
Collection Date: 24-Nov-2021 07:05

ANALYTICAL REPORT
WorkOrder:HS21120102
Lab ID:HS21120102-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 10-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	10-Dec-2021 22:46
Arsenic	**0.00130**	J	**0.000400**	**0.00200**	**mg/L**	1	10-Dec-2021 22:46
Beryllium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:46
Cadmium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:46
Chromium	**0.00155**	J	**0.000400**	**0.00400**	**mg/L**	1	10-Dec-2021 22:46
Copper	U		0.00100	0.00200	mg/L	1	10-Dec-2021 22:46
Iron	**2.04**		**0.0120**	**0.200**	**mg/L**	1	10-Dec-2021 22:46
Lead	**0.00137**	J	**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:46
Manganese	**0.0725**		**0.000700**	**0.00500**	**mg/L**	1	10-Dec-2021 22:46
Nickel	**0.00141**	J	**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:46
Potassium	**0.394**		**0.0180**	**0.200**	**mg/L**	1	10-Dec-2021 22:46
Selenium	U		0.00110	0.00200	mg/L	1	10-Dec-2021 22:46
Silver	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:46
Thallium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:46
Zinc	**0.00750**		**0.00200**	**0.00400**	**mg/L**	1	10-Dec-2021 22:46
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 08-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	08-Dec-2021 12:25
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	U		0.10	0.50	mg/L	1	14-Dec-2021 16:44
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	10-Dec-2021 13:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.678**	J	**0.150**	**1.00**	**mg/L**	5	13-Dec-2021 21:34
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 13-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**0.103**		**0.0200**	**0.0500**	**mg/L**	1	13-Dec-2021 15:20
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.39**	J	**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
Sample ID: S13
Collection Date: 24-Nov-2021 07:25

ANALYTICAL REPORT
WorkOrder:HS21120102
Lab ID:HS21120102-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 10-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	10-Dec-2021 22:48
Arsenic	**0.00354**		**0.000400**	**0.00200**	**mg/L**	1	10-Dec-2021 22:48
Beryllium	**0.000311**	J	**0.000200**	**0.00200**	**mg/L**	1	10-Dec-2021 22:48
Cadmium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:48
Chromium	**0.00488**		**0.000400**	**0.00400**	**mg/L**	1	10-Dec-2021 22:48
Copper	**0.00238**		**0.00100**	**0.00200**	**mg/L**	1	10-Dec-2021 22:48
Iron	**7.52**		**0.0120**	**0.200**	**mg/L**	1	10-Dec-2021 22:48
Lead	**0.00540**		**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:48
Manganese	**0.218**		**0.000700**	**0.00500**	**mg/L**	1	10-Dec-2021 22:48
Nickel	**0.00394**		**0.000600**	**0.00200**	**mg/L**	1	10-Dec-2021 22:48
Potassium	**1.25**		**0.0180**	**0.200**	**mg/L**	1	10-Dec-2021 22:48
Selenium	U		0.00110	0.00200	mg/L	1	10-Dec-2021 22:48
Silver	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:48
Thallium	U		0.000200	0.00200	mg/L	1	10-Dec-2021 22:48
Zinc	**0.0222**		**0.00200**	**0.00400**	**mg/L**	1	10-Dec-2021 22:48
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 08-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	08-Dec-2021 12:27
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	U		0.10	0.50	mg/L	1	14-Dec-2021 16:44
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**2.45**		**0.610**	**2.00**	**mg/L**	1	14-Dec-2021 14:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.688**	J	**0.150**	**1.00**	**mg/L**	5	13-Dec-2021 21:56
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 13-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**0.135**		**0.0200**	**0.0500**	**mg/L**	1	13-Dec-2021 15:20
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 13-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.42**	J	**0.10**	**0.50**	**mg/L**	1	13-Dec-2021 14:20

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

Batch ID: 173242 **Start Date:** 07 Dec 2021 07:00 **End Date:** 07 Dec 2021 12:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120102-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120102-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173295 **Start Date:** 08 Dec 2021 08:00 **End Date:** 08 Dec 2021 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120102-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120102-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120102-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120102-04		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173410 **Start Date:** 10 Dec 2021 12:00 **End Date:** 10 Dec 2021 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120102-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120102-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120102-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120102-04		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173490 **Start Date:** 13 Dec 2021 10:00 **End Date:** 13 Dec 2021 14:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120102-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120102-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120102-03		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120102-04		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 173493 **Start Date:** 13 Dec 2021 10:00 **End Date:** 13 Dec 2021 12:30
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120102-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120102-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120102-03		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120102-04		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173242 (0)	**Test Name :** LOW-LEVEL SEMIVOLATILES BY 8270D				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10		07 Dec 2021 09:02	09 Dec 2021 16:04	1
HS21120102-02	R2	24 Nov 2021 07:45		07 Dec 2021 09:02	09 Dec 2021 16:24	1
Batch ID: 173295 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10		08 Dec 2021 08:00	08 Dec 2021 12:22	1
HS21120102-02	R2	24 Nov 2021 07:45		08 Dec 2021 08:00	08 Dec 2021 12:23	1
HS21120102-03	R3	24 Nov 2021 07:05		08 Dec 2021 08:00	08 Dec 2021 12:25	1
HS21120102-04	S13	24 Nov 2021 07:25		08 Dec 2021 08:00	08 Dec 2021 12:27	1
Batch ID: 173410 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10		10 Dec 2021 16:00	10 Dec 2021 22:42	1
HS21120102-02	R2	24 Nov 2021 07:45		10 Dec 2021 16:00	10 Dec 2021 22:44	1
HS21120102-03	R3	24 Nov 2021 07:05		10 Dec 2021 16:00	10 Dec 2021 22:46	1
HS21120102-04	S13	24 Nov 2021 07:25		10 Dec 2021 16:00	10 Dec 2021 22:48	1
Batch ID: 173490 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10		13 Dec 2021 10:00	13 Dec 2021 14:20	1
HS21120102-02	R2	24 Nov 2021 07:45		13 Dec 2021 10:00	13 Dec 2021 14:20	1
HS21120102-03	R3	24 Nov 2021 07:05		13 Dec 2021 10:00	13 Dec 2021 14:20	1
HS21120102-04	S13	24 Nov 2021 07:25		13 Dec 2021 10:00	13 Dec 2021 14:20	1
Batch ID: 173493 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10		13 Dec 2021 10:00	13 Dec 2021 15:20	1
HS21120102-02	R2	24 Nov 2021 07:45		13 Dec 2021 10:00	13 Dec 2021 15:20	1
HS21120102-03	R3	24 Nov 2021 07:05		13 Dec 2021 10:00	13 Dec 2021 15:20	1
HS21120102-04	S13	24 Nov 2021 07:25		13 Dec 2021 10:00	13 Dec 2021 15:20	1
Batch ID: R396846 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10			02 Dec 2021 13:15	1
HS21120102-02	R2	24 Nov 2021 07:45			02 Dec 2021 13:15	1
Batch ID: R397024 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10			03 Dec 2021 17:20	1
HS21120102-02	R2	24 Nov 2021 07:45			03 Dec 2021 17:20	1
Batch ID: R397211 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10			06 Dec 2021 18:00	1
HS21120102-02	R2	24 Nov 2021 07:45			06 Dec 2021 18:00	1
Batch ID: R397258 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10			09 Dec 2021 10:00	1
HS21120102-02	R2	24 Nov 2021 07:45			09 Dec 2021 10:00	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R397386 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10			10 Dec 2021 13:35	1
HS21120102-02	R2	24 Nov 2021 07:45			10 Dec 2021 13:35	1
Batch ID: R397407 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10			10 Dec 2021 13:50	1
HS21120102-02	R2	24 Nov 2021 07:45			10 Dec 2021 13:50	1
HS21120102-03	R3	24 Nov 2021 07:05			10 Dec 2021 13:50	1
Batch ID: R397452 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10			11 Dec 2021 11:10	1
HS21120102-02	R2	24 Nov 2021 07:45			11 Dec 2021 11:10	1
Batch ID: R397543 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10			13 Dec 2021 20:33	5
HS21120102-02	R2	24 Nov 2021 07:45			13 Dec 2021 20:41	5
HS21120102-03	R3	24 Nov 2021 07:05			13 Dec 2021 21:34	5
HS21120102-04	S13	24 Nov 2021 07:25			13 Dec 2021 21:56	5
Batch ID: R397587 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS21120102-04	S13	24 Nov 2021 07:25			14 Dec 2021 14:00	1
Batch ID: R397595 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS21120102-01	R1	24 Nov 2021 08:10			14 Dec 2021 16:44	1
HS21120102-02	R2	24 Nov 2021 07:45			14 Dec 2021 16:44	1
HS21120102-03	R3	24 Nov 2021 07:05			14 Dec 2021 16:44	1
HS21120102-04	S13	24 Nov 2021 07:25			14 Dec 2021 16:44	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173295 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-173295** Units: **mg/L** Analysis Date: **08-Dec-2021 11:54**
Client ID: Run ID: **HG03_397205** SeqNo: **6411307** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-173295** Units: **mg/L** Analysis Date: **08-Dec-2021 11:56**
Client ID: Run ID: **HG03_397205** SeqNo: **6411308** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00526	0.000200	0.005	0	105	80 - 120				

MS Sample ID: **HS21120054-02MS** Units: **mg/L** Analysis Date: **08-Dec-2021 12:03**
Client ID: Run ID: **HG03_397205** SeqNo: **6411310** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00477	0.000200	0.005	0.000095	93.5	75 - 125				

MSD Sample ID: **HS21120054-02MSD** Units: **mg/L** Analysis Date: **08-Dec-2021 12:06**
Client ID: Run ID: **HG03_397205** SeqNo: **6411311** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00439	0.000200	0.005	0.000095	85.9	75 - 125	0.00477	8.3	20	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02 HS21120102-03 HS21120102-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-173410** Units: **mg/L** Analysis Date: **13-Dec-2021 12:04**
Client ID: Run ID: **ICPMS06_397490** SeqNo: **6418178** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Copper	U	0.00200								
Iron	U	0.200								
Lead	U	0.00200								
Manganese	U	0.00500								
Nickel	U	0.00200								
Potassium	U	0.200								
Selenium	U	0.00200								
Silver	0.000219	0.00200								J
Thallium	U	0.00200								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-173410** Units: **mg/L** Analysis Date: **10-Dec-2021 22:18**
Client ID: Run ID: **ICPMS06_397400** SeqNo: **6416765** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0508	0.00200	0.05	0	102	80 - 120				
Arsenic	0.04903	0.00200	0.05	0	98.1	80 - 120				
Beryllium	0.04831	0.00200	0.05	0	96.6	80 - 120				
Cadmium	0.04958	0.00200	0.05	0	99.2	80 - 120				
Chromium	0.04859	0.00400	0.05	0	97.2	80 - 120				
Copper	0.04927	0.00200	0.05	0	98.5	80 - 120				
Iron	4.876	0.200	5	0	97.5	80 - 120				
Lead	0.04897	0.00200	0.05	0	97.9	80 - 120				
Manganese	0.04826	0.00500	0.05	0	96.5	80 - 120				
Nickel	0.04905	0.00200	0.05	0	98.1	80 - 120				
Potassium	4.794	0.200	5	0	95.9	80 - 120				
Selenium	0.04972	0.00200	0.05	0	99.4	80 - 120				
Silver	0.04768	0.00200	0.05	0	95.4	80 - 120				
Thallium	0.05045	0.00200	0.05	0	101	80 - 120				
Zinc	0.05176	0.00400	0.05	0	104	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21120431-01MS** Units: **mg/L** Analysis Date: **10-Dec-2021 22:26**
Client ID: Run ID: **ICPMS06_397400** SeqNo: **6416769** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05057	0.00200	0.05	0.000043	101	80 - 120				
Arsenic	0.0508	0.00200	0.05	0.001069	99.5	80 - 120				
Beryllium	0.05088	0.00200	0.05	0.000032	102	80 - 120				
Cadmium	0.04771	0.00200	0.05	0.000064	95.3	80 - 120				
Chromium	0.04865	0.00400	0.05	0.000332	96.6	80 - 120				
Copper	0.0467	0.00200	0.05	0.000445	92.5	80 - 120				
Iron	4.78	0.200	5	0.0429	94.7	80 - 120				
Lead	0.0503	0.00200	0.05	0.000036	101	80 - 120				
Manganese	0.3212	0.00500	0.05	0.286	70.4	80 - 120				SO
Nickel	0.0509	0.00200	0.05	0.003229	95.3	80 - 120				
Potassium	6.37	0.200	5	1.771	92.0	80 - 120				
Selenium	0.05078	0.00200	0.05	0.000545	100	80 - 120				
Silver	0.04466	0.00200	0.05	-0.000008	89.3	80 - 120				
Thallium	0.05013	0.00200	0.05	0.00001	100	80 - 120				
Zinc	0.05067	0.00400	0.05	0.001532	98.3	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21120431-01MSD** Units: **mg/L** Analysis Date: **10-Dec-2021 22:28**
Client ID: Run ID: **ICPMS06_397400** SeqNo: **6416770** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05175	0.00200	0.05	0.000043	103	80 - 120	0.05057	2.31	20	
Arsenic	0.0513	0.00200	0.05	0.001069	100	80 - 120	0.0508	0.991	20	
Beryllium	0.05151	0.00200	0.05	0.000032	103	80 - 120	0.05088	1.22	20	
Cadmium	0.04868	0.00200	0.05	0.000064	97.2	80 - 120	0.04771	1.99	20	
Chromium	0.04931	0.00400	0.05	0.000332	98.0	80 - 120	0.04865	1.35	20	
Copper	0.0468	0.00200	0.05	0.000445	92.7	80 - 120	0.0467	0.21	20	
Iron	4.822	0.200	5	0.0429	95.6	80 - 120	4.78	0.867	20	
Lead	0.05071	0.00200	0.05	0.000036	101	80 - 120	0.0503	0.81	20	
Manganese	0.3232	0.00500	0.05	0.286	74.4	80 - 120	0.3212	0.621	20	SO
Nickel	0.05012	0.00200	0.05	0.003229	93.8	80 - 120	0.0509	1.54	20	
Potassium	6.517	0.200	5	1.771	94.9	80 - 120	6.37	2.29	20	
Selenium	0.05166	0.00200	0.05	0.000545	102	80 - 120	0.05078	1.72	20	
Silver	0.04485	0.00200	0.05	-0.000008	89.7	80 - 120	0.04466	0.438	20	
Thallium	0.05098	0.00200	0.05	0.00001	102	80 - 120	0.05013	1.7	20	
Zinc	0.05115	0.00400	0.05	0.001532	99.2	80 - 120	0.05067	0.951	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

PDS Sample ID: **HS21120431-01PDS** Units: **mg/L** Analysis Date: **10-Dec-2021 22:30**
Client ID: Run ID: **ICPMS06_397400** SeqNo: **6416771** PrepDate: **10-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1059	0.00200	0.1	0	106	75 - 125				
Arsenic	0.1054	0.00200	0.1	0.001069	104	75 - 125				
Beryllium	0.1059	0.00200	0.1	0	106	75 - 125				
Cadmium	0.0995	0.00200	0.1	0	99.5	75 - 125				
Chromium	0.1002	0.00400	0.1	0	100	75 - 125				
Copper	0.09656	0.00200	0.1	0	96.6	75 - 125				
Iron	9.89	0.200	10	0.0429	98.5	75 - 125				
Lead	0.1076	0.00200	0.1	0	108	75 - 125				
Manganese	0.3644	0.00500	0.1	0.286	78.4	75 - 125				
Nickel	0.1002	0.00200	0.1	0.003229	96.9	75 - 125				
Potassium	11.5	0.200	10	1.771	97.3	75 - 125				
Selenium	0.1051	0.00200	0.1	0	105	75 - 125				
Silver	0.08735	0.00200	0.1	0	87.4	75 - 125				
Thallium	0.11	0.00200	0.1	0	110	75 - 125				
Zinc	0.1034	0.00400	0.1	0	103	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173410 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21120431-01SD** Units: **mg/L** Analysis Date: **10-Dec-2021 22:24**
Client ID: Run ID: **ICPMS06_397400** SeqNo: **6416768** PrepDate: **10-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000043	0	10	
Arsenic	U	0.0100					0.001069	0	10	
Beryllium	U	0.0100					0.000032	0	10	
Cadmium	U	0.0100					0.000064	0	10	
Chromium	U	0.0200					0.000332	0	10	
Copper	U	0.0100					0.000445	0	10	
Iron	U	1.00					0.0429	0	10	
Lead	U	0.0100					0.000036	0	10	
Manganese	0.2782	0.0250					0.286	2.73	10	
Nickel	0.003057	0.0100					0.003229	0	10	J
Potassium	1.717	1.00					1.771	3.03	10	
Selenium	U	0.0100					0.000545	0	10	
Silver	U	0.0100					-0.000008	0	10	
Thallium	U	0.0100					0.00001	0	10	
Zinc	U	0.0200					0.001532	0	10	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02 HS21120102-03 HS21120102-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

MBLK Sample ID: **MBLK-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 11:52**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415760** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.10								
2-Methylnaphthalene	U	0.10								
Acenaphthene	U	0.10								
Acenaphthylene	U	0.10								
Anthracene	U	0.10								
Benz(a)anthracene	U	0.10								
Benzo(a)pyrene	U	0.10								
Benzo(b)fluoranthene	U	0.10								
Benzo(g,h,i)perylene	U	0.10								
Benzo(k)fluoranthene	U	0.10								
Chrysene	U	0.10								
Dibenz(a,h)anthracene	U	0.10								
Fluoranthene	U	0.10								
Fluorene	U	0.10								
Indeno(1,2,3-cd)pyrene	U	0.10								
Isophorone	U	0.20								
Naphthalene	U	0.10								
Phenanthrene	U	0.10								
Pyrene	U	0.10								
Surr: 2,4,6-Tribromophenol	*4.056*	*0.20*	*5*	*0*	*81.1*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*4.197*	*0.20*	*5*	*0*	*83.9*	*40 - 125*				
Surr: 2-Fluorophenol	*4.81*	*0.20*	*5*	*0*	*96.2*	*20 - 120*				
Surr: 4-Terphenyl-d14	*5.105*	*0.20*	*5*	*0*	*102*	*40 - 135*				
Surr: Nitrobenzene-d5	*4.041*	*0.20*	*5*	*0*	*80.8*	*41 - 120*				
Surr: Phenol-d6	*4.249*	*0.20*	*5*	*0*	*85.0*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCS Sample ID: **LCS-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 12:11**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415761** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	3.498	0.10	5	0	70.0	45 - 120				
2-Methylnaphthalene	3.437	0.10	5	0	68.7	50 - 120				
Acenaphthene	3.164	0.10	5	0	63.3	45 - 120				
Acenaphthylene	3.439	0.10	5	0	68.8	47 - 120				
Anthracene	3.694	0.10	5	0	73.9	45 - 120				
Benz(a)anthracene	4.17	0.10	5	0	83.4	40 - 120				
Benzo(a)pyrene	4.36	0.10	5	0	87.2	45 - 120				
Benzo(b)fluoranthene	3.998	0.10	5	0	80.0	50 - 120				
Benzo(g,h,i)perylene	4.078	0.10	5	0	81.6	42 - 127				
Benzo(k)fluoranthene	3.994	0.10	5	0	79.9	45 - 127				
Chrysene	3.905	0.10	5	0	78.1	43 - 120				
Dibenz(a,h)anthracene	3.887	0.10	5	0	77.7	45 - 125				
Fluoranthene	3.949	0.10	5	0	79.0	45 - 125				
Fluorene	3.485	0.10	5	0	69.7	49 - 120				
Indeno(1,2,3-cd)pyrene	4.072	0.10	5	0	81.4	41 - 128				
Isophorone	3.407	0.20	5	0	68.1	40 - 121				
Naphthalene	3.368	0.10	5	0	67.4	45 - 120				
Phenanthrene	3.593	0.10	5	0	71.9	45 - 121				
Pyrene	4.065	0.10	5	0	81.3	40 - 130				
Surr: 2,4,6-Tribromophenol	*3.536*	*0.20*	*5*	*0*	*70.7*	*34 - 129*				
Surr: 2-Fluorobiphenyl	*3.226*	*0.20*	*5*	*0*	*64.5*	*40 - 125*				
Surr: 2-Fluorophenol	*3.309*	*0.20*	*5*	*0*	*66.2*	*20 - 120*				
Surr: 4-Terphenyl-d14	*4.125*	*0.20*	*5*	*0*	*82.5*	*40 - 135*				
Surr: Nitrobenzene-d5	*3.167*	*0.20*	*5*	*0*	*63.3*	*41 - 120*				
Surr: Phenol-d6	*3.164*	*0.20*	*5*	*0*	*63.3*	*20 - 120*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173242 (0) **Instrument: SV-7** **Method: LOW-LEVEL SEMIVOLATILES BY 8270D**

LCSD Sample ID: **LCSD-173242** Units: **ug/L** Analysis Date: **09-Dec-2021 13:29**
Client ID: Run ID: **SV-7_397395** SeqNo: **6415764** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	3.718	0.10	5	0	74.4	45 - 120	3.498	6.09	20	
2-Methylnaphthalene	3.562	0.10	5	0	71.2	50 - 120	3.437	3.58	20	
Acenaphthene	3.034	0.10	5	0	60.7	45 - 120	3.164	4.18	20	
Acenaphthylene	3.434	0.10	5	0	68.7	47 - 120	3.439	0.163	20	
Anthracene	3.79	0.10	5	0	75.8	45 - 120	3.694	2.57	20	
Benz(a)anthracene	4.299	0.10	5	0	86.0	40 - 120	4.17	3.05	20	
Benzo(a)pyrene	4.456	0.10	5	0	89.1	45 - 120	4.36	2.17	20	
Benzo(b)fluoranthene	3.951	0.10	5	0	79.0	50 - 120	3.998	1.16	20	
Benzo(g,h,i)perylene	4.466	0.10	5	0	89.3	42 - 127	4.078	9.08	20	
Benzo(k)fluoranthene	3.923	0.10	5	0	78.5	45 - 127	3.994	1.78	20	
Chrysene	3.995	0.10	5	0	79.9	43 - 120	3.905	2.29	20	
Dibenz(a,h)anthracene	3.899	0.10	5	0	78.0	45 - 125	3.887	0.295	20	
Fluoranthene	4.116	0.10	5	0	82.3	45 - 125	3.949	4.15	20	
Fluorene	3.572	0.10	5	0	71.4	49 - 120	3.485	2.46	20	
Indeno(1,2,3-cd)pyrene	4.256	0.10	5	0	85.1	41 - 128	4.072	4.4	20	
Isophorone	3.85	0.20	5	0	77.0	40 - 121	3.407	12.2	20	
Naphthalene	3.346	0.10	5	0	66.9	45 - 120	3.368	0.64	20	
Phenanthrene	3.601	0.10	5	0	72.0	45 - 121	3.593	0.228	20	
Pyrene	4.245	0.10	5	0	84.9	40 - 130	4.065	4.34	20	
Surr: 2,4,6-Tribromophenol	*3.43*	*0.20*	*5*	*0*	*68.6*	*34 - 129*	*3.536*	*3.04*	*20*	
Surr: 2-Fluorobiphenyl	*3.142*	*0.20*	*5*	*0*	*62.8*	*40 - 125*	*3.226*	*2.63*	*20*	
Surr: 2-Fluorophenol	*3.516*	*0.20*	*5*	*0*	*70.3*	*20 - 120*	*3.309*	*6.07*	*20*	
Surr: 4-Terphenyl-d14	*4.434*	*0.20*	*5*	*0*	*88.7*	*40 - 135*	*4.125*	*7.24*	*20*	
Surr: Nitrobenzene-d5	*3.651*	*0.20*	*5*	*0*	*73.0*	*41 - 120*	*3.167*	*14.2*	*20*	
Surr: Phenol-d6	*3.285*	*0.20*	*5*	*0*	*65.7*	*20 - 120*	*3.164*	*3.74*	*20*	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173490 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-173490** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: Run ID: **WetChem_HS_397495** SeqNo: **6418454** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-173490** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: Run ID: **WetChem_HS_397495** SeqNo: **6418453** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.03	0.50	20	0	95.2	85 - 115				

MS Sample ID: **HS21120085-02MS** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: Run ID: **WetChem_HS_397495** SeqNo: **6418451** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.98	0.50	20	0.442	97.7	75 - 125				

MSD Sample ID: **HS21120085-02MSD** Units: **mg/L** Analysis Date: **13-Dec-2021 14:20**
Client ID: Run ID: **WetChem_HS_397495** SeqNo: **6418452** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20	0.50	20	0.442	97.8	75 - 125	19.98	0.07	20	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02 HS21120102-03 HS21120102-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: 173493 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173493** Units: **mg/L** Analysis Date: **13-Dec-2021 15:20**
Client ID: Run ID: **UV-2450_397506** SeqNo: **6418638** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U		0.0500								

LCS Sample ID: **LCS-173493** Units: **mg/L** Analysis Date: **13-Dec-2021 15:20**
Client ID: Run ID: **UV-2450_397506** SeqNo: **6418637** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.261		0.0500	0.25	0	104	80 - 120				

MS Sample ID: **HS21120085-02MS** Units: **mg/L** Analysis Date: **13-Dec-2021 15:20**
Client ID: Run ID: **UV-2450_397506** SeqNo: **6418635** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.297		0.0500	0.25	0.065	92.8	80 - 120				

MSD Sample ID: **HS21120085-02MSD** Units: **mg/L** Analysis Date: **13-Dec-2021 15:20**
Client ID: Run ID: **UV-2450_397506** SeqNo: **6418636** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.302		0.0500	0.25	0.065	94.8	80 - 120	0.297	1.67	20	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02 HS21120102-03 HS21120102-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: R396846 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-120121** Units: **mg/L** Analysis Date: **02-Dec-2021 13:15**
Client ID: Run ID: **Balance1_396846** SeqNo: **6402958** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-120121** Units: **mg/L** Analysis Date: **02-Dec-2021 13:15**
Client ID: Run ID: **Balance1_396846** SeqNo: **6402959** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	95	2.50	100	0	95.0	85 - 115				

DUP Sample ID: **HS21111602-01DUP** Units: **mg/L** Analysis Date: **02-Dec-2021 13:15**
Client ID: Run ID: **Balance1_396846** SeqNo: **6402957** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50					0	0	5	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: R397024 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-120321** Units: **mg/L** Analysis Date: **03-Dec-2021 17:20**
Client ID: Run ID: **Balance1_397024** SeqNo: **6406869** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-120321** Units: **mg/L** Analysis Date: **03-Dec-2021 17:20**
Client ID: Run ID: **Balance1_397024** SeqNo: **6406870** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1016	10.0	1000	0	102	85 - 115				

DUP Sample ID: **HS21111378-01DUP** Units: **mg/L** Analysis Date: **03-Dec-2021 17:20**
Client ID: Run ID: **Balance1_397024** SeqNo: **6406862** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	210	10.0					212	0.948	5	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: R397211 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R397211** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411617** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R397211** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411616** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	992	10.0	1000	0	99.2	85 - 115				

DUP Sample ID: **HS21120297-02DUP** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411618** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	142	10.0					140	1.42	20	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: R397258 (0) **Instrument: WetChem_HS** **Method: SALINITY**

DUP Sample ID: **HS21111455-02DUP** Units: **ppt** Analysis Date: **09-Dec-2021 10:00**
Client ID: Run ID: **WetChem_HS_397258** SeqNo: **6412861** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: R397386 (0) **Instrument: WetChem_HS** **Method: PH BY SW9040C**

DUP Sample ID: **HS21110712-01DUP** Units: **pH Units** Analysis Date: **10-Dec-2021 13:35**
Client ID: Run ID: **WetChem_HS_397386** SeqNo: **6415538** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	6.57	0.100					6.53	0.611	10	
Temp Deg C @pH	23.7	0					23.7	0	10	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: R397407 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-121021** Units: **mg/L** Analysis Date: **10-Dec-2021 13:50**
Client ID: Run ID: **Balance1_397407** SeqNo: **6416205** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-121021** Units: **mg/L** Analysis Date: **10-Dec-2021 13:50**
Client ID: Run ID: **Balance1_397407** SeqNo: **6416207** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.9	2.00	40	0	92.2	78 - 114				

LCSD Sample ID: **WLCSDW-121021** Units: **mg/L** Analysis Date: **10-Dec-2021 13:50**
Client ID: Run ID: **Balance1_397407** SeqNo: **6416206** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38	2.00	40	0	95.0	78 - 114	36.9	2.94	18	

MS Sample ID: **HS21120300-01MS** Units: **mg/L** Analysis Date: **10-Dec-2021 13:50**
Client ID: Run ID: **Balance1_397407** SeqNo: **6416202** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.1	2.00	40	2.834	83.2	78 - 114				

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02 HS21120102-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: R397452 (0) **Instrument:** ManTech01 **Method:** DISSOLVED OXYGEN BY SM4500-O G

DUP Sample ID: **HS21120085-01DUP** Units: **mg/L** Analysis Date: **11-Dec-2021 11:10**
Client ID: Run ID: **ManTech01_397452** SeqNo: **6417205** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	9.77	1.00					9.87	1.02	20	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: R397543 (0) **Instrument:** ICS-Integrion **Method:** NITRATE/NITRITE BY E300.0, REV 2.1, 1993

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **13-Dec-2021 21:18**
Client ID: Run ID: **ICS-Integrion_397543** SeqNo: **6419600** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **13-Dec-2021 21:26**
Client ID: Run ID: **ICS-Integrion_397543** SeqNo: **6419601** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	7.938	0.200	8	0	99.2	90 - 110				

MS Sample ID: **HS21120102-03MS** Units: **mg/L** Analysis Date: **13-Dec-2021 21:41**
Client ID: **R3** Run ID: **ICS-Integrion_397543** SeqNo: **6419603** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	18.38	1.00	20	0.678	88.5	80 - 120				

MS Sample ID: **HS21120013-01MS** Units: **mg/L** Analysis Date: **13-Dec-2021 22:11**
Client ID: Run ID: **ICS-Integrion_397543** SeqNo: **6419607** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	52.76	1.00	20	34.13	93.2	80 - 120				

MSD Sample ID: **HS21120102-03MSD** Units: **mg/L** Analysis Date: **13-Dec-2021 21:49**
Client ID: **R3** Run ID: **ICS-Integrion_397543** SeqNo: **6419604** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.01	1.00	20	0.678	91.6	80 - 120	18.38	3.37	20	

MSD Sample ID: **HS21120013-01MSD** Units: **mg/L** Analysis Date: **13-Dec-2021 22:19**
Client ID: Run ID: **ICS-Integrion_397543** SeqNo: **6419608** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	51.18	1.00	20	34.13	85.3	80 - 120	52.76	3.03	20	

The following samples were analyzed in this batch: HS21120102-01 HS21120102-02 HS21120102-03 HS21120102-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: HS21120102

QC BATCH REPORT

Batch ID: R397587 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-121421** Units: **mg/L** Analysis Date: **14-Dec-2021 14:00**
Client ID: Run ID: **Balance1_397587** SeqNo: **6420483** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-121421** Units: **mg/L** Analysis Date: **14-Dec-2021 14:00**
Client ID: Run ID: **Balance1_397587** SeqNo: **6420485** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.9	2.00	40	0	92.2	78 - 114				

LCSD Sample ID: **WLCSDW-121421** Units: **mg/L** Analysis Date: **14-Dec-2021 14:00**
Client ID: Run ID: **Balance1_397587** SeqNo: **6420484** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.1	2.00	40	0	90.2	78 - 114	36.9	2.19	18	

MS Sample ID: **HS21120102-04MS** Units: **mg/L** Analysis Date: **14-Dec-2021 14:00**
Client ID: **S13** Run ID: **Balance1_397587** SeqNo: **6420473** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.3	2.00	40	2.449	89.6	78 - 114				

The following samples were analyzed in this batch: HS21120102-04

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Client: ERM, Inc
Project: R1, R2, R3, S13
WorkOrder: **HS21120102**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Dept of Defense	PJLA L20-507-R2	22-Dec-2021
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

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Client: ERM, Inc
Project: R1, R2, R3, S13
Work Order: HS21120102

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS21120102-01	R1	Login	12/2/2021 1:08:49 PM	NDR	MET024
HS21120102-01	R1	Login	12/2/2021 1:08:49 PM	NDR	EXT134
HS21120102-01	R1	Login	12/2/2021 1:08:49 PM	NDR	WET053
HS21120102-01	R1	Login	12/2/2021 1:08:49 PM	NDR	WET053
HS21120102-01	R1	Login	12/2/2021 1:08:49 PM	NDR	WET053
HS21120102-01	R1	Login	12/2/2021 1:08:49 PM	NDR	WET053
HS21120102-01	R1	Login	12/2/2021 1:08:49 PM	NDR	WET049
HS21120102-02	R2	Login	12/2/2021 1:08:49 PM	NDR	MET024
HS21120102-02	R2	Login	12/2/2021 1:08:49 PM	NDR	EXT134
HS21120102-02	R2	Login	12/2/2021 1:08:49 PM	NDR	WET053
HS21120102-02	R2	Login	12/2/2021 1:08:49 PM	NDR	WET053
HS21120102-02	R2	Login	12/2/2021 1:08:49 PM	NDR	WET053
HS21120102-02	R2	Login	12/2/2021 1:08:49 PM	NDR	WET053
HS21120102-02	R2	Login	12/2/2021 1:08:49 PM	NDR	WET049

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Sample Receipt Checklist

Work Order ID: HS21120102 **Date/Time Received:** **01-Dec-2021 17:15**

Client Name: ERM NC **Received by:** **Pablo Marinez**

Completed By:	/S/ Nilesh D. Ranchod	02-Dec-2021 12:09	**Reviewed by:**	/S/ Corey Grandits	09-Dec-2021 16:38
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **Water** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:253018
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	20.4c UC/C	IR #31	
Cooler(s)/Kit(s):	47804		
Date/Time sample(s) sent to storage:	12/02/2021 13:45		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: Soil chain used for water samples , Logged per sample containers received .

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody Form

Page 1 of 1

COC ID: 253018

HS21120102

, WV

ERM

R1, R2, R3, S13

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name		
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte NC 28203	City/State/Zip	Charlotte NC 28203	
Phone	507-304-2187	Phone	(	
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	

A	8270SIM_Soil (PAHs)
B	8081 Pesticides
C	ICP_Soil_Low (6020/7471 Metals -16)
D	PCB_Soil_Total (8082 PCBs)
E	TS_S (Total Solids)
F	TOC_Soil (Total Organic Carbon)
G	Sub Sulfide 9030 ALS Holland MI
H	Sub ALS Kelso ASTM D422 - 15 Day TAT
I	
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	R1	24/11/21	8:10 am			8											
2	R2	24/11/21	7:45 am			8											
3	R3	24/11/21	7:05 am			5											
4	S13	24/11/21	7:25 am			5											
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Michael Lowe-CEMLO

Shipment Method:

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by: Michael Lowe-CEMLO Date: 12-1-21 Time: 10:50am

Received by: C Rooney

Relinquished by: Date: 12-1-21 Time: 17:15

Received by (Laboratory): Paul Le

Logged by (Laboratory): Date: Time:

Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
47604	20.4C
IR31	CFO

QC Package: (Check One Box Below)

[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SW846/CLP
[ ] Other
[ ] TRRP Checklist
[ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

December 30, 2021

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS21120141**

Laboratory Results for: **Gas to Energy**

Dear Selina Pradhan,

ALS Environmental received 6 sample(s) on Dec 01, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: Gas to Energy
Work Order: HS21120141

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21120141-01	R2	Soil		18-Nov-2021 08:15	01-Dec-2021 17:15	☐
HS21120141-02	S14	Soil		18-Nov-2021 08:30	01-Dec-2021 17:15	☐
HS21120141-03	S13	Soil		18-Nov-2021 08:40	01-Dec-2021 17:15	☐
HS21120141-04	R3	Soil		18-Nov-2021 09:00	01-Dec-2021 17:15	☐
HS21120141-05	R1	Soil		18-Nov-2021 12:30	01-Dec-2021 17:15	☐
HS21120141-06	C1	Soil		18-Nov-2021 13:07	01-Dec-2021 17:15	☐

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Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy
Work Order: HS21120141

Work Order Comments

• The analysis for sulfide was subcontracted to ALS Holland, MI. Final report attached.

The analysis for grain size was subcontracted to ALS Kelso, WA. Final report attached.

ECD Organics by Method SW8082

Batch ID: 173219

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ECD Organics by Method SW8081

Batch ID: 173218

• Limited hold time available upon sample receipt, lab unable to meet the 8081 extraction hold time. The results should be considered potentially bias low.

Sample ID: LCS-173218

• The multi-response compounds toxaphene and chlordane were not included in the spiking solution for the LCS.

Sample ID: LCS1-173218

• Mirex LCS/LCSD provided as batch quality control.

Sample ID: MBLK-173218

• WO HS21120141 8081 S Low were analyzed at a 5X dilution to eliminate matrix interference

Sample ID: R2 (HS21120141-01MS)

• The multi-response compounds toxaphene , chlordane and mirex were not included in the spiking solution for the MS/MSD.

• The recovery of the Matrix Spike (MS) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The recovery of the MS may be due to sample matrix interference.

Sample ID: R2 (HS21120141-01MSD)

• The recovery of the Matrix Spike Duplicate (MSD) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The failed recovery of the MSD may be due to sample matrix interference.

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Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy
Work Order: HS21120141

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 173278

• Limited hold time available upon sample receipt, lab unable to meet the 8270 extraction hold time. The results should be considered potentially bias low.

Sample ID: C1 (HS21120141-06MSD)

• The recovery of the Matrix Spike Duplicate (MSD) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The failed recovery of the MSD may be due to sample matrix interference.

• The RPD between the MS and MSD was outside of the control limit.

Sample ID: R1 (HS21120141-05)

• The GCMS semi-volatile extract of this sample was run at a dilution due to a high level of matrix interference.

Sample ID: R3 (HS21120141-04)

• The GCMS semi-volatile extract of this sample was run at a dilution due to a high level of matrix interference.

Sample ID: S13 (HS21120141-03)

• The GCMS semi-volatile extract of this sample was run at a dilution due to a high level of matrix interference.

Metals by Method SW6020A

Batch ID: 173264

Sample ID: HS21120324-24MS

• MS and MSD are for an unrelated sample.

Metals by Method SW7471B

Batch ID: 173194

Sample ID: HS21120231-09MS

• MS and MSD are for an unrelated sample.

WetChemistry by Method M2540G

Batch ID: R397230

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9060

Batch ID: 173484

Sample ID: R2 (HS21120141-01MS)

• The recovery of the Matrix Spike (MS) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The recovery of the MS may be due to sample matrix interference.

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WetChemistry by Method SW9060

Batch ID: 173484

Sample ID: R2 (HS21120141-01MSD)

- The recovery of the Matrix Spike Duplicate (MSD) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The failed recovery of the MSD may be due to sample matrix interference.

Client: ERM, Inc
Project: Gas to Energy
Sample ID: R2
Collection Date: 18-Nov-2021 08:15

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-01
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SW8270 SIM	**Method:SW8270SIM**				Prep:SW3541 / 07-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 16:48
2-Methylnaphthalene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 16:48
Acenaphthene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 16:48
Acenaphthylene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 16:48
Anthracene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 16:48
Benz(a)anthracene	**1.2**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 16:48
Benzo(a)pyrene	**9.9**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 16:48
Benzo(b)fluoranthene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 16:48
Benzo(g,h,i)perylene	**2.5**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 16:48
Benzo(k)fluoranthene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 16:48
Chrysene	**1.9**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 16:48
Dibenz(a,h)anthracene	**0.47**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 16:48
Dibenzofuran	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 16:48
Fluoranthene	**1.5**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 16:48
Fluorene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 16:48
Indeno(1,2,3-cd)pyrene	**2.3**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 16:48
Naphthalene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 16:48
Phenanthrene	**0.42**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 16:48
Pyrene	**1.7**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 16:48
Surr: 2-Fluorobiphenyl	*63.0*			*40-140*	*%REC*	*1*	*16-Dec-2021 16:48*
Surr: 4-Terphenyl-d14	*93.9*			*40-140*	*%REC*	*1*	*16-Dec-2021 16:48*
Surr: Nitrobenzene-d5	*64.1*			*40-140*	*%REC*	*1*	*16-Dec-2021 16:48*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM, Inc
Project: Gas to Energy
Sample ID: R2
Collection Date: 18-Nov-2021 08:15

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-01
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 10:10
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 10:10
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 10:10
Aldrin	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
alpha-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
beta-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
Chlordane	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 10:10
delta-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
Dieldrin	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 10:10
Endosulfan I	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 10:10
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 10:10
Endrin	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 10:10
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 10:10
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 10:10
gamma-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
Heptachlor	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
Heptachlor epoxide	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
Methoxychlor	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 10:10
Toxaphene	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 10:10
alpha-Chlordane	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
gamma-Chlordane	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
Surr: Decachlorobiphenyl	*122*			*59-144*	*%REC*	*5*	*09-Dec-2021 10:10*
Surr: Tetrachloro-m-xylene	*84.2*			*56.9-130*	*%REC*	*5*	*09-Dec-2021 10:10*
MISCELLANEOUS PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
Mirex	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 10:10
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
Aroclor 1016	U		0.42	1.7	ug/Kg	1	07-Dec-2021 02:24
Aroclor 1221	U		0.55	1.7	ug/Kg	1	07-Dec-2021 02:24
Aroclor 1232	U		0.44	1.7	ug/Kg	1	07-Dec-2021 02:24
Aroclor 1242	U		0.58	1.7	ug/Kg	1	07-Dec-2021 02:24
Aroclor 1248	U		0.58	1.7	ug/Kg	1	07-Dec-2021 02:24
Aroclor 1254	U		0.46	1.7	ug/Kg	1	07-Dec-2021 02:24
Aroclor 1260	U		0.24	1.7	ug/Kg	1	07-Dec-2021 02:24
Surr: Decachlorobiphenyl	*73.4*			*54-143*	*%REC*	*1*	*07-Dec-2021 02:24*
Surr: Tetrachloro-m-xylene	*69.5*			*50-140*	*%REC*	*1*	*07-Dec-2021 02:24*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: R2
Collection Date: 18-Nov-2021 08:15

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-01
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 08-Dec-2021		Analyst: JC
Antimony	U		0.0639	0.492	mg/Kg	1	09-Dec-2021 12:49
Arsenic	**7.37**		**0.0688**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:18
Beryllium	**0.211**	J	**0.0206**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:18
Cadmium	U		0.0265	0.492	mg/Kg	1	09-Dec-2021 00:18
Chromium	**4.24**		**0.0226**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:18
Cobalt	**1.49**		**0.0147**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:18
Copper	**1.27**		**0.0374**	**0.197**	**mg/Kg**	1	09-Dec-2021 00:18
Lead	**6.53**		**0.0128**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:18
Molybdenum	**0.172**	J	**0.0177**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:18
Nickel	**3.05**		**0.0472**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:18
Selenium	**0.211**	J	**0.0895**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:18
Silver	U		0.0147	0.492	mg/Kg	1	09-Dec-2021 00:18
Thallium	U		0.219	0.492	mg/Kg	1	09-Dec-2021 00:18
Vanadium	**11.5**		**0.0737**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:18
Zinc	**9.35**		**0.167**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:18
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 06-Dec-2021		Analyst: MSC
Mercury	**0.00998**		**0.000510**	**0.00361**	**mg/Kg**	1	06-Dec-2021 15:44
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**67.3**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 13-Dec-2021		Analyst: JAC
Total Organic Carbon	**0.934**	J	**0.0596**	**0.994**	**wt%-dry**	1	14-Dec-2021 17:00
SUBCONTRACT ANALYSIS - GRAIN SIZE		**Method:NA**					Analyst: SUBK
Subcontract Analysis	See Attached		0		NA	1	30-Dec-2021 09:29
SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS		**Method:NA**					Analyst: SUBHO
Subcontract Analysis	See Attached		0		NA	1	13-Dec-2021 09:17

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: S14
Collection Date: 18-Nov-2021 08:30

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-02
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SW8270 SIM	**Method:SW8270SIM**				Prep:SW3541 / 07-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 17:07
2-Methylnaphthalene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 17:07
Acenaphthene	**0.34**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Acenaphthylene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 17:07
Anthracene	**0.51**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Benz(a)anthracene	**5.0**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Benzo(a)pyrene	**5.3**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Benzo(b)fluoranthene	**6.5**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Benzo(g,h,i)perylene	**4.1**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Benzo(k)fluoranthene	**5.0**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Chrysene	**5.8**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Dibenz(a,h)anthracene	**0.66**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Dibenzofuran	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 17:07
Fluoranthene	**8.8**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Fluorene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 17:07
Indeno(1,2,3-cd)pyrene	**4.2**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Naphthalene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 17:07
Phenanthrene	**1.1**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Pyrene	**10**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 17:07
Surr: 2-Fluorobiphenyl	*66.2*			*40-140*	*%REC*	*1*	*16-Dec-2021 17:07*
Surr: 4-Terphenyl-d14	*100*			*40-140*	*%REC*	*1*	*16-Dec-2021 17:07*
Surr: Nitrobenzene-d5	*101*			*40-140*	*%REC*	*1*	*16-Dec-2021 17:07*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: S14
Collection Date: 18-Nov-2021 08:30

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-02
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:17
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:17
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:17
Aldrin	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
alpha-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
beta-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
Chlordane	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 11:17
delta-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
Dieldrin	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:17
Endosulfan I	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:17
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:17
Endrin	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:17
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:17
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:17
gamma-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
Heptachlor	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
Heptachlor epoxide	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
Methoxychlor	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 11:17
Toxaphene	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 11:17
alpha-Chlordane	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
gamma-Chlordane	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
Surr: Decachlorobiphenyl	*107*			*59-144*	*%REC*	*5*	*09-Dec-2021 11:17*
Surr: Tetrachloro-m-xylene	*80.6*			*56.9-130*	*%REC*	*5*	*09-Dec-2021 11:17*
MISCELLANEOUS PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
Mirex	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:17
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
Aroclor 1016	U		0.42	1.7	ug/Kg	1	07-Dec-2021 01:32
Aroclor 1221	U		0.56	1.7	ug/Kg	1	07-Dec-2021 01:32
Aroclor 1232	U		0.45	1.7	ug/Kg	1	07-Dec-2021 01:32
Aroclor 1242	U		0.58	1.7	ug/Kg	1	07-Dec-2021 01:32
Aroclor 1248	U		0.58	1.7	ug/Kg	1	07-Dec-2021 01:32
Aroclor 1254	U		0.47	1.7	ug/Kg	1	07-Dec-2021 01:32
Aroclor 1260	U		0.24	1.7	ug/Kg	1	07-Dec-2021 01:32
Surr: Decachlorobiphenyl	*70.5*			*54-143*	*%REC*	*1*	*07-Dec-2021 01:32*
Surr: Tetrachloro-m-xylene	*64.9*			*50-140*	*%REC*	*1*	*07-Dec-2021 01:32*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: S14
Collection Date: 18-Nov-2021 08:30

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-02
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 08-Dec-2021		Analyst: JC
Antimony	U		0.0611	0.470	mg/Kg	1	09-Dec-2021 12:52
Arsenic	**7.61**		**0.0658**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
Beryllium	**0.576**		**0.0197**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
Cadmium	U		0.0254	0.470	mg/Kg	1	09-Dec-2021 00:20
Chromium	**16.1**		**0.0216**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
Cobalt	**6.57**		**0.0141**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
Copper	**8.05**		**0.0357**	**0.188**	**mg/Kg**	1	09-Dec-2021 00:20
Lead	**11.0**		**0.0122**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
Molybdenum	**0.353**	J	**0.0169**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
Nickel	**11.1**		**0.0451**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
Selenium	**0.524**		**0.0855**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
Silver	**0.0162**	J	**0.0141**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
Thallium	U		0.210	0.470	mg/Kg	1	09-Dec-2021 00:20
Vanadium	**22.8**		**0.0705**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
Zinc	**39.3**		**0.160**	**0.470**	**mg/Kg**	1	09-Dec-2021 00:20
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 06-Dec-2021		Analyst: MSC
Mercury	**0.0162**		**0.000480**	**0.00340**	**mg/Kg**	1	06-Dec-2021 15:46
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**73.2**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 13-Dec-2021		Analyst: JAC
Total Organic Carbon	**1.23**		**0.0597**	**0.996**	**wt%-dry**	1	14-Dec-2021 17:00
SUBCONTRACT ANALYSIS - GRAIN SIZE		**Method:NA**					Analyst: SUBK
Subcontract Analysis	See Attached		0		NA	1	30-Dec-2021 09:29
SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS		**Method:NA**					Analyst: SUBHO
Subcontract Analysis	See Attached		0		NA	1	13-Dec-2021 09:17

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: S13
Collection Date: 18-Nov-2021 08:40

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-03
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SW8270 SIM	**Method:SW8270SIM**				Prep:SW3541 / 07-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
2-Methylnaphthalene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Acenaphthene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Acenaphthylene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Anthracene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Benz(a)anthracene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Benzo(a)pyrene	**4.1**	H	**3.2**	**3.2**	**ug/Kg**	10	17-Dec-2021 15:24
Benzo(b)fluoranthene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Benzo(g,h,i)perylene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Benzo(k)fluoranthene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Chrysene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Dibenz(a,h)anthracene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Dibenzofuran	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Fluoranthene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Fluorene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Indeno(1,2,3-cd)pyrene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Naphthalene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Phenanthrene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Pyrene	U	H	3.2	3.2	ug/Kg	10	17-Dec-2021 15:24
Surr: 2-Fluorobiphenyl	*94.3*			*40-140*	*%REC*	*10*	*17-Dec-2021 15:24*
Surr: 4-Terphenyl-d14	*88.7*			*40-140*	*%REC*	*10*	*17-Dec-2021 15:24*
Surr: Nitrobenzene-d5	*82.4*			*40-140*	*%REC*	*10*	*17-Dec-2021 15:24*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: S13
Collection Date: 18-Nov-2021 08:40

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-03
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:39
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:39
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:39
Aldrin	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
alpha-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
beta-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
Chlordane	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 11:39
delta-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
Dieldrin	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:39
Endosulfan I	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:39
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:39
Endrin	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:39
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:39
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 11:39
gamma-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
Heptachlor	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
Heptachlor epoxide	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
Methoxychlor	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 11:39
Toxaphene	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 11:39
alpha-Chlordane	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
gamma-Chlordane	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
Surr: Decachlorobiphenyl	*103*			*59-144*	*%REC*	*5*	*09-Dec-2021 11:39*
Surr: Tetrachloro-m-xylene	*71.7*			*56.9-130*	*%REC*	*5*	*09-Dec-2021 11:39*
MISCELLANEOUS PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
Mirex	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 11:39
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
Aroclor 1016	U		0.42	1.7	ug/Kg	1	07-Dec-2021 02:41
Aroclor 1221	U		0.56	1.7	ug/Kg	1	07-Dec-2021 02:41
Aroclor 1232	U		0.45	1.7	ug/Kg	1	07-Dec-2021 02:41
Aroclor 1242	U		0.59	1.7	ug/Kg	1	07-Dec-2021 02:41
Aroclor 1248	U		0.59	1.7	ug/Kg	1	07-Dec-2021 02:41
Aroclor 1254	U		0.47	1.7	ug/Kg	1	07-Dec-2021 02:41
Aroclor 1260	U		0.24	1.7	ug/Kg	1	07-Dec-2021 02:41
Surr: Decachlorobiphenyl	*70.3*			*54-143*	*%REC*	*1*	*07-Dec-2021 02:41*
Surr: Tetrachloro-m-xylene	*68.6*			*50-140*	*%REC*	*1*	*07-Dec-2021 02:41*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: S13
Collection Date: 18-Nov-2021 08:40

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-03
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 08-Dec-2021		Analyst: JC
Antimony	U		0.0639	0.492	mg/Kg	1	09-Dec-2021 12:56
Arsenic	**8.63**		**0.0688**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:22
Beryllium	**0.700**		**0.0206**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:22
Cadmium	U		0.0265	0.492	mg/Kg	1	09-Dec-2021 00:22
Chromium	**17.3**		**0.0226**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:22
Cobalt	**6.62**		**0.0147**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:22
Copper	**6.02**		**0.0374**	**0.197**	**mg/Kg**	1	09-Dec-2021 00:22
Lead	**11.4**		**0.0128**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:22
Molybdenum	**0.317**	J	**0.0177**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:22
Nickel	**11.8**		**0.0472**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:22
Selenium	**0.528**		**0.0895**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:22
Silver	U		0.0147	0.492	mg/Kg	1	09-Dec-2021 00:22
Thallium	U		0.219	0.492	mg/Kg	1	09-Dec-2021 00:22
Vanadium	**26.1**		**0.0737**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:22
Zinc	**44.0**		**0.167**	**0.492**	**mg/Kg**	1	09-Dec-2021 00:22
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 06-Dec-2021		Analyst: MSC
Mercury	**0.0178**		**0.000482**	**0.00341**	**mg/Kg**	1	06-Dec-2021 15:54
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**32.3**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 13-Dec-2021		Analyst: JAC
Total Organic Carbon	**1.20**		**0.0592**	**0.987**	**wt%-dry**	1	14-Dec-2021 17:00
SUBCONTRACT ANALYSIS - GRAIN SIZE		**Method:NA**					Analyst: SUBK
Subcontract Analysis	See Attached		0		NA	1	30-Dec-2021 09:29
SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS		**Method:NA**					Analyst: SUBHO
Subcontract Analysis	See Attached		0		NA	1	13-Dec-2021 09:17

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: R3
Collection Date: 18-Nov-2021 09:00

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-04
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SW8270 SIM	**Method:SW8270SIM**				Prep:SW3541 / 07-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
2-Methylnaphthalene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Acenaphthene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Acenaphthylene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Anthracene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Benz(a)anthracene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Benzo(a)pyrene	**3.7**	H	**3.3**	**3.3**	**ug/Kg**	10	17-Dec-2021 15:43
Benzo(b)fluoranthene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Benzo(g,h,i)perylene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Benzo(k)fluoranthene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Chrysene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Dibenz(a,h)anthracene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Dibenzofuran	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Fluoranthene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Fluorene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Indeno(1,2,3-cd)pyrene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Naphthalene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Phenanthrene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Pyrene	U	H	3.3	3.3	ug/Kg	10	17-Dec-2021 15:43
Surr: 2-Fluorobiphenyl	*75.2*			*40-140*	*%REC*	*10*	*17-Dec-2021 15:43*
Surr: 4-Terphenyl-d14	*112*			*40-140*	*%REC*	*10*	*17-Dec-2021 15:43*
Surr: Nitrobenzene-d5	*102*			*40-140*	*%REC*	*10*	*17-Dec-2021 15:43*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: R3
Collection Date: 18-Nov-2021 09:00

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-04
Matrix:Soil

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**				Prep:SW3541 / 06-Dec-2021		Analyst: JBA
4,4´-DDD	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:02
4,4´-DDE	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:02
4,4´-DDT	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:02
Aldrin	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
alpha-BHC	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
beta-BHC	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
Chlordane	U	H		8.3	8.3	ug/Kg	5	09-Dec-2021 12:02
delta-BHC	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
Dieldrin	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:02
Endosulfan I	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
Endosulfan II	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:02
Endosulfan sulfate	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:02
Endrin	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:02
Endrin aldehyde	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:02
Endrin ketone	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:02
gamma-BHC	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
Heptachlor	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
Heptachlor epoxide	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
Methoxychlor	U	H		8.3	8.3	ug/Kg	5	09-Dec-2021 12:02
Toxaphene	U	H		8.3	8.3	ug/Kg	5	09-Dec-2021 12:02
alpha-Chlordane	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
gamma-Chlordane	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
Surr: Decachlorobiphenyl	*120*				*59-144*	*%REC*	*5*	*09-Dec-2021 12:02*
Surr: Tetrachloro-m-xylene	*89.5*				*56.9-130*	*%REC*	*5*	*09-Dec-2021 12:02*
MISCELLANEOUS PESTICIDES BY SW8081B		**Method:SW8081**				Prep:SW3541 / 06-Dec-2021		Analyst: JBA
Mirex	U	H		0.83	0.83	ug/Kg	5	09-Dec-2021 12:02
PCBS BY SW8082A		**Method:SW8082**				Prep:SW3541 / 06-Dec-2021		Analyst: JBA
Aroclor 1016	U			0.42	1.7	ug/Kg	1	07-Dec-2021 02:59
Aroclor 1221	U			0.55	1.7	ug/Kg	1	07-Dec-2021 02:59
Aroclor 1232	U			0.45	1.7	ug/Kg	1	07-Dec-2021 02:59
Aroclor 1242	U			0.58	1.7	ug/Kg	1	07-Dec-2021 02:59
Aroclor 1248	U			0.58	1.7	ug/Kg	1	07-Dec-2021 02:59
Aroclor 1254	U			0.47	1.7	ug/Kg	1	07-Dec-2021 02:59
Aroclor 1260	U			0.24	1.7	ug/Kg	1	07-Dec-2021 02:59
Surr: Decachlorobiphenyl	*85.2*				*54-143*	*%REC*	*1*	*07-Dec-2021 02:59*
Surr: Tetrachloro-m-xylene	*64.6*				*50-140*	*%REC*	*1*	*07-Dec-2021 02:59*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: R3
Collection Date: 18-Nov-2021 09:00

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-04
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 08-Dec-2021		Analyst: JC
Antimony	U		0.0613	0.472	mg/Kg	1	09-Dec-2021 12:58
Arsenic	**1.32**		**0.0660**	**0.472**	**mg/Kg**	1	09-Dec-2021 00:24
Beryllium	**0.0628**	J	**0.0198**	**0.472**	**mg/Kg**	1	09-Dec-2021 00:24
Cadmium	U		0.0255	0.472	mg/Kg	1	09-Dec-2021 00:24
Chromium	**1.86**		**0.0217**	**0.472**	**mg/Kg**	1	09-Dec-2021 00:24
Cobalt	**0.517**		**0.0141**	**0.472**	**mg/Kg**	1	09-Dec-2021 00:24
Copper	**0.491**		**0.0358**	**0.189**	**mg/Kg**	1	09-Dec-2021 00:24
Lead	**1.81**		**0.0123**	**0.472**	**mg/Kg**	1	09-Dec-2021 00:24
Molybdenum	**0.0311**	J	**0.0170**	**0.472**	**mg/Kg**	1	09-Dec-2021 00:24
Nickel	**0.895**		**0.0453**	**0.472**	**mg/Kg**	1	09-Dec-2021 00:24
Selenium	U		0.0858	0.472	mg/Kg	1	09-Dec-2021 00:24
Silver	U		0.0141	0.472	mg/Kg	1	09-Dec-2021 00:24
Thallium	U		0.210	0.472	mg/Kg	1	09-Dec-2021 00:24
Vanadium	**3.16**		**0.0707**	**0.472**	**mg/Kg**	1	09-Dec-2021 00:24
Zinc	**3.35**		**0.160**	**0.472**	**mg/Kg**	1	09-Dec-2021 00:24
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 06-Dec-2021		Analyst: MSC
Mercury	**0.00582**		**0.000477**	**0.00337**	**mg/Kg**	1	06-Dec-2021 15:56
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**65.5**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 13-Dec-2021		Analyst: JAC
Total Organic Carbon	**0.145**	J	**0.0589**	**0.981**	**wt%-dry**	1	14-Dec-2021 17:00
SUBCONTRACT ANALYSIS - GRAIN SIZE		**Method:NA**					Analyst: SUBK
Subcontract Analysis	See Attached		0		NA	1	30-Dec-2021 09:29
SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS		**Method:NA**					Analyst: SUBHO
Subcontract Analysis	See Attached		0		NA	1	13-Dec-2021 09:17

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: R1
Collection Date: 18-Nov-2021 12:30

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-05
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SW8270 SIM	**Method:SW8270SIM**				Prep:SW3541 / 07-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	3.3	3.3	ug/Kg	10	16-Dec-2021 18:05
2-Methylnaphthalene	U	H	3.3	3.3	ug/Kg	10	16-Dec-2021 18:05
Acenaphthene	U	H	3.3	3.3	ug/Kg	10	16-Dec-2021 18:05
Acenaphthylene	U	H	3.3	3.3	ug/Kg	10	16-Dec-2021 18:05
Anthracene	**4.4**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Benz(a)anthracene	**60**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Benzo(a)pyrene	**100**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Benzo(b)fluoranthene	**150**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Benzo(g,h,i)perylene	**59**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Benzo(k)fluoranthene	**75**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Chrysene	**68**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Dibenz(a,h)anthracene	**9.1**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Dibenzofuran	U	H	3.3	3.3	ug/Kg	10	16-Dec-2021 18:05
Fluoranthene	**68**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Fluorene	U	H	3.3	3.3	ug/Kg	10	16-Dec-2021 18:05
Indeno(1,2,3-cd)pyrene	**61**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Naphthalene	U	H	3.3	3.3	ug/Kg	10	16-Dec-2021 18:05
Phenanthrene	**19**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Pyrene	**75**	H	**3.3**	**3.3**	**ug/Kg**	10	16-Dec-2021 18:05
Surr: 2-Fluorobiphenyl	*93.3*			*40-140*	*%REC*	*10*	*16-Dec-2021 18:05*
Surr: 4-Terphenyl-d14	*112*			*40-140*	*%REC*	*10*	*16-Dec-2021 18:05*
Surr: Nitrobenzene-d5	*99.7*			*40-140*	*%REC*	*10*	*16-Dec-2021 18:05*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: R1
Collection Date: 18-Nov-2021 12:30

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-05
Matrix:Soil

ANALYSES	RESULT	QUAL		MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3541 / 06-Dec-2021			Analyst: JBA
4,4´-DDD	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:24
4,4´-DDE	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:24
4,4´-DDT	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:24
Aldrin	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
alpha-BHC	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
beta-BHC	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
Chlordane	U	H		8.2	8.2	ug/Kg	5	09-Dec-2021 12:24
delta-BHC	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
Dieldrin	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:24
Endosulfan I	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
Endosulfan II	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:24
Endosulfan sulfate	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:24
Endrin	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:24
Endrin aldehyde	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:24
Endrin ketone	U	H		1.6	1.6	ug/Kg	5	09-Dec-2021 12:24
gamma-BHC	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
Heptachlor	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
Heptachlor epoxide	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
Methoxychlor	U	H		8.2	8.2	ug/Kg	5	09-Dec-2021 12:24
Toxaphene	U	H		8.2	8.2	ug/Kg	5	09-Dec-2021 12:24
alpha-Chlordane	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
gamma-Chlordane	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
Surr: Decachlorobiphenyl	*70.2*				*59-144*	*%REC*	*5*	*09-Dec-2021 12:24*
Surr: Tetrachloro-m-xylene	*68.8*				*56.9-130*	*%REC*	*5*	*09-Dec-2021 12:24*
MISCELLANEOUS PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3541 / 06-Dec-2021			Analyst: JBA
Mirex	U	H		0.82	0.82	ug/Kg	5	09-Dec-2021 12:24
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3541 / 06-Dec-2021			Analyst: JBA
Aroclor 1016	U			0.42	1.7	ug/Kg	1	07-Dec-2021 03:16
Aroclor 1221	U			0.56	1.7	ug/Kg	1	07-Dec-2021 03:16
Aroclor 1232	U			0.45	1.7	ug/Kg	1	07-Dec-2021 03:16
Aroclor 1242	U			0.59	1.7	ug/Kg	1	07-Dec-2021 03:16
Aroclor 1248	U			0.59	1.7	ug/Kg	1	07-Dec-2021 03:16
Aroclor 1254	U			0.47	1.7	ug/Kg	1	07-Dec-2021 03:16
Aroclor 1260	U			0.24	1.7	ug/Kg	1	07-Dec-2021 03:16
Surr: Decachlorobiphenyl	*81.5*				*54-143*	*%REC*	*1*	*07-Dec-2021 03:16*
Surr: Tetrachloro-m-xylene	*64.2*				*50-140*	*%REC*	*1*	*07-Dec-2021 03:16*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: R1
Collection Date: 18-Nov-2021 12:30

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-05
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 08-Dec-2021		Analyst: JC
Antimony	U		0.0621	0.478	mg/Kg	1	09-Dec-2021 13:03
Arsenic	**6.71**		**0.0669**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
Beryllium	**0.418**	J	**0.0201**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
Cadmium	**0.100**	J	**0.0258**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
Chromium	**11.2**		**0.0220**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
Cobalt	**4.14**		**0.0143**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
Copper	**5.00**		**0.0363**	**0.191**	**mg/Kg**	1	09-Dec-2021 00:26
Lead	**7.63**		**0.0124**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
Molybdenum	**0.153**	J	**0.0172**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
Nickel	**6.75**		**0.0459**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
Selenium	**0.365**	J	**0.0869**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
Silver	U		0.0143	0.478	mg/Kg	1	09-Dec-2021 00:26
Thallium	U		0.213	0.478	mg/Kg	1	09-Dec-2021 00:26
Vanadium	**18.4**		**0.0717**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
Zinc	**29.0**		**0.162**	**0.478**	**mg/Kg**	1	09-Dec-2021 00:26
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 06-Dec-2021		Analyst: MSC
Mercury	**0.0545**		**0.000483**	**0.00342**	**mg/Kg**	1	06-Dec-2021 15:58
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**36.1**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 13-Dec-2021		Analyst: JAC
Total Organic Carbon	**1.66**		**0.0591**	**0.985**	**wt%-dry**	1	14-Dec-2021 17:00
SUBCONTRACT ANALYSIS - GRAIN SIZE		**Method:NA**					Analyst: SUBK
Subcontract Analysis	See Attached		0		NA	1	30-Dec-2021 09:29
SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS		**Method:NA**					Analyst: SUBHO
Subcontract Analysis	See Attached		0		NA	1	13-Dec-2021 09:17

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: C1
Collection Date: 18-Nov-2021 13:07

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-06
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SW8270 SIM	**Method:SW8270SIM**				Prep:SW3541 / 07-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
2-Methylnaphthalene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Acenaphthene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Acenaphthylene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Anthracene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Benz(a)anthracene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Benzo(a)pyrene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Benzo(b)fluoranthene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Benzo(g,h,i)perylene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Benzo(k)fluoranthene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Chrysene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Dibenz(a,h)anthracene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Dibenzofuran	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Fluoranthene	**0.34**	H	**0.33**	**0.33**	**ug/Kg**	1	16-Dec-2021 18:25
Fluorene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Indeno(1,2,3-cd)pyrene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Naphthalene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Phenanthrene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Pyrene	U	H	0.33	0.33	ug/Kg	1	16-Dec-2021 18:25
Surr: 2-Fluorobiphenyl	*64.7*			*40-140*	*%REC*	*1*	*16-Dec-2021 18:25*
Surr: 4-Terphenyl-d14	*94.5*			*40-140*	*%REC*	*1*	*16-Dec-2021 18:25*
Surr: Nitrobenzene-d5	*84.8*			*40-140*	*%REC*	*1*	*16-Dec-2021 18:25*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: C1
Collection Date: 18-Nov-2021 13:07

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-06
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
4,4´-DDD	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 12:46
4,4´-DDE	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 12:46
4,4´-DDT	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 12:46
Aldrin	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
alpha-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
beta-BHC	U	HP	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
Chlordane	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 12:46
delta-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
Dieldrin	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 12:46
Endosulfan I	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
Endosulfan II	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 12:46
Endosulfan sulfate	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 12:46
Endrin	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 12:46
Endrin aldehyde	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 12:46
Endrin ketone	U	H	1.6	1.6	ug/Kg	5	09-Dec-2021 12:46
gamma-BHC	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
Heptachlor	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
Heptachlor epoxide	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
Methoxychlor	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 12:46
Toxaphene	U	H	8.3	8.3	ug/Kg	5	09-Dec-2021 12:46
alpha-Chlordane	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
gamma-Chlordane	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
Surr: Decachlorobiphenyl	*98.8*			*59-144*	*%REC*	*5*	*09-Dec-2021 12:46*
Surr: Tetrachloro-m-xylene	*54.7*	*S*		*56.9-130*	*%REC*	*5*	*09-Dec-2021 12:46*
MISCELLANEOUS PESTICIDES BY SW8081B		**Method:SW8081**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
Mirex	U	H	0.83	0.83	ug/Kg	5	09-Dec-2021 12:46
PCBS BY SW8082A		**Method:SW8082**			Prep:SW3541 / 06-Dec-2021		Analyst: JBA
Aroclor 1016	U		0.41	1.6	ug/Kg	1	07-Dec-2021 03:33
Aroclor 1221	U		0.55	1.6	ug/Kg	1	07-Dec-2021 03:33
Aroclor 1232	U		0.44	1.6	ug/Kg	1	07-Dec-2021 03:33
Aroclor 1242	U		0.58	1.6	ug/Kg	1	07-Dec-2021 03:33
Aroclor 1248	U		0.58	1.6	ug/Kg	1	07-Dec-2021 03:33
Aroclor 1254	U		0.46	1.6	ug/Kg	1	07-Dec-2021 03:33
Aroclor 1260	U		0.24	1.6	ug/Kg	1	07-Dec-2021 03:33
Surr: Decachlorobiphenyl	*68.3*			*54-143*	*%REC*	*1*	*07-Dec-2021 03:33*
Surr: Tetrachloro-m-xylene	*71.8*			*50-140*	*%REC*	*1*	*07-Dec-2021 03:33*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
Sample ID: C1
Collection Date: 18-Nov-2021 13:07

ANALYTICAL REPORT
WorkOrder:HS21120141
Lab ID:HS21120141-06
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 08-Dec-2021		Analyst: JC
Antimony	U		0.0637	0.490	mg/Kg	1	09-Dec-2021 13:08
Arsenic	**4.92**		**0.0686**	**0.490**	**mg/Kg**	1	09-Dec-2021 00:29
Beryllium	**0.439**	J	**0.0206**	**0.490**	**mg/Kg**	1	09-Dec-2021 00:29
Cadmium	U		0.0265	0.490	mg/Kg	1	09-Dec-2021 00:29
Chromium	**11.0**		**0.0225**	**0.490**	**mg/Kg**	1	09-Dec-2021 00:29
Cobalt	**4.00**		**0.0147**	**0.490**	**mg/Kg**	1	09-Dec-2021 00:29
Copper	**3.69**		**0.0372**	**0.196**	**mg/Kg**	1	09-Dec-2021 00:29
Lead	**7.00**		**0.0127**	**0.490**	**mg/Kg**	1	09-Dec-2021 00:29
Molybdenum	**0.127**	J	**0.0176**	**0.490**	**mg/Kg**	1	09-Dec-2021 00:29
Nickel	**7.29**		**0.0470**	**0.490**	**mg/Kg**	1	09-Dec-2021 00:29
Selenium	**0.288**	J	**0.0892**	**0.490**	**mg/Kg**	1	09-Dec-2021 00:29
Silver	U		0.0147	0.490	mg/Kg	1	09-Dec-2021 00:29
Thallium	U		0.219	0.490	mg/Kg	1	09-Dec-2021 00:29
Vanadium	**17.6**		**0.0735**	**0.490**	**mg/Kg**	1	09-Dec-2021 00:29
Zinc	**27.8**		**0.167**	**0.490**	**mg/Kg**	1	09-Dec-2021 00:29
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 06-Dec-2021		Analyst: MSC
Mercury	**0.0134**		**0.000475**	**0.00336**	**mg/Kg**	1	06-Dec-2021 16:00
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**26.0**		**0.0100**	**0.0100**	**wt%**	1	08-Dec-2021 11:30
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 13-Dec-2021		Analyst: JAC
Total Organic Carbon	**1.20**		**0.0590**	**0.984**	**wt%-dry**	1	14-Dec-2021 17:00
SUBCONTRACT ANALYSIS - GRAIN SIZE		**Method:NA**					Analyst: SUBK
Subcontract Analysis	See Attached		0		NA	1	30-Dec-2021 09:29
SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS		**Method:NA**					Analyst: SUBHO
Subcontract Analysis	See Attached		0		NA	1	13-Dec-2021 09:17

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Weight / Prep Log

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

Batch ID: 173194 **Start Date:** 06 Dec 2021 09:00 **End Date:** 06 Dec 2021 11:00
Method: MERCURY PREP - SOLID - 7471B **Prep Code:** HG_S_LOWPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120141-01		0.5533 (grams)	40 (mL)	72.29	8-oz glass, Neat
HS21120141-02		0.5869 (grams)	40 (mL)	68.15	8-oz glass, Neat
HS21120141-03		0.5849 (grams)	40 (mL)	68.39	8-oz glass, Neat
HS21120141-04		0.5913 (grams)	40 (mL)	67.65	8-oz glass, Neat
HS21120141-05		0.5836 (grams)	40 (mL)	68.54	8-oz glass, Neat
HS21120141-06		0.5931 (grams)	40 (mL)	67.44	8-oz glass, Neat

Batch ID: 173218 **Start Date:** 06 Dec 2021 10:00 **End Date:** 06 Dec 2021 15:00
Method: PEST_LOW_SOIL 3541 **Prep Code:** PESTPR_S_3541LO

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120141-01		30.28 (g)	1 (mL)	0.03303	8-oz glass, Neat
HS21120141-02		30.16 (g)	1 (mL)	0.03316	8-oz glass, Neat
HS21120141-03		30.11 (g)	1 (mL)	0.03321	8-oz glass, Neat
HS21120141-04		30.21 (g)	1 (mL)	0.0331	8-oz glass, Neat
HS21120141-05		30.38 (g)	1 (mL)	0.03292	8-oz glass, Neat
HS21120141-06		30.14 (g)	1 (mL)	0.03318	8-oz glass, Neat

Batch ID: 173219 **Start Date:** 06 Dec 2021 10:00 **End Date:** 06 Dec 2021 15:00
Method: PCB_3541_LO **Prep Code:** PCBPR_SOX_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120141-01		30.34 (grams)	1 (mL)	0.03296	8-oz glass, Neat
HS21120141-02		30.27 (grams)	1 (mL)	0.03304	8-oz glass, Neat
HS21120141-03		30.24 (grams)	1 (mL)	0.03307	8-oz glass, Neat
HS21120141-04		30.29 (grams)	1 (mL)	0.03301	8-oz glass, Neat
HS21120141-05		30.13 (grams)	1 (mL)	0.03319	8-oz glass, Neat
HS21120141-06		30.42 (grams)	1 (mL)	0.03287	8-oz glass, Neat

Batch ID: 173264 **Start Date:** 08 Dec 2021 07:30 **End Date:** 08 Dec 2021 19:30
Method: METALS PREP - SOLIDS - SW3050B **Prep Code:** 3050_I_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120141-01		0.50861 (g)	50 (mL)	98.31	8-oz glass, Neat
HS21120141-02		0.53191 (g)	50 (mL)	94	8-oz glass, Neat
HS21120141-03		0.50861 (g)	50 (mL)	98.31	8-oz glass, Neat
HS21120141-04		0.53011 (g)	50 (mL)	94.32	8-oz glass, Neat
HS21120141-05		0.52331 (g)	50 (mL)	95.55	8-oz glass, Neat
HS21120141-06		0.51021 (g)	50 (mL)	98	8-oz glass, Neat

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

Batch ID: 173278 **Start Date:** 07 Dec 2021 14:00 **End Date:** 07 Dec 2021 18:00
Method: SV SOXHLET EXTRACT-LOWLEVEL-SW3541 **Prep Code:** 3541_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120141-01		30.24 (g)	1 (mL)	0.03307	8-oz glass, Neat
HS21120141-02		30.33 (g)	1 (mL)	0.03297	8-oz glass, Neat
HS21120141-03		30.49 (g)	1 (mL)	0.0328	8-oz glass, Neat
HS21120141-04		30.2 (g)	1 (mL)	0.03311	8-oz glass, Neat
HS21120141-05		30.18 (g)	1 (mL)	0.03313	8-oz glass, Neat
HS21120141-06		30.42 (g)	1 (mL)	0.03287	8-oz glass, Neat

Batch ID: 173484 **Start Date:** 14 Dec 2021 11:00 **End Date:** 14 Dec 2021 12:00
Method: TOC SOLID PREP **Prep Code:** TOC_SOLID_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120141-01		0.2012 (grams)	0.2 (mL)	0.994	8-oz glass, Neat
HS21120141-02		0.2009 (grams)	0.2 (mL)	0.9955	8-oz glass, Neat
HS21120141-03		0.2026 (grams)	0.2 (mL)	0.9872	8-oz glass, Neat
HS21120141-04		0.2039 (grams)	0.2 (mL)	0.9809	8-oz glass, Neat
HS21120141-05		0.2031 (grams)	0.2 (mL)	0.9847	8-oz glass, Neat
HS21120141-06		0.2033 (grams)	0.2 (mL)	0.9838	8-oz glass, Neat

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173194 (0)	**Test Name :** MERCURY BY SW7471B				**Matrix:** Soil	
HS21120141-01	R2	18 Nov 2021 08:15		06 Dec 2021 11:00	06 Dec 2021 15:44	1
HS21120141-02	S14	18 Nov 2021 08:30		06 Dec 2021 11:00	06 Dec 2021 15:46	1
HS21120141-03	S13	18 Nov 2021 08:40		06 Dec 2021 11:00	06 Dec 2021 15:54	1
HS21120141-04	R3	18 Nov 2021 09:00		06 Dec 2021 11:00	06 Dec 2021 15:56	1
HS21120141-05	R1	18 Nov 2021 12:30		06 Dec 2021 11:00	06 Dec 2021 15:58	1
HS21120141-06	C1	18 Nov 2021 13:07		06 Dec 2021 11:00	06 Dec 2021 16:00	1
Batch ID: 173218 (0)	**Test Name :** MISCELLANEOUS PESTICIDES BY SW8081B				**Matrix:** Soil	
HS21120141-01	R2	18 Nov 2021 08:15		06 Dec 2021 10:00	09 Dec 2021 10:10	5
HS21120141-01	R2	18 Nov 2021 08:15		06 Dec 2021 10:00	09 Dec 2021 10:10	5
HS21120141-02	S14	18 Nov 2021 08:30		06 Dec 2021 10:00	09 Dec 2021 11:17	5
HS21120141-02	S14	18 Nov 2021 08:30		06 Dec 2021 10:00	09 Dec 2021 11:17	5
HS21120141-03	S13	18 Nov 2021 08:40		06 Dec 2021 10:00	09 Dec 2021 11:39	5
HS21120141-03	S13	18 Nov 2021 08:40		06 Dec 2021 10:00	09 Dec 2021 11:39	5
HS21120141-04	R3	18 Nov 2021 09:00		06 Dec 2021 10:00	09 Dec 2021 12:02	5
HS21120141-04	R3	18 Nov 2021 09:00		06 Dec 2021 10:00	09 Dec 2021 12:02	5
HS21120141-05	R1	18 Nov 2021 12:30		06 Dec 2021 10:00	09 Dec 2021 12:24	5
HS21120141-05	R1	18 Nov 2021 12:30		06 Dec 2021 10:00	09 Dec 2021 12:24	5
HS21120141-06	C1	18 Nov 2021 13:07		06 Dec 2021 10:00	09 Dec 2021 12:46	5
HS21120141-06	C1	18 Nov 2021 13:07		06 Dec 2021 10:00	09 Dec 2021 12:46	5
Batch ID: 173219 (0)	**Test Name :** PCBS BY SW8082A				**Matrix:** Soil	
HS21120141-01	R2	18 Nov 2021 08:15		06 Dec 2021 10:00	07 Dec 2021 02:24	1
HS21120141-02	S14	18 Nov 2021 08:30		06 Dec 2021 10:00	07 Dec 2021 01:32	1
HS21120141-03	S13	18 Nov 2021 08:40		06 Dec 2021 10:00	07 Dec 2021 02:41	1
HS21120141-04	R3	18 Nov 2021 09:00		06 Dec 2021 10:00	07 Dec 2021 02:59	1
HS21120141-05	R1	18 Nov 2021 12:30		06 Dec 2021 10:00	07 Dec 2021 03:16	1
HS21120141-06	C1	18 Nov 2021 13:07		06 Dec 2021 10:00	07 Dec 2021 03:33	1

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Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173264 (0)	**Test Name :** METALS BY SW6020A				**Matrix:** Soil	
HS21120141-01	R2	18 Nov 2021 08:15		08 Dec 2021 13:30	09 Dec 2021 12:49	1
HS21120141-01	R2	18 Nov 2021 08:15		08 Dec 2021 13:30	09 Dec 2021 00:18	1
HS21120141-02	S14	18 Nov 2021 08:30		08 Dec 2021 13:30	09 Dec 2021 12:52	1
HS21120141-02	S14	18 Nov 2021 08:30		08 Dec 2021 13:30	09 Dec 2021 00:20	1
HS21120141-03	S13	18 Nov 2021 08:40		08 Dec 2021 13:30	09 Dec 2021 12:56	1
HS21120141-03	S13	18 Nov 2021 08:40		08 Dec 2021 13:30	09 Dec 2021 00:22	1
HS21120141-04	R3	18 Nov 2021 09:00		08 Dec 2021 13:30	09 Dec 2021 12:58	1
HS21120141-04	R3	18 Nov 2021 09:00		08 Dec 2021 13:30	09 Dec 2021 00:24	1
HS21120141-05	R1	18 Nov 2021 12:30		08 Dec 2021 13:30	09 Dec 2021 13:03	1
HS21120141-05	R1	18 Nov 2021 12:30		08 Dec 2021 13:30	09 Dec 2021 00:26	1
HS21120141-06	C1	18 Nov 2021 13:07		08 Dec 2021 13:30	09 Dec 2021 13:08	1
HS21120141-06	C1	18 Nov 2021 13:07		08 Dec 2021 13:30	09 Dec 2021 00:29	1
Batch ID: 173278 (1)	**Test Name :** SW8270 SIM				**Matrix:** Soil	
HS21120141-01	R2	18 Nov 2021 08:15		07 Dec 2021 14:00	16 Dec 2021 16:48	1
HS21120141-02	S14	18 Nov 2021 08:30		07 Dec 2021 14:00	16 Dec 2021 17:07	1
HS21120141-03	S13	18 Nov 2021 08:40		07 Dec 2021 14:00	17 Dec 2021 15:24	10
HS21120141-04	R3	18 Nov 2021 09:00		07 Dec 2021 14:00	17 Dec 2021 15:43	10
HS21120141-05	R1	18 Nov 2021 12:30		07 Dec 2021 14:00	16 Dec 2021 18:05	10
HS21120141-06	C1	18 Nov 2021 13:07		07 Dec 2021 14:00	16 Dec 2021 18:25	1
Batch ID: 173484 (0)	**Test Name :** TOTAL ORGANIC CARBON BY SW9060A				**Matrix:** Soil	
HS21120141-01	R2	18 Nov 2021 08:15		13 Dec 2021 13:42	14 Dec 2021 17:00	1
HS21120141-02	S14	18 Nov 2021 08:30		13 Dec 2021 13:42	14 Dec 2021 17:00	1
HS21120141-03	S13	18 Nov 2021 08:40		13 Dec 2021 13:42	14 Dec 2021 17:00	1
HS21120141-04	R3	18 Nov 2021 09:00		13 Dec 2021 13:42	14 Dec 2021 17:00	1
HS21120141-05	R1	18 Nov 2021 12:30		13 Dec 2021 13:42	14 Dec 2021 17:00	1
HS21120141-06	C1	18 Nov 2021 13:07		13 Dec 2021 13:42	14 Dec 2021 17:00	1
Batch ID: R397230 (0)	**Test Name :** TOTAL SOLIDS BY SM2540G-2011				**Matrix:** Soil	
HS21120141-01	R2	18 Nov 2021 08:15			08 Dec 2021 11:30	1
HS21120141-02	S14	18 Nov 2021 08:30			08 Dec 2021 11:30	1
HS21120141-03	S13	18 Nov 2021 08:40			08 Dec 2021 11:30	1
HS21120141-04	R3	18 Nov 2021 09:00			08 Dec 2021 11:30	1
HS21120141-05	R1	18 Nov 2021 12:30			08 Dec 2021 11:30	1
HS21120141-06	C1	18 Nov 2021 13:07			08 Dec 2021 11:30	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R397459 (0)	**Test Name :** SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS				**Matrix:** Soil	
HS21120141-01	R2	18 Nov 2021 08:15			13 Dec 2021 09:17	1
HS21120141-02	S14	18 Nov 2021 08:30			13 Dec 2021 09:17	1
HS21120141-03	S13	18 Nov 2021 08:40			13 Dec 2021 09:17	1
HS21120141-04	R3	18 Nov 2021 09:00			13 Dec 2021 09:17	1
HS21120141-05	R1	18 Nov 2021 12:30			13 Dec 2021 09:17	1
HS21120141-06	C1	18 Nov 2021 13:07			13 Dec 2021 09:17	1
Batch ID: R398600 (0)	**Test Name :** SUBCONTRACT ANALYSIS - GRAIN SIZE				**Matrix:** Soil	
HS21120141-01	R2	18 Nov 2021 08:15			30 Dec 2021 09:29	1
HS21120141-02	S14	18 Nov 2021 08:30			30 Dec 2021 09:29	1
HS21120141-03	S13	18 Nov 2021 08:40			30 Dec 2021 09:29	1
HS21120141-04	R3	18 Nov 2021 09:00			30 Dec 2021 09:29	1
HS21120141-05	R1	18 Nov 2021 12:30			30 Dec 2021 09:29	1
HS21120141-06	C1	18 Nov 2021 13:07			30 Dec 2021 09:29	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173218 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MBLK Sample ID: **MBLK-173218** Units: **ug/Kg** Analysis Date: **09-Dec-2021 07:34**
Client ID: Run ID: **ECD_11_397346** SeqNo: **6414724** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	U	0.33								
4,4´-DDE	U	0.33								
4,4´-DDT	U	0.33								
Aldrin	U	0.17								
alpha-BHC	U	0.17								
alpha-Chlordane	U	0.17								
beta-BHC	U	0.17								
Chlordane	U	1.7								
delta-BHC	U	0.17								
Dieldrin	U	0.33								
Endosulfan I	U	0.17								
Endosulfan II	U	0.33								
Endosulfan sulfate	U	0.33								
Endrin	U	0.33								
Endrin aldehyde	U	0.33								
Endrin ketone	U	0.33								
gamma-BHC	U	0.17								
gamma-Chlordane	U	0.17								
Heptachlor	U	0.17								
Heptachlor epoxide	U	0.17								
Methoxychlor	U	1.7								
Toxaphene	U	1.7								
Surr: Decachlorobiphenyl	*0.7289*	*0*	*0.6667*	*0*	*109*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.7217*	*0*	*0.6667*	*0*	*108*	*56.9 - 130*				

MBLK Sample ID: **MBLK-173218** Units: **ug/Kg** Analysis Date: **09-Dec-2021 07:34**
Client ID: Run ID: **ECD_11_397346** SeqNo: **6414757** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mirex	U	0.17								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173218 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS-173218** Units: **ug/Kg** Analysis Date: **09-Dec-2021 07:56**
Client ID: Run ID: **ECD_11_397346** SeqNo: **6414725** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	1.687	0.33	1.667	0	101	53 - 138				
4,4´-DDE	1.613	0.33	1.667	0	96.8	57 - 136				
4,4´-DDT	2.088	0.33	1.667	0	125	53 - 139				
Aldrin	0.8408	0.17	0.8333	0	101	52 - 130				
alpha-BHC	0.8701	0.17	0.8333	0	104	52 - 130				
alpha-Chlordane	0.8535	0.17	0.8333	0	102	55 - 132				
beta-BHC	0.8098	0.17	0.8333	0	97.2	62 - 130				
delta-BHC	0.8722	0.17	0.8333	0	105	41 - 137				
Dieldrin	1.751	0.33	1.667	0	105	54 - 138				
Endosulfan I	0.6989	0.17	0.8333	0	83.9	55 - 132				
Endosulfan II	1.482	0.33	1.667	0	88.9	59 - 134				
Endosulfan sulfate	1.777	0.33	1.667	0	107	54 - 141				
Endrin	1.926	0.33	1.667	0	116	60 - 157				
Endrin aldehyde	1.536	0.33	1.667	0	92.1	56 - 146				
Endrin ketone	1.741	0.33	1.667	0	104	56 - 153				
gamma-BHC	0.8611	0.17	0.8333	0	103	52 - 133				
gamma-Chlordane	0.8479	0.17	0.8333	0	102	60 - 129				
Heptachlor	0.9942	0.17	0.8333	0	119	54 - 134				
Heptachlor epoxide	0.8643	0.17	0.8333	0	104	58 - 130				
Methoxychlor	9.668	1.7	8.33	0	116	60 - 140				
Surr: Decachlorobiphenyl	*0.7309*	*0*	*0.6667*	*0*	*110*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.72*	*0*	*0.6667*	*0*	*108*	*56.9 - 130*				

LCS Sample ID: **LCS1-173218** Units: **ug/Kg** Analysis Date: **09-Dec-2021 08:19**
Client ID: Run ID: **ECD_11_397346** SeqNo: **6414758** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mirex	1.019	0.17	0.8333	0	122	50 - 150				

LCSD Sample ID: **LCSD1-173218** Units: **ug/Kg** Analysis Date: **09-Dec-2021 08:41**
Client ID: Run ID: **ECD_11_397346** SeqNo: **6414759** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mirex	0.9264	0.17	0.8333	0	111	50 - 150	1.019	9.54	30	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173218 (0) **Instrument:** ECD_11 **Method:** ORGANOCHLORINE PESTICIDES BY SW8081B

MS Sample ID: **HS21120141-01MS** Units: **ug/Kg** Analysis Date: **09-Dec-2021 10:32**
Client ID: **R2** Run ID: **ECD_11_397346** SeqNo: **6414727** PrepDate: **06-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	1.956	1.6	1.659	0.6149	80.8	53 - 138				
4,4´-DDE	2.006	1.6	1.659	0	121	57 - 136				
4,4´-DDT	2.507	1.6	1.659	0.3331	131	53 - 139				
Aldrin	0.9323	0.83	0.8297	0	112	52 - 130				
alpha-BHC	0.926	0.83	0.8297	0	112	52 - 130				
alpha-Chlordane	1.044	0.83	0.8297	0	126	55 - 132				
beta-BHC	1.124	0.83	0.8297	0	135	62 - 130				S
delta-BHC	1.061	0.83	0.8297	0	128	41 - 137				
Dieldrin	2.032	1.6	1.659	0	122	54 - 138				
Endosulfan I	0.843	0.83	0.8297	0	102	55 - 132				
Endosulfan II	1.808	1.6	1.659	0	109	59 - 134				
Endosulfan sulfate	2.148	1.6	1.659	0.3468	109	54 - 141				
Endrin	2.325	1.6	1.659	0	140	60 - 157				
Endrin aldehyde	1.885	1.6	1.659	0	114	56 - 146				
Endrin ketone	2.019	1.6	1.659	0	122	56 - 153				
gamma-BHC	1.015	0.83	0.8297	0	122	52 - 133				
gamma-Chlordane	1.02	0.83	0.8297	0	123	60 - 129				
Heptachlor	1.111	0.83	0.8297	0	134	54 - 134				
Heptachlor epoxide	1.029	0.83	0.8297	0	124	58 - 130				
Methoxychlor	10.61	8.3	8.294	0	128	60 - 140				
Surr: Decachlorobiphenyl	*0.923*	*0*	*0.6638*	*0*	*139*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.6118*	*0*	*0.6638*	*0*	*92.2*	*56.9 - 130*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173218 (0) **Instrument:** ECD_11 **Method:** ORGANOCHLORINE PESTICIDES BY SW8081B

MSD Sample ID: **HS21120141-01MSD** Units: **ug/Kg** Analysis Date: **09-Dec-2021 10:55**
Client ID: **R2** Run ID: **ECD_11_397346** SeqNo: **6414728** PrepDate: **06-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
4,4´-DDD	2.06	1.6	1.664	0	124	53 - 138	1.956	5.16	30	
4,4´-DDE	2.106	1.6	1.664	0	127	57 - 136	2.006	4.9	30	
4,4´-DDT	2.484	1.6	1.664	0	149	53 - 139	2.507	0.933	30	S
Aldrin	0.982	0.83	0.8319	0	118	52 - 130	0.9323	5.2	30	
alpha-BHC	0.9656	0.83	0.8319	0	116	52 - 130	0.926	4.18	30	
alpha-Chlordane	1.099	0.83	0.8319	0	132	55 - 132	1.044	5.15	30	S
beta-BHC	1.175	0.83	0.8319	0	141	62 - 130	1.124	4.4	30	S
delta-BHC	1.115	0.83	0.8319	0	134	41 - 137	1.061	5.01	30	
Dieldrin	2.113	1.6	1.664	0	127	54 - 138	2.032	3.88	30	
Endosulfan I	0.881	0.83	0.8319	0	106	55 - 132	0.843	4.41	30	
Endosulfan II	1.876	1.6	1.664	0	113	59 - 134	1.808	3.65	30	
Endosulfan sulfate	2.22	1.6	1.664	0	133	54 - 141	2.148	3.27	30	
Endrin	2.498	1.6	1.664	0	150	60 - 157	2.325	7.17	30	
Endrin aldehyde	1.843	1.6	1.664	0	111	56 - 146	1.885	2.29	30	
Endrin ketone	2.228	1.6	1.664	0	134	56 - 153	2.019	9.83	30	
gamma-BHC	1.089	0.83	0.8319	0	131	52 - 133	1.015	7.07	30	
gamma-Chlordane	1.076	0.83	0.8319	0	129	60 - 129	1.02	5.37	30	S
Heptachlor	1.146	0.83	0.8319	0	138	54 - 134	1.111	3.14	30	S
Heptachlor epoxide	1.094	0.83	0.8319	0	132	58 - 130	1.029	6.12	30	S
Methoxychlor	11.62	8.3	8.316	0	140	60 - 140	10.61	9.14	30	
Surr: Decachlorobiphenyl	*0.777*	*0*	*0.6656*	*0*	*117*	*59 - 144*	*0.923*	*17.2*	*30*	
Surr: Tetrachloro-m-xylene	*0.6692*	*0*	*0.6656*	*0*	*101*	*56.9 - 130*	*0.6118*	*8.96*	*30*	

The following samples were analyzed in this batch: HS21120141-01 HS21120141-02 HS21120141-03 HS21120141-04 HS21120141-05 HS21120141-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173219 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MBLK Sample ID: **MBLK-173219** Units: **ug/Kg** Analysis Date: **07-Dec-2021 00:23**
Client ID: Run ID: **ECD_7_397065** SeqNo: **6408121** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	U	1.7								
Aroclor 1221	U	1.7								
Aroclor 1232	U	1.7								
Aroclor 1242	U	1.7								
Aroclor 1248	U	1.7								
Aroclor 1254	U	1.7								
Aroclor 1260	U	1.7								
Surr: Decachlorobiphenyl	*0.595*	*0.16*	*0.6667*	*0*	*89.3*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.5252*	*0.16*	*0.6667*	*0*	*78.8*	*50 - 140*				

LCS Sample ID: **LCS-173219** Units: **ug/Kg** Analysis Date: **07-Dec-2021 00:40**
Client ID: Run ID: **ECD_7_397065** SeqNo: **6408122** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	14.32	1.7	16.67	0	85.9	53 - 135				
Aroclor 1260	15.52	1.7	16.67	0	93.1	54 - 137				
Surr: Decachlorobiphenyl	*0.6493*	*0.16*	*0.6667*	*0*	*97.4*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.5895*	*0.16*	*0.6667*	*0*	*88.4*	*50 - 140*				

MS Sample ID: **HS21120141-02MS** Units: **ug/Kg** Analysis Date: **07-Dec-2021 01:49**
Client ID: **S14** Run ID: **ECD_7_397065** SeqNo: **6408124** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	11.86	1.7	16.65	0	71.2	53 - 135				
Aroclor 1260	11.74	1.7	16.65	0	70.5	54 - 137				
Surr: Decachlorobiphenyl	*0.4738*	*0.16*	*0.666*	*0*	*71.1*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.4132*	*0.16*	*0.666*	*0*	*62.0*	*50 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173219 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MSD Sample ID: **HS21120141-02MSD** Units: **ug/Kg** Analysis Date: **07-Dec-2021 02:07**
Client ID: **S14** Run ID: **ECD_7_397065** SeqNo: **6408125** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	11.28	1.7	16.47	0	68.5	53 - 135	11.86	4.97	30	
Aroclor 1260	11.15	1.7	16.47	0	67.7	54 - 137	11.74	5.12	30	
Surr: Decachlorobiphenyl	*0.4871*	*0.16*	*0.6588*	*0*	*73.9*	*54 - 143*	*0.4738*	*2.75*	*30*	
Surr: Tetrachloro-m-xylene	*0.4001*	*0.16*	*0.6588*	*0*	*60.7*	*50 - 140*	*0.4132*	*3.2*	*30*	

The following samples were analyzed in this batch: HS21120141-01 HS21120141-02 HS21120141-03 HS21120141-04 HS21120141-05 HS21120141-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173194 (0) **Instrument: HG03** **Method: MERCURY BY SW7471B**

MBLK Sample ID: **MBLK-173194** Units: **ug/Kg** Analysis Date: **06-Dec-2021 15:34**
Client ID: Run ID: **HG03_397016** SeqNo: **6407251** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	3.38								

LCS Sample ID: **LCS-173194** Units: **ug/Kg** Analysis Date: **06-Dec-2021 15:38**
Client ID: Run ID: **HG03_397016** SeqNo: **6407270** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	349.7	3.56	356.8	0	98.0	80 - 120				

MS Sample ID: **HS21120231-09MS** Units: **ug/Kg** Analysis Date: **06-Dec-2021 15:41**
Client ID: Run ID: **HG03_397016** SeqNo: **6407272** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	248	3.47	348.3	16.54	66.5	80 - 120				S

MSD Sample ID: **HS21120231-09MSD** Units: **ug/Kg** Analysis Date: **06-Dec-2021 15:43**
Client ID: Run ID: **HG03_397016** SeqNo: **6407273** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	242.2	3.40	341.2	16.54	66.2	80 - 120	248	2.35	20	S

The following samples were analyzed in this batch: HS21120141-01 HS21120141-02 HS21120141-03 HS21120141-04 HS21120141-05 HS21120141-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173264 (0) **Instrument: ICPMS06** **Method: METALS BY SW6020A**

MBLK Sample ID: **MBLK-173264** Units: **mg/Kg** Analysis Date: **08-Dec-2021 22:59**
Client ID: Run ID: **ICPMS06_397206** SeqNo: **6412531** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.499								
Arsenic	U	0.499								
Beryllium	U	0.499								
Cadmium	U	0.499								
Chromium	U	0.499								
Cobalt	U	0.499								
Copper	U	0.199								
Lead	U	0.499								
Molybdenum	U	0.499								
Nickel	U	0.499								
Selenium	U	0.499								
Silver	U	0.499								
Thallium	U	0.499								
Vanadium	U	0.499								
Zinc	U	0.499								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173264 (0) **Instrument: ICPMS06** **Method: METALS BY SW6020A**

LCS Sample ID: **LCS-173264** Units: **mg/Kg** Analysis Date: **08-Dec-2021 23:01**
Client ID: Run ID: **ICPMS06_397206** SeqNo: **6412532** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	11.42	0.497	9.942	0	115	80 - 120				
Arsenic	10.38	0.497	9.942	0	104	80 - 120				
Beryllium	9.905	0.497	9.942	0	99.6	80 - 120				
Cadmium	10.53	0.497	9.942	0	106	80 - 120				
Chromium	10.31	0.497	9.942	0	104	80 - 120				
Cobalt	10.35	0.497	9.942	0	104	80 - 120				
Copper	10.53	0.199	9.942	0	106	80 - 120				
Lead	10.66	0.497	9.942	0	107	80 - 120				
Molybdenum	10.77	0.497	9.942	0	108	80 - 120				
Nickel	10.7	0.497	9.942	0	108	80 - 120				
Selenium	10.51	0.497	9.942	0	106	80 - 120				
Silver	10.51	0.497	9.942	0	106	80 - 120				
Thallium	10.84	0.497	9.942	0	109	80 - 120				
Vanadium	10.46	0.497	9.942	0	105	80 - 120				
Zinc	10.55	0.497	9.942	0	106	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173264 (0) **Instrument: ICPMS06** **Method: METALS BY SW6020A**

MS Sample ID: **HS21120324-24MS** Units: **mg/Kg** Analysis Date: **08-Dec-2021 23:07**
Client ID: Run ID: **ICPMS06_397206** SeqNo: **6412535** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	4.577	0.483	9.656	0.1307	46.0	75 - 125				S
Arsenic	12.14	0.483	9.656	1.997	105	75 - 125				
Beryllium	10.34	0.483	9.656	0.2456	105	75 - 125				
Cadmium	10.59	0.483	9.656	0.03229	109	75 - 125				
Chromium	16.32	0.483	9.656	10.63	58.8	75 - 125				S
Cobalt	11.37	0.483	9.656	1.203	105	75 - 125				
Copper	11.56	0.193	9.656	1.842	101	75 - 125				
Lead	14.35	0.483	9.656	4.136	106	75 - 125				
Molybdenum	10.09	0.483	9.656	0.09331	104	75 - 125				
Nickel	12.66	0.483	9.656	2.666	104	75 - 125				
Selenium	10.38	0.483	9.656	0.2511	105	75 - 125				
Silver	10.41	0.483	9.656	0.03671	107	75 - 125				
Thallium	11.06	0.483	9.656	0.08139	114	75 - 125				
Vanadium	19.22	0.483	9.656	7.771	119	75 - 125				
Zinc	20.21	0.483	9.656	11.21	93.2	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173264 (0) **Instrument: ICPMS06** **Method: METALS BY SW6020A**

MSD Sample ID: **HS21120324-24MSD** Units: **mg/Kg** Analysis Date: **08-Dec-2021 23:09**
Client ID: Run ID: **ICPMS06_397206** SeqNo: **6412536** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	5.004	0.474	9.477	0.1307	51.4	75 - 125	4.577	8.91	20	S
Arsenic	11.22	0.474	9.477	1.997	97.3	75 - 125	12.14	7.82	20	
Beryllium	9.592	0.474	9.477	0.2456	98.6	75 - 125	10.34	7.51	20	
Cadmium	9.826	0.474	9.477	0.03229	103	75 - 125	10.59	7.53	20	
Chromium	16.92	0.474	9.477	10.63	66.3	75 - 125	16.32	3.64	20	S
Cobalt	10.5	0.474	9.477	1.203	98.1	75 - 125	11.37	7.95	20	
Copper	10.82	0.190	9.477	1.842	94.7	75 - 125	11.56	6.67	20	
Lead	13.12	0.474	9.477	4.136	94.8	75 - 125	14.35	8.94	20	
Molybdenum	9.485	0.474	9.477	0.09331	99.1	75 - 125	10.09	6.19	20	
Nickel	12.02	0.474	9.477	2.666	98.7	75 - 125	12.66	5.22	20	
Selenium	9.643	0.474	9.477	0.2511	99.1	75 - 125	10.38	7.4	20	
Silver	9.73	0.474	9.477	0.03671	102	75 - 125	10.41	6.76	20	
Thallium	10.24	0.474	9.477	0.08139	107	75 - 125	11.06	7.73	20	
Vanadium	17.62	0.474	9.477	7.771	104	75 - 125	19.22	8.69	20	
Zinc	20.01	0.474	9.477	11.21	92.8	75 - 125	20.21	1.01	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173264 (0) **Instrument: ICPMS06** **Method: METALS BY SW6020A**

PDS Sample ID: **HS21120324-24PDS** Units: **mg/Kg** Analysis Date: **08-Dec-2021 23:11**
Client ID: Run ID: **ICPMS06_397206** SeqNo: **6412537** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	11.65	0.480	9.61	0.1307	120	75 - 125				
Arsenic	12.51	0.480	9.61	1.997	109	75 - 125				
Beryllium	10.32	0.480	9.61	0.2456	105	75 - 125				
Cadmium	10.7	0.480	9.61	0.03229	111	75 - 125				
Chromium	21.31	0.480	9.61	10.63	111	75 - 125				
Cobalt	11.4	0.480	9.61	1.203	106	75 - 125				
Copper	11.91	0.192	9.61	1.842	105	75 - 125				
Lead	15.11	0.480	9.61	4.136	114	75 - 125				
Molybdenum	11.01	0.480	9.61	0.09331	114	75 - 125				
Nickel	12.96	0.480	9.61	2.666	107	75 - 125				
Selenium	10.76	0.480	9.61	0.2511	109	75 - 125				
Silver	10.1	0.480	9.61	0.03671	105	75 - 125				
Thallium	11.19	0.480	9.61	0.08139	116	75 - 125				
Vanadium	18.6	0.480	9.61	7.771	113	75 - 125				
Zinc	21.68	0.480	9.61	11.21	109	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173264 (0) **Instrument: ICPMS06** **Method: METALS BY SW6020A**

SD Sample ID: **HS21120324-24SD** Units: **mg/Kg** Analysis Date: **08-Dec-2021 23:05**
Client ID: Run ID: **ICPMS06_397206** SeqNo: **6412534** PrepDate: **08-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	2.40					0.1307	0	10	
Arsenic	2.101	2.40					1.997	0	10	J
Beryllium	0.2223	2.40					0.2456	0	10	J
Cadmium	U	2.40					0.03229	0	10	
Chromium	10.84	2.40					10.63	1.97	10	
Cobalt	1.229	2.40					1.203	0	10	J
Copper	1.875	0.961					1.842	1.81	10	
Lead	4.108	2.40					4.136	0.681	10	
Molybdenum	U	2.40					0.09331	0	10	
Nickel	2.713	2.40					2.666	1.77	10	
Selenium	U	2.40					0.2511	0	10	
Silver	U	2.40					0.03671	0	10	
Thallium	U	2.40					0.08139	0	10	
Vanadium	7.764	2.40					7.771	0.0878	10	
Zinc	11.66	2.40					11.21	4	10	

The following samples were analyzed in this batch: HS21120141-01 HS21120141-02 HS21120141-03 HS21120141-04 HS21120141-05 HS21120141-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173278 (1) **Instrument: SV-6** **Method: SW8270 SIM**

MBLK Sample ID: **MBLK-173278** Units: **ug/Kg** Analysis Date: **16-Dec-2021 14:14**
Client ID: Run ID: **SV-6_397867** SeqNo: **6427968** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.33								
2-Methylnaphthalene	U	0.33								
Acenaphthene	U	0.33								
Acenaphthylene	U	0.33								
Anthracene	U	0.33								
Benz(a)anthracene	U	0.33								
Benzo(a)pyrene	U	0.33								
Benzo(b)fluoranthene	U	0.33								
Benzo(g,h,i)perylene	U	0.33								
Benzo(k)fluoranthene	U	0.33								
Chrysene	U	0.33								
Dibenz(a,h)anthracene	U	0.33								
Dibenzofuran	U	0.33								
Fluoranthene	U	0.33								
Fluorene	U	0.33								
Indeno(1,2,3-cd)pyrene	U	0.33								
Naphthalene	U	0.33								
Phenanthrene	U	0.33								
Pyrene	U	0.33								
Surr: 2-Fluorobiphenyl	*2.077*	*0*	*2.66*	*0*	*78.1*	*40 - 140*				
Surr: 4-Terphenyl-d14	*2.547*	*0*	*2.66*	*0*	*95.7*	*40 - 140*				
Surr: Nitrobenzene-d5	*2.157*	*0*	*2.66*	*0*	*81.1*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173278 (1) **Instrument: SV-6** **Method: SW8270 SIM**

LCS Sample ID: **LCS-173278** Units: **ug/Kg** Analysis Date: **16-Dec-2021 14:33**
Client ID: Run ID: **SV-6_397867** SeqNo: **6427969** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	2.244	0.33	2.66	0	84.4	40 - 140				
2-Methylnaphthalene	1.978	0.33	2.66	0	74.4	40 - 140				
Acenaphthene	2.116	0.33	2.66	0	79.5	40 - 140				
Acenaphthylene	1.849	0.33	2.66	0	69.5	40 - 140				
Anthracene	2.085	0.33	2.66	0	78.4	40 - 140				
Benz(a)anthracene	1.693	0.33	2.66	0	63.6	40 - 140				
Benzo(a)pyrene	2.165	0.33	2.66	0	81.4	40 - 140				
Benzo(b)fluoranthene	1.83	0.33	2.66	0	68.8	40 - 140				
Benzo(g,h,i)perylene	2.472	0.33	2.66	0	92.9	40 - 140				
Benzo(k)fluoranthene	2.986	0.33	2.66	0	112	40 - 140				
Chrysene	2.721	0.33	2.66	0	102	40 - 140				
Dibenz(a,h)anthracene	1.988	0.33	2.66	0	74.7	40 - 140				
Dibenzofuran	2.208	0.33	2.66	0	83.0	40 - 140				
Fluoranthene	1.862	0.33	2.66	0	70.0	40 - 140				
Fluorene	2.2	0.33	2.66	0	82.7	40 - 140				
Indeno(1,2,3-cd)pyrene	1.973	0.33	2.66	0	74.2	40 - 140				
Naphthalene	2.596	0.33	2.66	0	97.6	40 - 140				
Phenanthrene	2.009	0.33	2.66	0	75.5	40 - 140				
Pyrene	2.662	0.33	2.66	0	100	40 - 140				
Surr: 2-Fluorobiphenyl	*2.202*	*0*	*2.66*	*0*	*82.8*	*40 - 140*				
Surr: 4-Terphenyl-d14	*2.932*	*0*	*2.66*	*0*	*110*	*40 - 140*				
Surr: Nitrobenzene-d5	*2.058*	*0*	*2.66*	*0*	*77.4*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173278 (1) **Instrument: SV-6** **Method: SW8270 SIM**

MS Sample ID: **HS21120141-06MS** Units: **ug/Kg** Analysis Date: **16-Dec-2021 18:44**
Client ID: **C1** Run ID: **SV-6_397867** SeqNo: **6427974** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	1.598	0.33	2.63	0	60.7	40 - 140				
2-Methylnaphthalene	1.496	0.33	2.63	0	56.9	40 - 140				
Acenaphthene	1.455	0.33	2.63	0	55.3	40 - 140				
Acenaphthylene	1.378	0.33	2.63	0	52.4	40 - 140				
Anthracene	1.689	0.33	2.63	0	64.2	40 - 140				
Benz(a)anthracene	2.519	0.33	2.63	0	95.8	40 - 140				
Benzo(a)pyrene	2.276	0.33	2.63	0	86.5	40 - 140				
Benzo(b)fluoranthene	2.881	0.33	2.63	0	110	40 - 140				
Benzo(g,h,i)perylene	2.399	0.33	2.63	0	91.2	40 - 140				
Benzo(k)fluoranthene	2.409	0.33	2.63	0	91.6	40 - 140				
Chrysene	2.739	0.33	2.63	0	104	40 - 140				
Dibenz(a,h)anthracene	1.556	0.33	2.63	0	59.1	40 - 140				
Dibenzofuran	1.329	0.33	2.63	0	50.5	40 - 140				
Fluoranthene	2.994	0.33	2.63	0.3436	101	40 - 140				
Fluorene	1.475	0.33	2.63	0	56.1	40 - 140				
Indeno(1,2,3-cd)pyrene	2.382	0.33	2.63	0	90.6	40 - 140				
Naphthalene	1.723	0.33	2.63	0	65.5	40 - 140				
Phenanthrene	2.819	0.33	2.63	0	107	40 - 140				
Pyrene	3.72	0.33	2.63	0.3047	130	40 - 140				
Surr: 2-Fluorobiphenyl	*2.081*	*0*	*2.63*	*0*	*79.1*	*40 - 140*				
Surr: 4-Terphenyl-d14	*2.918*	*0*	*2.63*	*0*	*111*	*40 - 140*				
Surr: Nitrobenzene-d5	*2*	*0*	*2.63*	*0*	*76.0*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173278 (1) **Instrument: SV-6** **Method: SW8270 SIM**

MSD Sample ID: **HS21120141-06MSD** Units: **ug/Kg** Analysis Date: **16-Dec-2021 19:03**
Client ID: **C1** Run ID: **SV-6_397867** SeqNo: **6427975** PrepDate: **07-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	1.578	0.33	2.658	0	59.4	40 - 140	1.598	1.22	30	
2-Methylnaphthalene	1.541	0.33	2.658	0	58.0	40 - 140	1.496	2.96	30	
Acenaphthene	1.766	0.33	2.658	0	66.4	40 - 140	1.455	19.3	30	
Acenaphthylene	1.928	0.33	2.658	0	72.5	40 - 140	1.378	33.3	30	R
Anthracene	1.673	0.33	2.658	0	62.9	40 - 140	1.689	0.935	30	
Benz(a)anthracene	2.695	0.33	2.658	0	101	40 - 140	2.519	6.73	30	
Benzo(a)pyrene	2.475	0.33	2.658	0	93.1	40 - 140	2.276	8.39	30	
Benzo(b)fluoranthene	3.758	0.33	2.658	0	141	40 - 140	2.881	26.4	30	S
Benzo(g,h,i)perylene	3.585	0.33	2.658	0	135	40 - 140	2.399	39.7	30	R
Benzo(k)fluoranthene	3.46	0.33	2.658	0	130	40 - 140	2.409	35.8	30	R
Chrysene	3.816	0.33	2.658	0	144	40 - 140	2.739	32.9	30	SR
Dibenz(a,h)anthracene	2.188	0.33	2.658	0	82.3	40 - 140	1.556	33.8	30	R
Dibenzofuran	1.857	0.33	2.658	0	69.9	40 - 140	1.329	33.2	30	R
Fluoranthene	2.836	0.33	2.658	0.3436	93.8	40 - 140	2.994	5.4	30	
Fluorene	2.036	0.33	2.658	0	76.6	40 - 140	1.475	32	30	R
Indeno(1,2,3-cd)pyrene	2.917	0.33	2.658	0	110	40 - 140	2.382	20.2	30	
Naphthalene	1.782	0.33	2.658	0	67.1	40 - 140	1.723	3.42	30	
Phenanthrene	2.178	0.33	2.658	0	81.9	40 - 140	2.819	25.6	30	
Pyrene	4.724	0.33	2.658	0.3047	166	40 - 140	3.72	23.8	30	S
Surr: 2-Fluorobiphenyl	*2.266*	*0*	*2.658*	*0*	*85.2*	*40 - 140*	*2.081*	*8.5*	*30*	
Surr: 4-Terphenyl-d14	*2.824*	*0*	*2.658*	*0*	*106*	*40 - 140*	*2.918*	*3.3*	*30*	
Surr: Nitrobenzene-d5	*3.057*	*0*	*2.658*	*0*	*115*	*40 - 140*	*2*	*41.8*	*30*	R

The following samples were analyzed in this batch: HS21120141-01 HS21120141-02 HS21120141-03 HS21120141-04 HS21120141-05 HS21120141-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: 173484 (0) **Instrument: TOC_03** **Method: TOTAL ORGANIC CARBON BY SW9060A**

MBLK Sample ID: **MBLK-173484** Units: **wt%-dry** Analysis Date: **14-Dec-2021 17:00**
Client ID: Run ID: **TOC_03_397599** SeqNo: **6420778** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	0.1007	0.997								J

LCS Sample ID: **LCS-173484** Units: **wt%-dry** Analysis Date: **14-Dec-2021 17:00**
Client ID: Run ID: **TOC_03_397599** SeqNo: **6420776** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.464	0.948	3.791	0	91.4	80 - 120				

LCSD Sample ID: **LCSD-173484** Units: **wt%-dry** Analysis Date: **14-Dec-2021 17:00**
Client ID: Run ID: **TOC_03_397599** SeqNo: **6420777** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.394	0.933	3.731	0	91.0	80 - 120	3.464	2.04	20	

MS Sample ID: **HS21120141-01MS** Units: **wt%-dry** Analysis Date: **14-Dec-2021 17:00**
Client ID: **R2** Run ID: **TOC_03_397599** SeqNo: **6420774** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.823	0.939	3.756	0.9344	76.9	80 - 120				S

MSD Sample ID: **HS21120141-01MSD** Units: **wt%-dry** Analysis Date: **14-Dec-2021 17:00**
Client ID: **R2** Run ID: **TOC_03_397599** SeqNo: **6420775** PrepDate: **13-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.706	0.936	3.744	0.9344	74.0	80 - 120	3.823	3.12	20	S

The following samples were analyzed in this batch: HS21120141-01 HS21120141-02 HS21120141-03 HS21120141-04 HS21120141-05 HS21120141-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: HS21120141

QC BATCH REPORT

Batch ID: R397230 (0) **Instrument:** Balance1 **Method:** TOTAL SOLIDS BY SM2540G-2011

DUP Sample ID: **HS21111398-01DUP** Units: **wt%** Analysis Date: **08-Dec-2021 11:30**
Client ID: Run ID: **Balance1_397230** SeqNo: **6411988** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Solids	61.91	0.0100					60.39	2.49	20	

The following samples were analyzed in this batch: HS21120141-01 HS21120141-02 HS21120141-03 HS21120141-04 HS21120141-05 HS21120141-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy
WorkOrder: **HS21120141**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
Date	
mg/Kg	Milligrams per Kilogram
UG/KG	Micrograms per Kilograms

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

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Sample Receipt Checklist

Work Order ID: HS21120141 **Date/Time Received:** **01-Dec-2021 17:15**

Client Name: ERM NC **Received by:** **Pablo Marinez**

Completed By:	/S/ Paresh M. Giga	02-Dec-2021 17:04	**Reviewed by:**	/S/ Corey Grandits	09-Dec-2021 16:40
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **Soil** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:253017
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	21.7C U/C	IR31	
Cooler(s)/Kit(s):	46105		
Date/Time sample(s) sent to storage:	12/1/2021 19:00		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 253017

HS21120141

ERM, Inc
Gas to Energy

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	Gas to Energy
Work Order		Project Number	
Company Name	ERM	Bill To Company	ERM
Send Report To	Selina Pradhan	Invoice Attn	AP
Address	300 West Summit Avenue	Address	300 West Summit Avenue
City/State/Zip	Charlotte NC 28203	City/State/Zip	Charlotte NC 28203
Phone	507-304-2187	Phone	(
Fax		Fax	
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

A	8270SIM_Soil (PAHs)
B	8081 Pesticides
C	ICP_Soil_Low (6020/7471 Metals -16)
D	PCB_Soil_Total (8082 PCBs)
E	TS_S (Total Solids)
F	TOC_Soil (Total Organic Carbon)
G	Sub Sulfide 9030 ALS Holland MI
H	Sub ALS Kelso ASTM D422 - 15 Day TAT
I	
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	R2	12-11-21	8:15am														
2	S14	"	8:30am														
3	S13	"	8:40am														
4	R3	"	9:00am														
5	R1	"	12:30pm														
6	C1	"	1:07pm														
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by: Date: 12/11/2021 Time: 09:30 Received by:

Relinquished by: Date: 12-1-21 Time: 17:15 Received by (Laboratory):

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
46105	2.7C
IR31	CF0

QC Package: (Check One Box Below)

- [X] Level II Std QC
- [ ] Level III Std QC/Raw Data
- [ ] Level IV SW846/CLP
- [ ] Other
- [ ] TRRP Checklist
- [ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

46105

Date: 12/01/21
Name:
Company:

46105

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

46105

CUSTODY SEAL

Date: Time:
Name:
Company:

Seal Broken By:
Date: 12/01/21

LB1026 (6/11) DMN

EXPRESS WORLDWIDE WPX DHL

From: GUYANA BUSINESS SUPPORT SERVICE
CHRISTO RODNEY
110 DUKES BARRACK STREETS
GEORGETOWN
GEORGETOWN (GUYANA)
Guyana (Bright)

Orig n.
GEO

To: ALS LABORATORY
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210

46105

77099 HOUSTON Texas
United States of America

US-IAH-HOU

G

Day Time

Ref: 954831200

Pcs/Shpt Weight Piece
29.0/209.0 lbs 5/7

Contents WATER SAMPLES AND EMPTY BOTTLES

WAYBILL 51 3544 4425

(2L)US77099-48000031

(J) JD01 4600 0091 5879 7717

C. Rodney

P
3

EDD:11/30/2021
Residential

DHL

RIGHT SOLUTIONS | RIGHT PARTNER

13-Dec-2021

Corey Grandits
ALS Environmental
10450 Stancliff Rd
Suite 210
Houston, TX 77099

Re: **HS21120141** Work Order: **21120432**

Dear Corey,

ALS Environmental received 6 samples on 03-Dec-2021 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 15.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Chad Whelton

Chad Whelton
Project Manager

Report of Laboratory Analysis

Certificate No: MN 026-999-449

Client: ALS Environmental
Project: HS21120141
Work Order: **21120432**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
21120432-01	R2	Soil	HS21120141-01	11/18/2021 08:15	12/3/2021 10:00	☐
21120432-02	S14	Soil	HS21120141-02	11/18/2021 08:30	12/3/2021 10:00	☐
21120432-03	S13	Soil	HS21120141-03	11/18/2021 08:40	12/3/2021 10:00	☐
21120432-04	R3	Soil	HS21120141-04	11/18/2021 09:00	12/3/2021 10:00	☐
21120432-05	R1	Soil	HS21120141-05	11/18/2021 12:30	12/3/2021 10:00	☐
21120432-06	C1	Soil	HS21120141-06	11/18/2021 13:07	12/3/2021 10:00	☐

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Client:	ALS Environmental
Project:	HS21120141
Work Order:	21120432

Case Narrative

Batch 188462, Method SW9034: Samples analyzed after hold time due to being received after expiration date.

Batch 188660, Method SW9034: Samples analyzed after hold time due to being received after expiration date.

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Client: ALS Environmental
Project: HS21120141
WorkOrder: **21120432**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
mg/Kg	Milligrams per Kilogram

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Client: ALS Environmental
Project: HS21120141 **Work Order:** 21120432
Sample ID: R2 **Lab ID:** 21120432-01
Collection Date: 11/18/2021 08:15 AM **Matrix:** SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SULFIDE			**SW9034**		Prep: SW9030B 12/10/21 12:28	Analyst: **EDL**
Sulfide (Acid Insoluble)	ND	H	99	mg/Kg	1	12/10/2021 05:25 PM
Sulfide (Acid Soluble)	ND	H	100	mg/Kg	1	12/7/2021 04:00 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

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Client: ALS Environmental
Project: HS21120141 **Work Order:** 21120432
Sample ID: S14 **Lab ID:** 21120432-02
Collection Date: 11/18/2021 08:30 AM **Matrix:** SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SULFIDE			**SW9034**		Prep: SW9030B 12/10/21 12:28	Analyst: **EDL**
Sulfide (Acid Insoluble)	ND	H	100	mg/Kg	1	12/10/2021 05:25 PM
Sulfide (Acid Soluble)	ND	H	100	mg/Kg	1	12/7/2021 04:00 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

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Client: ALS Environmental
Project: HS21120141 **Work Order:** 21120432
Sample ID: S13 **Lab ID:** 21120432-03
Collection Date: 11/18/2021 08:40 AM **Matrix:** SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SULFIDE			**SW9034**		Prep: SW9030B 12/10/21 12:28	Analyst: **EDL**
Sulfide (Acid Insoluble)	ND	H	99	mg/Kg	1	12/10/2021 05:25 PM
Sulfide (Acid Soluble)	ND	H	99	mg/Kg	1	12/7/2021 04:00 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

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Client: ALS Environmental
Project: HS21120141 **Work Order:** 21120432
Sample ID: R3 **Lab ID:** 21120432-04
Collection Date: 11/18/2021 09:00 AM **Matrix:** SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SULFIDE			**SW9034**		Prep: SW9030B 12/10/21 12:28	Analyst: **EDL**
Sulfide (Acid Insoluble)	ND	H	98	mg/Kg	1	12/10/2021 05:25 PM
Sulfide (Acid Soluble)	ND	H	100	mg/Kg	1	12/7/2021 04:00 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

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Client: ALS Environmental
Project: HS21120141 **Work Order:** 21120432
Sample ID: R1 **Lab ID:** 21120432-05
Collection Date: 11/18/2021 12:30 PM **Matrix:** SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SULFIDE			**SW9034**		Prep: SW9030B 12/10/21 12:28	Analyst: **EDL**
Sulfide (Acid Insoluble)	ND	H	99	mg/Kg	1	12/10/2021 05:25 PM
Sulfide (Acid Soluble)	ND	H	99	mg/Kg	1	12/7/2021 04:00 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

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Client: ALS Environmental
Project: HS21120141 **Work Order:** 21120432
Sample ID: C1 **Lab ID:** 21120432-06
Collection Date: 11/18/2021 01:07 PM **Matrix:** SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SULFIDE			**SW9034**		Prep: SW9030B 12/10/21 12:28	Analyst: **EDL**
Sulfide (Acid Insoluble)	ND	H	99	mg/Kg	1	12/10/2021 05:25 PM
Sulfide (Acid Soluble)	ND	H	100	mg/Kg	1	12/7/2021 04:00 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

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Batch ID: **188462** Instrument ID **WETCHEM** Method: **SW9034**

MBLK Sample ID: **MBLK-188462-188462** Units: **mg/Kg** Analysis Date: **12/7/2021 04:00 PM**
Client ID: Run ID: **WETCHEM_211207E** SeqNo: **8007104** Prep Date: **12/7/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	ND	100								

LCS Sample ID: **LCS-188462-188462** Units: **mg/Kg** Analysis Date: **12/7/2021 04:00 PM**
Client ID: Run ID: **WETCHEM_211207E** SeqNo: **8007105** Prep Date: **12/7/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	432	100	1075	0	40.2	32-99	0			

MS Sample ID: **21120058-02A MS** Units: **mg/Kg** Analysis Date: **12/7/2021 04:00 PM**
Client ID: Run ID: **WETCHEM_211207E** SeqNo: **8007108** Prep Date: **12/7/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	463.4	99	1064	0	43.5	32-99	0			

MSD Sample ID: **21120058-02A MSD** Units: **mg/Kg** Analysis Date: **12/7/2021 04:00 PM**
Client ID: Run ID: **WETCHEM_211207E** SeqNo: **8007109** Prep Date: **12/7/2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	510.9	99	1064	0	48	32-99	463.4	9.76	30	

The following samples were analyzed in this batch:

21120432-01A	21120432-02A	21120432-03A
21120432-04A	21120432-05A	21120432-06A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

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QC BATCH REPORT

Batch ID: **188660** Instrument ID **WETCHEM** Method: **SW9034**

MBLK	Sample ID: **MBLK-188660-188660**				Units: **mg/Kg**			Analysis Date: **12/10/2021 05:25 PM**			
Client ID:	Run ID: **WETCHEM_211210L**				SeqNo: **8018696**			Prep Date: **12/10/2021**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	ND	100								

LCS	Sample ID: **LCS-188660-188660**				Units: **mg/Kg**			Analysis Date: **12/10/2021 05:25 PM**			
Client ID:	Run ID: **WETCHEM_211210L**				SeqNo: **8018697**			Prep Date: **12/10/2021**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	900	100	1075	0	83.7	59-124	0			

MS	Sample ID: **21120432-03A MS**				Units: **mg/Kg**			Analysis Date: **12/10/2021 05:25 PM**			
Client ID: **S13**	Run ID: **WETCHEM_211210L**				SeqNo: **8018701**			Prep Date: **12/10/2021**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	863.9	99	1060	23.86	79.2	59-124	0			H

MSD	Sample ID: **21120432-03A MSD**				Units: **mg/Kg**			Analysis Date: **12/10/2021 05:25 PM**			
Client ID: **S13**	Run ID: **WETCHEM_211210L**				SeqNo: **8018702**			Prep Date: **12/10/2021**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	885.8	98	1058	23.86	81.5	59-124	863.9	2.51	30	H

The following samples were analyzed in this batch:

21120432-01A	21120432-02A	21120432-03A
21120432-04A	21120432-05A	21120432-06A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

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21120432

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

SAMPLING STATE: **North Carolina** **COC ID:** **17559**

SUBCONTRACT TO:

ALS Group USA, Corp.
3352 - 128th Ave
Holland, MI 494249263

Phone: +1 616 399 6070

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	Corey Grandits
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	Corey.Grandits@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS21120141
TSR:	Houston House Acct

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS21120141-01**	**R2**	**Soil**	**18 Nov 2021 08:15**
	9030 Sub Total Sulfide ALS Holland MI			15 Dec 2021
2.	**HS21120141-02**	**S14**	**Soil**	**18 Nov 2021 08:30**
	9030 Sub Total Sulfide ALS Holland MI			15 Dec 2021
3.	**HS21120141-03**	**S13**	**Soil**	**18 Nov 2021 08:40**
	9030 Sub Total Sulfide ALS Holland MI			15 Dec 2021
4.	**HS21120141-04**	**R3**	**Soil**	**18 Nov 2021 09:00**
	9030 Sub Total Sulfide ALS Holland MI			15 Dec 2021
5.	**HS21120141-05**	**R1**	**Soil**	**18 Nov 2021 12:30**
	9030 Sub Total Sulfide ALS Holland MI			15 Dec 2021
6.	**HS21120141-06**	**C1**	**Soil**	**18 Nov 2021 13:07**
	9030 Sub Total Sulfide ALS Holland MI			15 Dec 2021

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: STD (Laboratory Standard QC: method blank and LCS required)

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Subcontract Chain of Custody

SAMPLING STATE: **North Carolina** **COC ID:** **17559**

Relinquished By: J. Mattern Date/Time: 12/02/21 18:50

Received By: Date/Time: 12/3/21 1000

Cooler ID(s): Temperature(s): IR1 3.2

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Sample Receipt Checklist

Client Name: **ALS - HOUSTON** Date/Time Received: **03-Dec-21 10:00**

Work Order: **21120432** Received by: **LYS**

Checklist completed by Lydia Sweet (eSignature) 06-Dec-21 (Date) Reviewed by: Chad Whelton (eSignature) 07-Dec-21 (Date)

Matrices: Soil

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.2/3.2c	IR1	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	12/6/2021 3:32:46 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

SRC Page 1 of 1

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ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
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F : +1 360 636 1068
www.alsglobal.com

December 29, 2021 **Analytical Report for Service Request No:** K2113995

Corey Grandits
ALS Environmental - Houston
10450 Stancliff Road
Suite 210
Houston, TX 77099

RE: HS21120141

Dear Corey,

Enclosed are the results of the sample(s) submitted to our laboratory December 03, 2021
For your reference, these analyses have been assigned our service request number **K2113995.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3364. You may also contact me via email at howard.holmes@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Howard Holmes
Project Manager

RIGHT SOLUTIONS | RIGHT PARTNER
RIGHT SOLUTIONS | RIGHT PARTNER

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
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Acronyms
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Case Narrative
Chain of Custody
Total Solids
General Chemistry

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

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Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

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ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

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Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ALS Environmental - US
Project: HS21120141
Sample Matrix: Soil

Service Request: K2113995
Date Received: 12/03/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Six soil samples were received for analysis at ALS Environmental on 12/03/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Date 12/29/2021

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Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

SAMPLING STATE: **North Carolina** **COC ID:** **17560**

SUBCONTRACT TO:

ALS Environmental Kelso
1317 S. 13th Avenue
Kelso, WA 98626

Phone: +1 360 501 3312

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	Corey Grandits
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	Corey.Grandits@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS21120141
TSR:	Houston House Acct

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS21120141-01**	**R2**	**Soil**	**18 Nov 2021 08:15**
	Sub Grainsize ALS Kelso ASTM D422			22 Dec 2021
2.	**HS21120141-02**	**S14**	**Soil**	**18 Nov 2021 08:30**
	Sub Grainsize ALS Kelso ASTM D422			22 Dec 2021
3.	**HS21120141-03**	**S13**	**Soil**	**18 Nov 2021 08:40**
	Sub Grainsize ALS Kelso ASTM D422			22 Dec 2021
4.	**HS21120141-04**	**R3**	**Soil**	**18 Nov 2021 09:00**
	Sub Grainsize ALS Kelso ASTM D422			22 Dec 2021
5.	**HS21120141-05**	**R1**	**Soil**	**18 Nov 2021 12:30**
	Sub Grainsize ALS Kelso ASTM D422			22 Dec 2021
6.	**HS21120141-06**	**C1**	**Soil**	**18 Nov 2021 13:07**
	Sub Grainsize ALS Kelso ASTM D422			22 Dec 2021

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: STD (Laboratory Standard QC: method blank and LCS required)

Rec by MReddish 12/3/21 1030

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Subcontract Chain of Custody

SAMPLING STATE: **North Carolina** **COC ID: 17560**

Relinquished By: _____ Date/Time: 12/2/2021 1800

Received By: _____ Date/Time: 12/3/21 1030

Cooler ID(s): _____ Temperature(s): _____

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PM HH

Cooler Receipt and Preservation Form

Client ALS Houston Service Request K21 1399 5

Received: 12/3/24 Opened: 12/3/24 By: AP Unloaded: 12/3/24 By: AP

1. Samples were received via? *USPS* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 2 Front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N
4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA (Y) N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. (NA) Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp Indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
0.5	—	1201	17550	—		5300 5225 7086	
			17560				

6. Packing material: *Inserts* (*Baggies*) (*Bubble Wrap*) *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: _____

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Total Solids

ALS Environmental—Kelso Laboratory
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Phone (360)577-7222 Fax (360)636-1068
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Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2113995
Project:	HS21120141	**Date Collected:**	11/18/21
Sample Matrix:	Soil	**Date Received:**	12/3/21
Analysis Method:	160.3 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
R2	K2113995-001	**77.6**	-	-	1	12/06/21 08:54	
S14	K2113995-002	**40.4**	-	-	1	12/06/21 08:54	
S13	K2113995-003	**40.3**	-	-	1	12/06/21 08:54	
R3	K2113995-004	**81.6**	-	-	1	12/06/21 08:54	
R1	K2113995-005	**36.8**	-	-	1	12/06/21 08:54	
C1	K2113995-006	**31.2**	-	-	1	12/06/21 08:54	

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General Chemistry

ALS Environmental—Kelso Laboratory
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www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2113995
Project:	HS21120141	**Date Collected:**	11/18/21
Sample Matrix:	Soil	**Date Received:**	12/03/21
		Date Analyzed:	12/20/21

Particle Size Determination
ASTM D422

Sample Name: R2
Lab Code: K2113995-001

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.93
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.93
Gravel, Medium	**No.4 (4.75 mm)**	0.0748	99.77
Gravel, Fine	**No.10 (2.00 mm)**	0.0567	99.64
Sand, Very Coarse	**No.20 (0.850 mm)**	0.1481	99.31
Sand, Coarse	**No.40 (0.425 mm)**	3.0076	92.67
Sand, Medium	**No.60 (0.250 mm)**	16.6233	55.92
Sand, Fine	**No.140 (0.106 mm)**	20.3812	10.87
Sand, Very Fine	**No.200 (0.0750 mm)**	1.0634	8.52

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	7.89
0.005 mm	3.87
0.001 mm	1.47

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ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2113995
Project:	HS21120141	**Date Collected:**	11/18/21
Sample Matrix:	Soil	**Date Received:**	12/03/21
		Date Analyzed:	12/20/21

Particle Size Determination
ASTM D422

Sample Name: S14
Lab Code: K2113995-002

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0864	99.79
Gravel, Fine	**No.10 (2.00 mm)**	0.1359	99.45
Sand, Very Coarse	**No.20 (0.850 mm)**	0.2111	98.92
Sand, Coarse	**No.40 (0.425 mm)**	0.1650	98.50
Sand, Medium	**No.60 (0.250 mm)**	0.1088	98.22
Sand, Fine	**No.140 (0.106 mm)**	0.0871	98.00
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0355	97.91

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	95.34
0.005 mm	68.88
0.001 mm	53.08

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ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2113995
Project:	HS21120141	**Date Collected:**	11/18/21
Sample Matrix:	Soil	**Date Received:**	12/03/21
		Date Analyzed:	12/20/21

Particle Size Determination
ASTM D422

Sample Name: S13
Lab Code: K2113995-003

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0130	99.97
Sand, Very Coarse	**No.20 (0.850 mm)**	0.0441	99.86
Sand, Coarse	**No.40 (0.425 mm)**	0.1263	99.53
Sand, Medium	**No.60 (0.250 mm)**	0.2518	98.89
Sand, Fine	**No.140 (0.106 mm)**	0.4573	97.72
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0344	97.63

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	98.33
0.005 mm	88.96
0.001 mm	83.37

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ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2113995
Project:	HS21120141	**Date Collected:**	11/18/21
Sample Matrix:	Soil	**Date Received:**	12/03/21
		Date Analyzed:	12/20/21

Particle Size Determination
ASTM D422

Sample Name: R3
Lab Code: K2113995-004

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.99
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.99
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	99.99
Gravel, Fine	**No.10 (2.00 mm)**	0.0218	99.93
Sand, Very Coarse	**No.20 (0.850 mm)**	1.7854	95.49
Sand, Coarse	**No.40 (0.425 mm)**	12.2937	64.93
Sand, Medium	**No.60 (0.250 mm)**	17.0980	22.43
Sand, Fine	**No.140 (0.106 mm)**	7.5028	3.77
Sand, Very Fine	**No.200 (0.0750 mm)**	0.1005	3.52

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	3.22
0.005 mm	2.62
0.001 mm	2.26

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ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2113995
Project:	HS21120141	**Date Collected:**	11/18/21
Sample Matrix:	Soil	**Date Received:**	12/03/21
		Date Analyzed:	12/20/21

Particle Size Determination
ASTM D422

Sample Name: R3
Lab Code: K2113995-004DUP

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	99.90
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	99.90
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	99.90
Gravel, Fine	**No.10 (2.00 mm)**	0.0370	99.81
Sand, Very Coarse	**No.20 (0.850 mm)**	1.7184	95.60
Sand, Coarse	**No.40 (0.425 mm)**	12.0501	66.05
Sand, Medium	**No.60 (0.250 mm)**	16.9425	24.51
Sand, Fine	**No.140 (0.106 mm)**	8.6891	3.21
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0997	2.97

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	2.88
0.005 mm	2.56
0.001 mm	2.38

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ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2113995
Project:	HS21120141	**Date Collected:**	11/18/21
Sample Matrix:	Soil	**Date Received:**	12/03/21
		Date Analyzed:	12/20/21

Particle Size Determination
ASTM D422

Sample Name: R1
Lab Code: K2113995-005

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0000	100.00
Sand, Very Coarse	**No.20 (0.850 mm)**	0.0199	99.95
Sand, Coarse	**No.40 (0.425 mm)**	0.0705	99.77
Sand, Medium	**No.60 (0.250 mm)**	0.1284	99.44
Sand, Fine	**No.140 (0.106 mm)**	1.4977	95.62
Sand, Very Fine	**No.200 (0.0750 mm)**	2.7264	88.67

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	87.86
0.005 mm	67.41
0.001 mm	55.19

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ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2113995
Project:	HS21120141	**Date Collected:**	11/18/21
Sample Matrix:	Soil	**Date Received:**	12/03/21
		Date Analyzed:	12/20/21

Particle Size Determination
ASTM D422

Sample Name: C1
Lab Code: K2113995-006

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0000	100.00
Sand, Very Coarse	**No.20 (0.850 mm)**	0.0000	100.00
Sand, Coarse	**No.40 (0.425 mm)**	0.0269	99.93
Sand, Medium	**No.60 (0.250 mm)**	0.0233	99.87
Sand, Fine	**No.140 (0.106 mm)**	0.0290	99.79
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0267	99.73

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	98.58
0.005 mm	81.67
0.001 mm	71.57

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
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December 24, 2021

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS21120295**

Laboratory Results for: **Gas to Energy - E1A Study**

Dear Selina Pradhan,

ALS Environmental received 3 sample(s) on Dec 06, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Work Order: HS21120295

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21120295-01	S1	Water		29-Nov-2021 10:25	06-Dec-2021 11:18	☐
HS21120295-02	S2	Water		29-Nov-2021 10:00	06-Dec-2021 11:18	☐
HS21120295-03	S10	Water		29-Nov-2021 13:00	06-Dec-2021 11:18	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - E1A Study
Work Order: HS21120295

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 173225

Sample ID: LCSD-173225

- The RPD between the LCS and LCSD was outside of the control limit.

Metals by Method SW6020A

Batch ID: 173642

Sample ID: S1 (HS21120295-01)

- Sample ran at 5x due to high concentration of Sodium.

Metals by Method SW7470A

Batch ID: 173296

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E1664A

Batch ID: R397888

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method Calculation

Batch ID: R398240

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E300

Batch ID: R398062

Sample ID: S1 (HS21120295-01)

- The reporting limit is elevated due to dilution for high concentrations of non-target analytes. (Nitrate/Nitrite (as N))

Sample ID: S2 (HS21120295-02)

- The reporting limit is elevated due to dilution for high concentrations of non-target analytes. (Nitrate/Nitrite (as N))

WetChemistry by Method M2540B

Batch ID: R397211

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540D

Batch ID: R397056

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - E1A Study
Work Order: HS21120295

WetChemistry by Method M2540C

Batch ID: R397139

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 173665

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 173609

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S1
Collection Date: 29-Nov-2021 10:25

ANALYTICAL REPORT
WorkOrder:HS21120295
Lab ID:HS21120295-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 06-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	**0.011**		**0.010**	**0.010**	**ug/L**	1	16-Dec-2021 19:22
2-Methylnaphthalene	**0.020**		**0.010**	**0.010**	**ug/L**	1	16-Dec-2021 19:22
Acenaphthene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Acenaphthylene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Benz(a)anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Chrysene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Dibenzofuran	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Fluorene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Naphthalene	**0.061**		**0.010**	**0.010**	**ug/L**	1	16-Dec-2021 19:22
Phenanthrene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:22
Surr: 2-Fluorobiphenyl	*70.0*			*40-140*	*%REC*	*1*	*16-Dec-2021 19:22*
Surr: 4-Terphenyl-d14	*106*			*40-140*	*%REC*	*1*	*16-Dec-2021 19:22*
Surr: Nitrobenzene-d5	*83.0*			*40-140*	*%REC*	*1*	*16-Dec-2021 19:22*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 16-Dec-2021		Analyst: JHD
Antimony	U		0.00200	0.0100	mg/L	5	17-Dec-2021 19:17
Arsenic	**0.0336**		**0.00200**	**0.0100**	**mg/L**	5	17-Dec-2021 19:17
Beryllium	**0.00714**	J	**0.00100**	**0.0100**	**mg/L**	5	17-Dec-2021 19:17
Cadmium	U		0.00100	0.0100	mg/L	5	17-Dec-2021 19:17
Chromium	**0.0805**		**0.00200**	**0.0200**	**mg/L**	5	17-Dec-2021 19:17
Cobalt	**0.0683**		**0.00100**	**0.0250**	**mg/L**	5	17-Dec-2021 19:17
Copper	**0.0414**		**0.00500**	**0.0100**	**mg/L**	5	17-Dec-2021 19:17
Lead	**0.117**		**0.00300**	**0.0100**	**mg/L**	5	17-Dec-2021 19:17
Molybdenum	U		0.00300	0.0250	mg/L	5	17-Dec-2021 19:17
Nickel	**0.0717**		**0.00300**	**0.0100**	**mg/L**	5	17-Dec-2021 19:17
Selenium	**0.00698**	J	**0.00550**	**0.0100**	**mg/L**	5	17-Dec-2021 19:17
Silver	U		0.00100	0.0100	mg/L	5	17-Dec-2021 19:17
Thallium	U		0.00100	0.0100	mg/L	5	17-Dec-2021 19:17
Vanadium	**0.179**		**0.00300**	**0.0250**	**mg/L**	5	17-Dec-2021 19:17
Zinc	**0.381**		**0.0100**	**0.0200**	**mg/L**	5	17-Dec-2021 19:17

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S1
Collection Date: 29-Nov-2021 10:25

ANALYTICAL REPORT
WorkOrder:HS21120295
Lab ID:HS21120295-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 08-Dec-2021		Analyst: MSC
Mercury	**0.0000380**	J	**0.0000300**	**0.000200**	**mg/L**	1	08-Dec-2021 13:30
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.37**	J	**0.10**	**0.50**	**mg/L**	1	22-Dec-2021 17:13
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.22**	J	**0.610**	**2.00**	**mg/L**	1	17-Dec-2021 14:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	U		0.150	1.00	mg/L	5	20-Dec-2021 11:06
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 15-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	15-Dec-2021 13:45
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**13,500**		**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**9,080**		**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 15:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**4,250**		**2.50**	**2.50**	**mg/L**	1	06-Dec-2021 15:15
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 16-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.37**	J	**0.10**	**0.50**	**mg/L**	1	16-Dec-2021 14:30

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S2
Collection Date: 29-Nov-2021 10:00

ANALYTICAL REPORT
WorkOrder:HS21120295
Lab ID:HS21120295-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 06-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Acenaphthene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Acenaphthylene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Benz(a)anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Chrysene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Dibenzofuran	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Fluorene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Naphthalene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Phenanthrene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 19:42
Surr: 2-Fluorobiphenyl	*67.2*			*40-140*	*%REC*	*1*	*16-Dec-2021 19:42*
Surr: 4-Terphenyl-d14	*85.5*			*40-140*	*%REC*	*1*	*16-Dec-2021 19:42*
Surr: Nitrobenzene-d5	*74.5*			*40-140*	*%REC*	*1*	*16-Dec-2021 19:42*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 16-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	20-Dec-2021 13:32
Arsenic	**0.00566**		**0.000400**	**0.00200**	**mg/L**	1	20-Dec-2021 13:32
Beryllium	**0.000597**	J	**0.000200**	**0.00200**	**mg/L**	1	20-Dec-2021 13:32
Cadmium	U		0.000200	0.00200	mg/L	1	20-Dec-2021 13:32
Chromium	**0.00504**		**0.000400**	**0.00400**	**mg/L**	1	20-Dec-2021 13:32
Cobalt	**0.00348**	J	**0.000200**	**0.00500**	**mg/L**	1	20-Dec-2021 13:32
Copper	**0.00702**		**0.00100**	**0.00200**	**mg/L**	1	20-Dec-2021 13:32
Lead	**0.00859**		**0.000600**	**0.00200**	**mg/L**	1	20-Dec-2021 13:32
Molybdenum	U		0.000600	0.00500	mg/L	1	20-Dec-2021 13:32
Nickel	**0.00564**		**0.000600**	**0.00200**	**mg/L**	1	20-Dec-2021 13:32
Selenium	U		0.00110	0.00200	mg/L	1	20-Dec-2021 13:32
Silver	U		0.000200	0.00200	mg/L	1	20-Dec-2021 13:32
Thallium	U		0.000200	0.00200	mg/L	1	20-Dec-2021 13:32
Vanadium	**0.0123**		**0.000600**	**0.00500**	**mg/L**	1	20-Dec-2021 13:32
Zinc	**0.0298**		**0.00200**	**0.00400**	**mg/L**	1	20-Dec-2021 13:32

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S2
Collection Date: 29-Nov-2021 10:00

ANALYTICAL REPORT
WorkOrder:HS21120295
Lab ID:HS21120295-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 08-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	08-Dec-2021 13:32
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**1.7**		**0.10**	**0.50**	**mg/L**	1	22-Dec-2021 17:13
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**2.47**		**0.610**	**2.00**	**mg/L**	1	17-Dec-2021 14:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.632**	J	**0.150**	**1.00**	**mg/L**	5	20-Dec-2021 11:29
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 15-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**0.0840**		**0.0200**	**0.0500**	**mg/L**	1	15-Dec-2021 13:45
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**726**		**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**512**		**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 15:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**235**		**2.50**	**2.50**	**mg/L**	1	06-Dec-2021 15:15
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 16-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**1.1**		**0.10**	**0.50**	**mg/L**	1	16-Dec-2021 14:30

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S10
Collection Date: 29-Nov-2021 13:00

ANALYTICAL REPORT
WorkOrder:HS21120295
Lab ID:HS21120295-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 06-Dec-2021		Analyst: JLJ
1-Methylnaphthalene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
2-Methylnaphthalene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Acenaphthene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Acenaphthylene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Anthracene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Benz(a)anthracene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Benzo(a)pyrene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Benzo(b)fluoranthene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Benzo(g,h,i)perylene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Benzo(k)fluoranthene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Chrysene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Dibenz(a,h)anthracene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Dibenzofuran		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Fluoranthene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Fluorene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Indeno(1,2,3-cd)pyrene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Naphthalene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Phenanthrene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Pyrene		U	0.010	0.010	ug/L	1	16-Dec-2021 20:01
Surr: 2-Fluorobiphenyl	*68.7*			*40-140*	*%REC*	*1*	*16-Dec-2021 20:01*
Surr: 4-Terphenyl-d14	*99.7*			*40-140*	*%REC*	*1*	*16-Dec-2021 20:01*
Surr: Nitrobenzene-d5	*70.1*			*40-140*	*%REC*	*1*	*16-Dec-2021 20:01*
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**124**		**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**66.0**		**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 15:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**44.0**		**2.50**	**2.50**	**mg/L**	1	06-Dec-2021 15:15

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

Batch ID: 173225 **Start Date:** 06 Dec 2021 13:49 **End Date:** 06 Dec 2021 15:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120295-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120295-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120295-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173296 **Start Date:** 08 Dec 2021 08:00 **End Date:** 08 Dec 2021 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120295-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120295-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173609 **Start Date:** 15 Dec 2021 10:30 **End Date:** 15 Dec 2021 12:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120295-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120295-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

Batch ID: 173642 **Start Date:** 16 Dec 2021 12:00 **End Date:** 16 Dec 2021 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120295-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120295-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173665 **Start Date:** 16 Dec 2021 10:00 **End Date:** 16 Dec 2021 13:30
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120295-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120295-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173225 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25		06 Dec 2021 13:49	16 Dec 2021 19:22	1
HS21120295-02	S2	29 Nov 2021 10:00		06 Dec 2021 13:49	16 Dec 2021 19:42	1
HS21120295-03	S10	29 Nov 2021 13:00		06 Dec 2021 13:49	16 Dec 2021 20:01	1
Batch ID: 173296 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25		08 Dec 2021 08:00	08 Dec 2021 13:30	1
HS21120295-02	S2	29 Nov 2021 10:00		08 Dec 2021 08:00	08 Dec 2021 13:32	1
Batch ID: 173609 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25		15 Dec 2021 10:30	15 Dec 2021 13:45	1
HS21120295-02	S2	29 Nov 2021 10:00		15 Dec 2021 10:30	15 Dec 2021 13:45	1
Batch ID: 173642 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25		16 Dec 2021 16:00	17 Dec 2021 19:17	5
HS21120295-02	S2	29 Nov 2021 10:00		16 Dec 2021 16:00	20 Dec 2021 13:32	1
Batch ID: 173665 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25		16 Dec 2021 10:00	16 Dec 2021 14:30	1
HS21120295-02	S2	29 Nov 2021 10:00		16 Dec 2021 10:00	16 Dec 2021 14:30	1
Batch ID: R397056 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25			06 Dec 2021 15:15	1
HS21120295-02	S2	29 Nov 2021 10:00			06 Dec 2021 15:15	1
HS21120295-03	S10	29 Nov 2021 13:00			06 Dec 2021 15:15	1
Batch ID: R397139 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25			06 Dec 2021 15:20	1
HS21120295-02	S2	29 Nov 2021 10:00			06 Dec 2021 15:20	1
HS21120295-03	S10	29 Nov 2021 13:00			06 Dec 2021 15:20	1
Batch ID: R397211 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25			06 Dec 2021 18:00	1
HS21120295-02	S2	29 Nov 2021 10:00			06 Dec 2021 18:00	1
HS21120295-03	S10	29 Nov 2021 13:00			06 Dec 2021 18:00	1
Batch ID: R397888 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25			17 Dec 2021 14:50	1
HS21120295-02	S2	29 Nov 2021 10:00			17 Dec 2021 14:50	1
Batch ID: R398062 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25			20 Dec 2021 11:06	5
HS21120295-02	S2	29 Nov 2021 10:00			20 Dec 2021 11:29	5
Batch ID: R398240 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS21120295-01	S1	29 Nov 2021 10:25			22 Dec 2021 17:13	1
HS21120295-02	S2	29 Nov 2021 10:00			22 Dec 2021 17:13	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173296 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-173296** Units: **mg/L** Analysis Date: **08-Dec-2021 12:51**
Client ID: Run ID: **HG03_397205** SeqNo: **6411335** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U		0.000200								

LCS Sample ID: **LCS-173296** Units: **mg/L** Analysis Date: **08-Dec-2021 12:52**
Client ID: Run ID: **HG03_397205** SeqNo: **6411336** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00525		0.000200	0.005	0	105	80 - 120				

MS Sample ID: **HS21120207-01MS** Units: **mg/L** Analysis Date: **08-Dec-2021 13:01**
Client ID: Run ID: **HG03_397205** SeqNo: **6411278** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00502		0.000200	0.005	0.000035	99.7	75 - 125				

MSD Sample ID: **HS21120207-01MSD** Units: **mg/L** Analysis Date: **08-Dec-2021 13:03**
Client ID: Run ID: **HG03_397205** SeqNo: **6411279** PrepDate: **08-Dec-2021** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00497		0.000200	0.005	0.000035	98.7	75 - 125	0.00502	1	20	

The following samples were analyzed in this batch: HS21120295-01 HS21120295-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173642 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-173642** Units: **mg/L** Analysis Date: **17-Dec-2021 16:00**
Client ID: Run ID: **ICPMS06_397852** SeqNo: **6428269** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	0.001879	0.00500								J
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173642 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-173642** Units: **mg/L** Analysis Date: **17-Dec-2021 16:02**
Client ID: Run ID: **ICPMS06_397852** SeqNo: **6428270** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05276	0.00200	0.05	0	106	80 - 120				
Arsenic	0.05228	0.00200	0.05	0	105	80 - 120				
Beryllium	0.04827	0.00200	0.05	0	96.5	80 - 120				
Cadmium	0.05221	0.00200	0.05	0	104	80 - 120				
Chromium	0.05034	0.00400	0.05	0	101	80 - 120				
Cobalt	0.05095	0.00500	0.05	0	102	80 - 120				
Copper	0.05324	0.00200	0.05	0	106	80 - 120				
Lead	0.04896	0.00200	0.05	0	97.9	80 - 120				
Molybdenum	0.05008	0.00500	0.05	0	100	80 - 120				
Nickel	0.05218	0.00200	0.05	0	104	80 - 120				
Selenium	0.05303	0.00200	0.05	0	106	80 - 120				
Silver	0.05145	0.00200	0.05	0	103	80 - 120				
Thallium	0.05099	0.00200	0.05	0	102	80 - 120				
Vanadium	0.05316	0.00500	0.05	0	106	80 - 120				
Zinc	0.05401	0.00400	0.05	0	108	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173642 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21120297-02MS** Units: **mg/L** Analysis Date: **17-Dec-2021 16:12**
Client ID: Run ID: **ICPMS06_397852** SeqNo: **6428274** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05441	0.00200	0.05	-0.000206	109	80 - 120				
Arsenic	0.05394	0.00200	0.05	0.000684	107	80 - 120				
Beryllium	0.05146	0.00200	0.05	0.000513	102	80 - 120				
Cadmium	0.05305	0.00200	0.05	0.000028	106	80 - 120				
Chromium	0.05125	0.00400	0.05	0.000759	101	80 - 120				
Cobalt	0.0543	0.00500	0.05	0.002698	103	80 - 120				
Copper	0.05501	0.00200	0.05	0.000854	108	80 - 120				
Lead	0.05037	0.00200	0.05	0.000788	99.2	80 - 120				
Molybdenum	0.04924	0.00500	0.05	0.000022	98.4	80 - 120				
Nickel	0.05886	0.00200	0.05	0.006328	105	80 - 120				
Selenium	0.05208	0.00200	0.05	-0.000162	104	80 - 120				
Silver	0.05081	0.00200	0.05	-0.00003	102	80 - 120				
Thallium	0.0514	0.00200	0.05	-0.000049	103	80 - 120				
Vanadium	0.05374	0.00500	0.05	0.002335	103	80 - 120				
Zinc	0.08626	0.00400	0.05	0.03154	109	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173642 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21120297-02MSD** Units: **mg/L** Analysis Date: **17-Dec-2021 16:14**
Client ID: Run ID: **ICPMS06_397852** SeqNo: **6428275** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Antimony	0.05623	0.00200	0.05	-0.000206	113	80 - 120	0.05441	3.29	20	
Arsenic	0.05491	0.00200	0.05	0.000684	108	80 - 120	0.05394	1.78	20	
Beryllium	0.05135	0.00200	0.05	0.000513	102	80 - 120	0.05146	0.196	20	
Cadmium	0.05524	0.00200	0.05	0.000028	110	80 - 120	0.05305	4.04	20	
Chromium	0.0522	0.00400	0.05	0.000759	103	80 - 120	0.05125	1.83	20	
Cobalt	0.05525	0.00500	0.05	0.002698	105	80 - 120	0.0543	1.74	20	
Copper	0.05632	0.00200	0.05	0.000854	111	80 - 120	0.05501	2.35	20	
Lead	0.05161	0.00200	0.05	0.000788	102	80 - 120	0.05037	2.43	20	
Molybdenum	0.05131	0.00500	0.05	0.000022	103	80 - 120	0.04924	4.13	20	
Nickel	0.06027	0.00200	0.05	0.006328	108	80 - 120	0.05886	2.38	20	
Selenium	0.0553	0.00200	0.05	-0.000162	111	80 - 120	0.05208	6	20	
Silver	0.0531	0.00200	0.05	-0.00003	106	80 - 120	0.05081	4.42	20	
Thallium	0.05348	0.00200	0.05	-0.000049	107	80 - 120	0.0514	3.96	20	
Vanadium	0.05457	0.00500	0.05	0.002335	104	80 - 120	0.05374	1.53	20	
Zinc	0.08702	0.00400	0.05	0.03154	111	80 - 120	0.08626	0.868	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173642 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21120297-02SD** Units: **mg/L** Analysis Date: **17-Dec-2021 16:06**
Client ID: Run ID: **ICPMS06_397852** SeqNo: **6428272** PrepDate: **16-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					-0.000206	0	10	
Arsenic	U	0.0100					0.000684	0	10	
Beryllium	U	0.0100					0.000513	0	10	
Cadmium	U	0.0100					0.000028	0	10	
Chromium	U	0.0200					0.000759	0	10	
Cobalt	0.002684	0.0250					0.002698	0	10	J
Copper	U	0.0100					0.000854	0	10	
Lead	U	0.0100					0.000788	0	10	
Molybdenum	U	0.0250					0.000022	0	10	
Nickel	0.006281	0.0100					0.006328	0	10	J
Selenium	U	0.0100					-0.000162	0	10	
Silver	U	0.0100					-0.00003	0	10	
Thallium	U	0.0100					-0.000049	0	10	
Vanadium	0.009817	0.0250					0.002335	0	10	J
Zinc	0.03029	0.0200					0.03154	3.95	10	

The following samples were analyzed in this batch: HS21120295-01 HS21120295-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173225 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-173225** Units: **ug/L** Analysis Date: **16-Dec-2021 14:52**
Client ID: Run ID: **SV-6_397867** SeqNo: **6427869** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.0653*	*0*	*0.08*	*0*	*81.6*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.06697*	*0*	*0.08*	*0*	*83.7*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.05665*	*0*	*0.08*	*0*	*70.8*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173225 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-173225** Units: **ug/L** Analysis Date: **16-Dec-2021 15:11**
Client ID: Run ID: **SV-6_397867** SeqNo: **6427870** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.05744	0.010	0.08	0	71.8	40 - 140				
2-Methylnaphthalene	0.05264	0.010	0.08	0	65.8	40 - 140				
Acenaphthene	0.06881	0.010	0.08	0	86.0	40 - 140				
Acenaphthylene	0.06546	0.010	0.08	0	81.8	40 - 140				
Anthracene	0.05528	0.010	0.08	0	69.1	40 - 140				
Benz(a)anthracene	0.07537	0.010	0.08	0	94.2	40 - 140				
Benzo(a)pyrene	0.06484	0.010	0.08	0	81.0	40 - 140				
Benzo(b)fluoranthene	0.06866	0.010	0.08	0	85.8	40 - 140				
Benzo(g,h,i)perylene	0.0702	0.010	0.08	0	87.7	40 - 140				
Benzo(k)fluoranthene	0.08189	0.010	0.08	0	102	40 - 140				
Chrysene	0.07852	0.010	0.08	0	98.2	40 - 140				
Dibenz(a,h)anthracene	0.05226	0.010	0.08	0	65.3	40 - 140				
Dibenzofuran	0.06229	0.010	0.08	0	77.9	40 - 140				
Fluoranthene	0.0626	0.010	0.08	0	78.2	40 - 140				
Fluorene	0.06103	0.010	0.08	0	76.3	40 - 140				
Indeno(1,2,3-cd)pyrene	0.05259	0.010	0.08	0	65.7	40 - 140				
Naphthalene	0.06818	0.010	0.08	0	85.2	40 - 140				
Phenanthrene	0.05271	0.010	0.08	0	65.9	40 - 140				
Pyrene	0.07946	0.010	0.08	0	99.3	40 - 140				
Surr: 2-Fluorobiphenyl	*0.05762*	*0*	*0.08*	*0*	*72.0*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.06941*	*0*	*0.08*	*0*	*86.8*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.05976*	*0*	*0.08*	*0*	*74.7*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173225 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-173225** Units: **ug/L** Analysis Date: **16-Dec-2021 15:31**
Client ID: Run ID: **SV-6_397867** SeqNo: **6427871** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.06262	0.010	0.08	0	78.3	40 - 140	0.05744	8.62	20	
2-Methylnaphthalene	0.05366	0.010	0.08	0	67.1	40 - 140	0.05264	1.91	20	
Acenaphthene	0.05515	0.010	0.08	0	68.9	40 - 140	0.06881	22	20	R
Acenaphthylene	0.06376	0.010	0.08	0	79.7	40 - 140	0.06546	2.63	20	
Anthracene	0.05024	0.010	0.08	0	62.8	40 - 140	0.05528	9.56	20	
Benz(a)anthracene	0.0641	0.010	0.08	0	80.1	40 - 140	0.07537	16.2	20	
Benzo(a)pyrene	0.06367	0.010	0.08	0	79.6	40 - 140	0.06484	1.82	20	
Benzo(b)fluoranthene	0.06388	0.010	0.08	0	79.8	40 - 140	0.06866	7.22	20	
Benzo(g,h,i)perylene	0.06078	0.010	0.08	0	76.0	40 - 140	0.0702	14.4	20	
Benzo(k)fluoranthene	0.06161	0.010	0.08	0	77.0	40 - 140	0.08189	28.3	20	R
Chrysene	0.05296	0.010	0.08	0	66.2	40 - 140	0.07852	38.9	20	R
Dibenz(a,h)anthracene	0.05967	0.010	0.08	0	74.6	40 - 140	0.05226	13.2	20	
Dibenzofuran	0.06064	0.010	0.08	0	75.8	40 - 140	0.06229	2.68	20	
Fluoranthene	0.06699	0.010	0.08	0	83.7	40 - 140	0.0626	6.79	20	
Fluorene	0.055	0.010	0.08	0	68.7	40 - 140	0.06103	10.4	20	
Indeno(1,2,3-cd)pyrene	0.05924	0.010	0.08	0	74.1	40 - 140	0.05259	11.9	20	
Naphthalene	0.06653	0.010	0.08	0	83.2	40 - 140	0.06818	2.45	20	
Phenanthrene	0.05305	0.010	0.08	0	66.3	40 - 140	0.05271	0.637	20	
Pyrene	0.07279	0.010	0.08	0	91.0	40 - 140	0.07946	8.76	20	
Surr: 2-Fluorobiphenyl	*0.05416*	*0*	*0.08*	*0*	*67.7*	*40 - 140*	*0.05762*	*6.19*	*20*	
Surr: 4-Terphenyl-d14	*0.09033*	*0*	*0.08*	*0*	*113*	*40 - 140*	*0.06941*	*26.2*	*20*	R
Surr: Nitrobenzene-d5	*0.05951*	*0*	*0.08*	*0*	*74.4*	*40 - 140*	*0.05976*	*0.419*	*20*	

The following samples were analyzed in this batch: HS21120295-01 HS21120295-02 HS21120295-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173609 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173609** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422754** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-173609** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422753** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.217	0.0500	0.25	0	86.8	80 - 120				

MS Sample ID: **HS21120297-02MS** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422751** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.254	0.0500	0.25	0	102	80 - 120				

MSD Sample ID: **HS21120297-02MSD** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422752** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.252	0.0500	0.25	0	101	80 - 120	0.254	0.791	20	

The following samples were analyzed in this batch: HS21120295-01 HS21120295-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: 173665 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-173665** Units: **mg/L** Analysis Date: **16-Dec-2021 14:30**
Client ID: Run ID: **WetChem_HS_397783** SeqNo: **6425171** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-173665** Units: **mg/L** Analysis Date: **16-Dec-2021 14:30**
Client ID: Run ID: **WetChem_HS_397783** SeqNo: **6425170** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.24	0.50	20	0	101	85 - 115				

MS Sample ID: **HS21120297-02MS** Units: **mg/L** Analysis Date: **16-Dec-2021 14:30**
Client ID: Run ID: **WetChem_HS_397783** SeqNo: **6425168** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.13	0.50	20	0.172	115	75 - 125				

MSD Sample ID: **HS21120297-02MSD** Units: **mg/L** Analysis Date: **16-Dec-2021 14:30**
Client ID: Run ID: **WetChem_HS_397783** SeqNo: **6425169** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.1	0.50	20	0.172	115	75 - 125	23.13	0.147	20	

The following samples were analyzed in this batch: HS21120295-01 HS21120295-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: R397056 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-120621** Units: **mg/L** Analysis Date: **06-Dec-2021 15:15**
Client ID: Run ID: **Balance1_397056** SeqNo: **6407891** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-120621** Units: **mg/L** Analysis Date: **06-Dec-2021 15:15**
Client ID: Run ID: **Balance1_397056** SeqNo: **6407892** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	96	2.50	100	0	96.0	85 - 115				

DUP Sample ID: **HS21120295-01DUP** Units: **mg/L** Analysis Date: **06-Dec-2021 15:15**
Client ID: **S1** Run ID: **Balance1_397056** SeqNo: **6407886** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	4400	2.50					4250	3.47	5	

The following samples were analyzed in this batch: HS21120295-01 HS21120295-02 HS21120295-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: R397139 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-120621** Units: **mg/L** Analysis Date: **06-Dec-2021 15:20**
Client ID: Run ID: **Balance1_397139** SeqNo: **6409797** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-120621** Units: **mg/L** Analysis Date: **06-Dec-2021 15:20**
Client ID: Run ID: **Balance1_397139** SeqNo: **6409798** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	992	10.0	1000	0	99.2	85 - 115				

DUP Sample ID: **HS21120297-02DUP** Units: **mg/L** Analysis Date: **06-Dec-2021 15:20**
Client ID: Run ID: **Balance1_397139** SeqNo: **6409796** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	104	10.0					100	3.92	5	

DUP Sample ID: **HS21111572-01DUP** Units: **mg/L** Analysis Date: **06-Dec-2021 15:20**
Client ID: Run ID: **Balance1_397139** SeqNo: **6409776** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1294	10.0					1274	1.56	5	

The following samples were analyzed in this batch: HS21120295-01 HS21120295-02 HS21120295-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: R397211 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R397211** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411617** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R397211** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411616** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	992	10.0	1000	0	99.2	85 - 115				

DUP Sample ID: **HS21120297-02DUP** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411618** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	142	10.0					140	1.42	20	

The following samples were analyzed in this batch: HS21120295-01 HS21120295-02 HS21120295-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: R397888 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-121721** Units: **mg/L** Analysis Date: **17-Dec-2021 14:50**
Client ID: Run ID: **Balance1_397888** SeqNo: **6428195** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-121721** Units: **mg/L** Analysis Date: **17-Dec-2021 14:50**
Client ID: Run ID: **Balance1_397888** SeqNo: **6428197** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39.5	2.00	40	0	98.8	78 - 114				

LCSD Sample ID: **WLCSDW-121721** Units: **mg/L** Analysis Date: **17-Dec-2021 14:50**
Client ID: Run ID: **Balance1_397888** SeqNo: **6428196** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37.2	2.00	40	0	93.0	78 - 114	39.5	6	18	

MS Sample ID: **HS21120488-01MS** Units: **mg/L** Analysis Date: **17-Dec-2021 14:50**
Client ID: Run ID: **Balance1_397888** SeqNo: **6428191** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	41.3	2.00	40	3.213	95.2	78 - 114				

The following samples were analyzed in this batch: HS21120295-01 HS21120295-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120295

QC BATCH REPORT

Batch ID: R398062 (0) **Instrument:** ICS-Integrion **Method:** NITRATE/NITRITE BY E300.0, REV 2.1, 1993

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **20-Dec-2021 08:54**
Client ID: Run ID: **ICS-Integrion_398062** SeqNo: **6432004** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **20-Dec-2021 09:01**
Client ID: Run ID: **ICS-Integrion_398062** SeqNo: **6432005** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	8.5	0.200	8	0	106	90 - 110				

MS Sample ID: **HS21120295-01MS** Units: **mg/L** Analysis Date: **20-Dec-2021 11:13**
Client ID: **S1** Run ID: **ICS-Integrion_398062** SeqNo: **6432009** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	20.6	1.00	20	0	103	80 - 120				

MSD Sample ID: **HS21120295-01MSD** Units: **mg/L** Analysis Date: **20-Dec-2021 11:21**
Client ID: **S1** Run ID: **ICS-Integrion_398062** SeqNo: **6432010** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	20.72	1.00	20	0	104	80 - 120	20.6	0.605	20	

The following samples were analyzed in this batch: HS21120295-01 HS21120295-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: **HS21120295**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

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Sample Receipt Checklist

Work Order ID: HS21120295 **Date/Time Received:** **06-Dec-2021 11:18**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By: */S/ Paresh M. Giga* (eSignature) 06-Dec-2021 12:21 (Date/Time) **Reviewed by:** */S/ Corey Grandits* (eSignature) 09-Dec-2021 16:42 (Date/Time)

Matrices: **Water** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:252579
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	23.8C U/C	IR31	
Cooler(s)/Kit(s):	47206		
Date/Time sample(s) sent to storage:	12/6/2021 12:30		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: Limited volume for 8270SIM - 1 x Amber per sample

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody Form

Page 1 of 2

COC ID: 252579

HS21120295

ERM, Inc
Gas to Energy - E1A Study

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name	Gas to Energy - E1A study	
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte | NC | 28203	City/State/Zip	Charlotte | NC | 28203	
Phone		Phone		
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	emnaaccountspayable@erm.com	

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	S1	29/11/21	10:25am	S	2,3	8	✓		✓	✓	✓	✓			✓		
2	S2	29/11/21	10:00 am	S	2,3	8	✓		✓	✓	✓	✓			✓		
3	S10	29/11/21	1.00pm	S		3	✓								✓		
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Michael Lowe

Shipment Method:

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by: Michael Lowe Date: 30/11/21 Time: 11:30am Received by: C Rodney

Relinquished by: Date: Time: Received by (Laboratory): 12/6/2021 11:18

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
4726	23.3°
	+3.1

QC Package: (Check One Box Below)
[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SW846/CLP
[ ] Other
[ ] TRRP Checklist
[ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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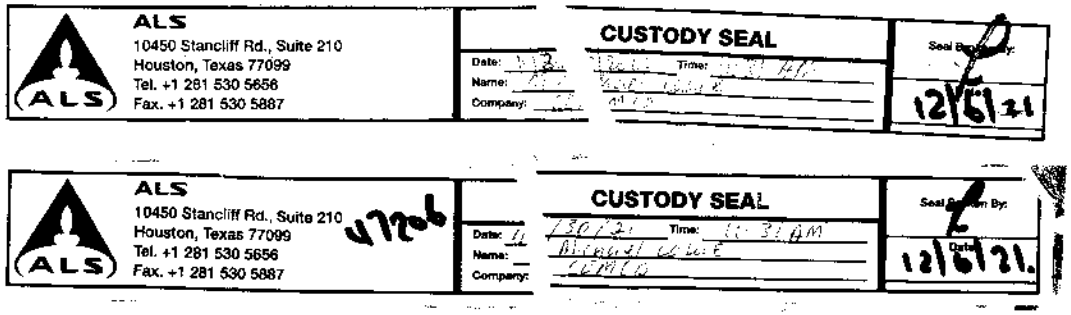

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

December 24, 2021

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS21120297**

Laboratory Results for: **Gas to Energy - E1A Study**

Dear Selina Pradhan,

ALS Environmental received 3 sample(s) on Dec 06, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Work Order: HS21120297

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21120297-01	S3	Water		29-Nov-2021 11:13	06-Dec-2021 11:18	☐
HS21120297-02	S5	Water		29-Nov-2021 14:30	06-Dec-2021 11:18	☐
HS21120297-03	S10	Water		29-Nov-2021 13:00	06-Dec-2021 11:18	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - E1A Study
Work Order: HS21120297

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 173225

Sample ID: LCSD-173225

- The RPD between the LCS and LCSD was outside of the control limit.

Metals by Method SW6020A

Batch ID: 173642

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 173346

Sample ID: HS21120430-03MS

- MS and MSD are for an unrelated sample

WetChemistry by Method E1664A

Batch ID: R397888

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method Calculation

Batch ID: R398240

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E300

Batch ID: R398062

Sample ID: S10 (HS21120297-03)

- The reporting limit is elevated due to dilution for high concentrations of non-target analytes. (Nitrate/Nitrite (as N))

Sample ID: S3 (HS21120297-01)

- The reporting limit is elevated due to dilution for high concentrations of non-target analytes. (Nitrate/Nitrite (as N))

Sample ID: S5 (HS21120297-02)

- The reporting limit is elevated due to dilution for high concentrations of non-target analytes. (Nitrate/Nitrite (as N))

WetChemistry by Method M2540B

Batch ID: R397211

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - E1A Study
Work Order: HS21120297

WetChemistry by Method M2540D

Batch ID: R397056

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R397139

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 173665

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 173609

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S3
Collection Date: 29-Nov-2021 11:13

ANALYTICAL REPORT
WorkOrder:HS21120297
Lab ID:HS21120297-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 06-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Acenaphthene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Acenaphthylene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Benz(a)anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Chrysene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Dibenzofuran	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Fluorene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Naphthalene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Phenanthrene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:20
Surr: 2-Fluorobiphenyl	*68.9*			*40-140*	*%REC*	*1*	*16-Dec-2021 20:20*
Surr: 4-Terphenyl-d14	*104*			*40-140*	*%REC*	*1*	*16-Dec-2021 20:20*
Surr: Nitrobenzene-d5	*72.0*			*40-140*	*%REC*	*1*	*16-Dec-2021 20:20*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 16-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	17-Dec-2021 19:15
Arsenic	U		0.000400	0.00200	mg/L	1	17-Dec-2021 19:15
Beryllium	U		0.000200	0.00200	mg/L	1	17-Dec-2021 19:15
Cadmium	U		0.000200	0.00200	mg/L	1	17-Dec-2021 19:15
Chromium	**0.000566**	J	**0.000400**	**0.00400**	**mg/L**	1	17-Dec-2021 19:15
Cobalt	U		0.000200	0.00500	mg/L	1	17-Dec-2021 19:15
Copper	U		0.00100	0.00200	mg/L	1	17-Dec-2021 19:15
Lead	U		0.000600	0.00200	mg/L	1	17-Dec-2021 19:15
Molybdenum	U		0.000600	0.00500	mg/L	1	17-Dec-2021 19:15
Nickel	U		0.000600	0.00200	mg/L	1	17-Dec-2021 19:15
Selenium	U		0.00110	0.00200	mg/L	1	17-Dec-2021 19:15
Silver	U		0.000200	0.00200	mg/L	1	17-Dec-2021 19:15
Thallium	U		0.000200	0.00200	mg/L	1	17-Dec-2021 19:15
Vanadium	U		0.000600	0.00500	mg/L	1	17-Dec-2021 19:15
Zinc	**0.00416**		**0.00200**	**0.00400**	**mg/L**	1	17-Dec-2021 19:15

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S3
Collection Date: 29-Nov-2021 11:13

ANALYTICAL REPORT
WorkOrder:HS21120297
Lab ID:HS21120297-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 09-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	09-Dec-2021 12:03
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**1.0**		**0.10**	**0.50**	**mg/L**	1	22-Dec-2021 17:13
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	17-Dec-2021 14:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.576**	J	**0.150**	**1.00**	**mg/L**	5	20-Dec-2021 11:36
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 15-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	15-Dec-2021 13:45
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**42.0**		**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**28.0**		**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 15:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**8.80**		**2.50**	**2.50**	**mg/L**	1	06-Dec-2021 15:15
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 16-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.44**	J	**0.10**	**0.50**	**mg/L**	1	16-Dec-2021 14:30

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S5
Collection Date: 29-Nov-2021 14:30

ANALYTICAL REPORT
WorkOrder:HS21120297
Lab ID:HS21120297-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 06-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Acenaphthene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Acenaphthylene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Benz(a)anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Chrysene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Dibenzofuran	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Fluoranthene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Fluorene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Naphthalene	**0.064**		**0.010**	**0.010**	**ug/L**	1	16-Dec-2021 20:40
Phenanthrene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Pyrene	U		0.010	0.010	ug/L	1	16-Dec-2021 20:40
Surr: 2-Fluorobiphenyl	*83.0*			*40-140*	*%REC*	*1*	*16-Dec-2021 20:40*
Surr: 4-Terphenyl-d14	*99.7*			*40-140*	*%REC*	*1*	*16-Dec-2021 20:40*
Surr: Nitrobenzene-d5	*102*			*40-140*	*%REC*	*1*	*16-Dec-2021 20:40*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 16-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	17-Dec-2021 16:10
Arsenic	**0.000684**	J	**0.000400**	**0.00200**	**mg/L**	1	17-Dec-2021 16:10
Beryllium	**0.000513**	J	**0.000200**	**0.00200**	**mg/L**	1	17-Dec-2021 16:10
Cadmium	U		0.000200	0.00200	mg/L	1	17-Dec-2021 16:10
Chromium	**0.000759**	J	**0.000400**	**0.00400**	**mg/L**	1	17-Dec-2021 16:10
Cobalt	**0.00270**	J	**0.000200**	**0.00500**	**mg/L**	1	17-Dec-2021 16:10
Copper	U		0.00100	0.00200	mg/L	1	17-Dec-2021 16:10
Lead	**0.000788**	J	**0.000600**	**0.00200**	**mg/L**	1	17-Dec-2021 16:10
Molybdenum	U		0.000600	0.00500	mg/L	1	17-Dec-2021 16:10
Nickel	**0.00633**		**0.000600**	**0.00200**	**mg/L**	1	17-Dec-2021 16:10
Selenium	U		0.00110	0.00200	mg/L	1	17-Dec-2021 16:10
Silver	U		0.000200	0.00200	mg/L	1	17-Dec-2021 16:10
Thallium	U		0.000200	0.00200	mg/L	1	17-Dec-2021 16:10
Vanadium	**0.00234**	J	**0.000600**	**0.00500**	**mg/L**	1	17-Dec-2021 16:10
Zinc	**0.0315**		**0.00200**	**0.00400**	**mg/L**	1	17-Dec-2021 16:10

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S5
Collection Date: 29-Nov-2021 14:30

ANALYTICAL REPORT
WorkOrder:HS21120297
Lab ID:HS21120297-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 09-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	09-Dec-2021 12:05
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.72**		**0.10**	**0.50**	**mg/L**	1	22-Dec-2021 17:13
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	17-Dec-2021 14:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.548**	J	**0.150**	**1.00**	**mg/L**	5	20-Dec-2021 11:44
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 15-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	15-Dec-2021 13:45
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**140**		**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 18:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: KAH
Total Dissolved Solids (Residue, Filterable)	**100**		**5.00**	**10.0**	**mg/L**	1	06-Dec-2021 15:20
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non-Filterable)	U		2.50	2.50	mg/L	1	06-Dec-2021 15:15
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 16-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.17**	J	**0.10**	**0.50**	**mg/L**	1	16-Dec-2021 14:30

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S10
Collection Date: 29-Nov-2021 13:00

ANALYTICAL REPORT
WorkOrder:HS21120297
Lab ID:HS21120297-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 16-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	17-Dec-2021 19:20
Arsenic	**0.00198**	J	**0.000400**	**0.00200**	**mg/L**	1	17-Dec-2021 19:20
Beryllium	U		0.000200	0.00200	mg/L	1	17-Dec-2021 19:20
Cadmium	U		0.000200	0.00200	mg/L	1	17-Dec-2021 19:20
Chromium	**0.00231**	J	**0.000400**	**0.00400**	**mg/L**	1	17-Dec-2021 19:20
Cobalt	**0.000387**	J	**0.000200**	**0.00500**	**mg/L**	1	17-Dec-2021 19:20
Copper	**0.00101**	J	**0.00100**	**0.00200**	**mg/L**	1	17-Dec-2021 19:20
Lead	**0.00149**	J	**0.000600**	**0.00200**	**mg/L**	1	17-Dec-2021 19:20
Molybdenum	U		0.000600	0.00500	mg/L	1	17-Dec-2021 19:20
Nickel	**0.000882**	J	**0.000600**	**0.00200**	**mg/L**	1	17-Dec-2021 19:20
Selenium	U		0.00110	0.00200	mg/L	1	17-Dec-2021 19:20
Silver	U		0.000200	0.00200	mg/L	1	17-Dec-2021 19:20
Thallium	U		0.000200	0.00200	mg/L	1	17-Dec-2021 19:20
Vanadium	**0.00455**	J	**0.000600**	**0.00500**	**mg/L**	1	17-Dec-2021 19:20
Zinc	**0.0103**		**0.00200**	**0.00400**	**mg/L**	1	17-Dec-2021 19:20
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 09-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	09-Dec-2021 12:06
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**1.1**		**0.10**	**0.50**	**mg/L**	1	22-Dec-2021 17:13
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**0.816**	J	**0.610**	**2.00**	**mg/L**	1	17-Dec-2021 14:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.602**	J	**0.150**	**1.00**	**mg/L**	5	20-Dec-2021 11:51
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 15-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	**0.0510**		**0.0200**	**0.0500**	**mg/L**	1	15-Dec-2021 13:45
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 16-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.54**		**0.10**	**0.50**	**mg/L**	1	16-Dec-2021 14:30

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

Batch ID: 173225 **Start Date:** 06 Dec 2021 13:49 **End Date:** 06 Dec 2021 15:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120297-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120297-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173346 **Start Date:** 09 Dec 2021 08:00 **End Date:** 09 Dec 2021 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120297-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120297-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120297-03		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173609 **Start Date:** 15 Dec 2021 10:30 **End Date:** 15 Dec 2021 12:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120297-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120297-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120297-03		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

Batch ID: 173642 **Start Date:** 16 Dec 2021 12:00 **End Date:** 16 Dec 2021 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120297-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120297-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120297-03		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 173665 **Start Date:** 16 Dec 2021 10:00 **End Date:** 16 Dec 2021 13:30
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120297-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120297-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120297-03		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173225 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13		06 Dec 2021 13:49	16 Dec 2021 20:20	1
HS21120297-02	S5	29 Nov 2021 14:30		06 Dec 2021 13:49	16 Dec 2021 20:40	1
Batch ID: 173346 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13		09 Dec 2021 11:00	09 Dec 2021 12:03	1
HS21120297-02	S5	29 Nov 2021 14:30		09 Dec 2021 11:00	09 Dec 2021 12:05	1
HS21120297-03	S10	29 Nov 2021 13:00		09 Dec 2021 11:00	09 Dec 2021 12:06	1
Batch ID: 173609 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13		15 Dec 2021 10:30	15 Dec 2021 13:45	1
HS21120297-02	S5	29 Nov 2021 14:30		15 Dec 2021 10:30	15 Dec 2021 13:45	1
HS21120297-03	S10	29 Nov 2021 13:00		15 Dec 2021 10:30	15 Dec 2021 13:45	1
Batch ID: 173642 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13		16 Dec 2021 16:00	17 Dec 2021 19:15	1
HS21120297-02	S5	29 Nov 2021 14:30		16 Dec 2021 16:00	17 Dec 2021 16:10	1
HS21120297-03	S10	29 Nov 2021 13:00		16 Dec 2021 16:00	17 Dec 2021 19:20	1
Batch ID: 173665 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13		16 Dec 2021 10:00	16 Dec 2021 14:30	1
HS21120297-02	S5	29 Nov 2021 14:30		16 Dec 2021 10:00	16 Dec 2021 14:30	1
HS21120297-03	S10	29 Nov 2021 13:00		16 Dec 2021 10:00	16 Dec 2021 14:30	1
Batch ID: R397056 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13			06 Dec 2021 15:15	1
HS21120297-02	S5	29 Nov 2021 14:30			06 Dec 2021 15:15	1
Batch ID: R397139 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13			06 Dec 2021 15:20	1
HS21120297-02	S5	29 Nov 2021 14:30			06 Dec 2021 15:20	1
Batch ID: R397211 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13			06 Dec 2021 18:00	1
HS21120297-02	S5	29 Nov 2021 14:30			06 Dec 2021 18:00	1
Batch ID: R397888 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13			17 Dec 2021 14:50	1
HS21120297-02	S5	29 Nov 2021 14:30			17 Dec 2021 14:50	1
HS21120297-03	S10	29 Nov 2021 13:00			17 Dec 2021 14:50	1
Batch ID: R398062 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13			20 Dec 2021 11:36	5
HS21120297-02	S5	29 Nov 2021 14:30			20 Dec 2021 11:44	5
HS21120297-03	S10	29 Nov 2021 13:00			20 Dec 2021 11:51	5

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R398240 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS21120297-01	S3	29 Nov 2021 11:13			22 Dec 2021 17:13	1
HS21120297-02	S5	29 Nov 2021 14:30			22 Dec 2021 17:13	1
HS21120297-03	S10	29 Nov 2021 13:00			22 Dec 2021 17:13	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173346 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLKF1-173346** Units: **mg/L** Analysis Date: **09-Dec-2021 11:26**
Client ID: Run ID: **HG03_397296** SeqNo: **6413464** PrepDate: **09-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

MBLK Sample ID: **MBLK-173346** Units: **mg/L** Analysis Date: **09-Dec-2021 11:25**
Client ID: Run ID: **HG03_397296** SeqNo: **6413463** PrepDate: **09-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-173346** Units: **mg/L** Analysis Date: **09-Dec-2021 11:28**
Client ID: Run ID: **HG03_397296** SeqNo: **6413465** PrepDate: **09-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.005	0.000200	0.005	0	100	80 - 120				

MS Sample ID: **HS21120430-03MS** Units: **mg/L** Analysis Date: **09-Dec-2021 11:49**
Client ID: Run ID: **HG03_397296** SeqNo: **6413522** PrepDate: **09-Dec-2021** DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.0752	0.00400	0.1	0.0714	3.80	75 - 125				S

MSD Sample ID: **HS21120430-03MSD** Units: **mg/L** Analysis Date: **09-Dec-2021 11:50**
Client ID: Run ID: **HG03_397296** SeqNo: **6413523** PrepDate: **09-Dec-2021** DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.0776	0.00400	0.1	0.0714	6.20	75 - 125	0.0752	3.14	20	S

The following samples were analyzed in this batch: HS21120297-01 HS21120297-02 HS21120297-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173642 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-173642** Units: **mg/L** Analysis Date: **17-Dec-2021 16:00**
Client ID: Run ID: **ICPMS06_397852** SeqNo: **6428269** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	0.001879	0.00500								J
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173642 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-173642** Units: **mg/L** Analysis Date: **17-Dec-2021 16:02**
Client ID: Run ID: **ICPMS06_397852** SeqNo: **6428270** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05276	0.00200	0.05	0	106	80 - 120				
Arsenic	0.05228	0.00200	0.05	0	105	80 - 120				
Beryllium	0.04827	0.00200	0.05	0	96.5	80 - 120				
Cadmium	0.05221	0.00200	0.05	0	104	80 - 120				
Chromium	0.05034	0.00400	0.05	0	101	80 - 120				
Cobalt	0.05095	0.00500	0.05	0	102	80 - 120				
Copper	0.05324	0.00200	0.05	0	106	80 - 120				
Lead	0.04896	0.00200	0.05	0	97.9	80 - 120				
Molybdenum	0.05008	0.00500	0.05	0	100	80 - 120				
Nickel	0.05218	0.00200	0.05	0	104	80 - 120				
Selenium	0.05303	0.00200	0.05	0	106	80 - 120				
Silver	0.05145	0.00200	0.05	0	103	80 - 120				
Thallium	0.05099	0.00200	0.05	0	102	80 - 120				
Vanadium	0.05316	0.00500	0.05	0	106	80 - 120				
Zinc	0.05401	0.00400	0.05	0	108	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173642 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21120297-02MS** Units: **mg/L** Analysis Date: **17-Dec-2021 16:12**
Client ID: **S5** Run ID: **ICPMS06_397852** SeqNo: **6428274** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05441	0.00200	0.05	-0.000206	109	80 - 120				
Arsenic	0.05394	0.00200	0.05	0.000684	107	80 - 120				
Beryllium	0.05146	0.00200	0.05	0.000513	102	80 - 120				
Cadmium	0.05305	0.00200	0.05	0.000028	106	80 - 120				
Chromium	0.05125	0.00400	0.05	0.000759	101	80 - 120				
Cobalt	0.0543	0.00500	0.05	0.002698	103	80 - 120				
Copper	0.05501	0.00200	0.05	0.000854	108	80 - 120				
Lead	0.05037	0.00200	0.05	0.000788	99.2	80 - 120				
Molybdenum	0.04924	0.00500	0.05	0.000022	98.4	80 - 120				
Nickel	0.05886	0.00200	0.05	0.006328	105	80 - 120				
Selenium	0.05208	0.00200	0.05	-0.000162	104	80 - 120				
Silver	0.05081	0.00200	0.05	-0.00003	102	80 - 120				
Thallium	0.0514	0.00200	0.05	-0.000049	103	80 - 120				
Vanadium	0.05374	0.00500	0.05	0.002335	103	80 - 120				
Zinc	0.08626	0.00400	0.05	0.03154	109	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173642 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21120297-02MSD** Units: **mg/L** Analysis Date: **17-Dec-2021 16:14**
Client ID: **S5** Run ID: **ICPMS06_397852** SeqNo: **6428275** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05623	0.00200	0.05	-0.000206	113	80 - 120	0.05441	3.29	20	
Arsenic	0.05491	0.00200	0.05	0.000684	108	80 - 120	0.05394	1.78	20	
Beryllium	0.05135	0.00200	0.05	0.000513	102	80 - 120	0.05146	0.196	20	
Cadmium	0.05524	0.00200	0.05	0.000028	110	80 - 120	0.05305	4.04	20	
Chromium	0.0522	0.00400	0.05	0.000759	103	80 - 120	0.05125	1.83	20	
Cobalt	0.05525	0.00500	0.05	0.002698	105	80 - 120	0.0543	1.74	20	
Copper	0.05632	0.00200	0.05	0.000854	111	80 - 120	0.05501	2.35	20	
Lead	0.05161	0.00200	0.05	0.000788	102	80 - 120	0.05037	2.43	20	
Molybdenum	0.05131	0.00500	0.05	0.000022	103	80 - 120	0.04924	4.13	20	
Nickel	0.06027	0.00200	0.05	0.006328	108	80 - 120	0.05886	2.38	20	
Selenium	0.0553	0.00200	0.05	-0.000162	111	80 - 120	0.05208	6	20	
Silver	0.0531	0.00200	0.05	-0.00003	106	80 - 120	0.05081	4.42	20	
Thallium	0.05348	0.00200	0.05	-0.000049	107	80 - 120	0.0514	3.96	20	
Vanadium	0.05457	0.00500	0.05	0.002335	104	80 - 120	0.05374	1.53	20	
Zinc	0.08702	0.00400	0.05	0.03154	111	80 - 120	0.08626	0.868	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173642 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21120297-02SD** Units: **mg/L** Analysis Date: **17-Dec-2021 16:06**
Client ID: **S5** Run ID: **ICPMS06_397852** SeqNo: **6428272** PrepDate: **16-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					-0.000206	0	10	
Arsenic	U	0.0100					0.000684	0	10	
Beryllium	U	0.0100					0.000513	0	10	
Cadmium	U	0.0100					0.000028	0	10	
Chromium	U	0.0200					0.000759	0	10	
Cobalt	0.002684	0.0250					0.002698	0	10	J
Copper	U	0.0100					0.000854	0	10	
Lead	U	0.0100					0.000788	0	10	
Molybdenum	U	0.0250					0.000022	0	10	
Nickel	0.006281	0.0100					0.006328	0	10	J
Selenium	U	0.0100					-0.000162	0	10	
Silver	U	0.0100					-0.00003	0	10	
Thallium	U	0.0100					-0.000049	0	10	
Vanadium	0.009817	0.0250					0.002335	0	10	J
Zinc	0.03029	0.0200					0.03154	3.95	10	

The following samples were analyzed in this batch: HS21120297-01 HS21120297-02 HS21120297-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173225 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-173225** Units: **ug/L** Analysis Date: **16-Dec-2021 14:52**
Client ID: Run ID: **SV-6_397867** SeqNo: **6427869** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.0653*	*0*	*0.08*	*0*	*81.6*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.06697*	*0*	*0.08*	*0*	*83.7*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.05665*	*0*	*0.08*	*0*	*70.8*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173225 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-173225** Units: **ug/L** Analysis Date: **16-Dec-2021 15:11**
Client ID: Run ID: **SV-6_397867** SeqNo: **6427870** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.05744	0.010	0.08	0	71.8	40 - 140				
2-Methylnaphthalene	0.05264	0.010	0.08	0	65.8	40 - 140				
Acenaphthene	0.06881	0.010	0.08	0	86.0	40 - 140				
Acenaphthylene	0.06546	0.010	0.08	0	81.8	40 - 140				
Anthracene	0.05528	0.010	0.08	0	69.1	40 - 140				
Benz(a)anthracene	0.07537	0.010	0.08	0	94.2	40 - 140				
Benzo(a)pyrene	0.06484	0.010	0.08	0	81.0	40 - 140				
Benzo(b)fluoranthene	0.06866	0.010	0.08	0	85.8	40 - 140				
Benzo(g,h,i)perylene	0.0702	0.010	0.08	0	87.7	40 - 140				
Benzo(k)fluoranthene	0.08189	0.010	0.08	0	102	40 - 140				
Chrysene	0.07852	0.010	0.08	0	98.2	40 - 140				
Dibenz(a,h)anthracene	0.05226	0.010	0.08	0	65.3	40 - 140				
Dibenzofuran	0.06229	0.010	0.08	0	77.9	40 - 140				
Fluoranthene	0.0626	0.010	0.08	0	78.2	40 - 140				
Fluorene	0.06103	0.010	0.08	0	76.3	40 - 140				
Indeno(1,2,3-cd)pyrene	0.05259	0.010	0.08	0	65.7	40 - 140				
Naphthalene	0.06818	0.010	0.08	0	85.2	40 - 140				
Phenanthrene	0.05271	0.010	0.08	0	65.9	40 - 140				
Pyrene	0.07946	0.010	0.08	0	99.3	40 - 140				
Surr: 2-Fluorobiphenyl	*0.05762*	*0*	*0.08*	*0*	*72.0*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.06941*	*0*	*0.08*	*0*	*86.8*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.05976*	*0*	*0.08*	*0*	*74.7*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173225 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-173225** Units: **ug/L** Analysis Date: **16-Dec-2021 15:31**
Client ID: Run ID: **SV-6_397867** SeqNo: **6427871** PrepDate: **06-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.06262	0.010	0.08	0	78.3	40 - 140	0.05744	8.62	20	
2-Methylnaphthalene	0.05366	0.010	0.08	0	67.1	40 - 140	0.05264	1.91	20	
Acenaphthene	0.05515	0.010	0.08	0	68.9	40 - 140	0.06881	22	20	R
Acenaphthylene	0.06376	0.010	0.08	0	79.7	40 - 140	0.06546	2.63	20	
Anthracene	0.05024	0.010	0.08	0	62.8	40 - 140	0.05528	9.56	20	
Benz(a)anthracene	0.0641	0.010	0.08	0	80.1	40 - 140	0.07537	16.2	20	
Benzo(a)pyrene	0.06367	0.010	0.08	0	79.6	40 - 140	0.06484	1.82	20	
Benzo(b)fluoranthene	0.06388	0.010	0.08	0	79.8	40 - 140	0.06866	7.22	20	
Benzo(g,h,i)perylene	0.06078	0.010	0.08	0	76.0	40 - 140	0.0702	14.4	20	
Benzo(k)fluoranthene	0.06161	0.010	0.08	0	77.0	40 - 140	0.08189	28.3	20	R
Chrysene	0.05296	0.010	0.08	0	66.2	40 - 140	0.07852	38.9	20	R
Dibenz(a,h)anthracene	0.05967	0.010	0.08	0	74.6	40 - 140	0.05226	13.2	20	
Dibenzofuran	0.06064	0.010	0.08	0	75.8	40 - 140	0.06229	2.68	20	
Fluoranthene	0.06699	0.010	0.08	0	83.7	40 - 140	0.0626	6.79	20	
Fluorene	0.055	0.010	0.08	0	68.7	40 - 140	0.06103	10.4	20	
Indeno(1,2,3-cd)pyrene	0.05924	0.010	0.08	0	74.1	40 - 140	0.05259	11.9	20	
Naphthalene	0.06653	0.010	0.08	0	83.2	40 - 140	0.06818	2.45	20	
Phenanthrene	0.05305	0.010	0.08	0	66.3	40 - 140	0.05271	0.637	20	
Pyrene	0.07279	0.010	0.08	0	91.0	40 - 140	0.07946	8.76	20	
Surr: 2-Fluorobiphenyl	*0.05416*	*0*	*0.08*	*0*	*67.7*	*40 - 140*	*0.05762*	*6.19*	*20*	
Surr: 4-Terphenyl-d14	*0.09033*	*0*	*0.08*	*0*	*113*	*40 - 140*	*0.06941*	*26.2*	*20*	R
Surr: Nitrobenzene-d5	*0.05951*	*0*	*0.08*	*0*	*74.4*	*40 - 140*	*0.05976*	*0.419*	*20*	

The following samples were analyzed in this batch: HS21120297-01 HS21120297-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173609 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173609** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422754** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-173609** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: Run ID: **UV-2450_397692** SeqNo: **6422753** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.217	0.0500	0.25	0	86.8	80 - 120				

MS Sample ID: **HS21120297-02MS** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: **S5** Run ID: **UV-2450_397692** SeqNo: **6422751** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.254	0.0500	0.25	0	102	80 - 120				

MSD Sample ID: **HS21120297-02MSD** Units: **mg/L** Analysis Date: **15-Dec-2021 13:45**
Client ID: **S5** Run ID: **UV-2450_397692** SeqNo: **6422752** PrepDate: **15-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.252	0.0500	0.25	0	101	80 - 120	0.254	0.791	20	

The following samples were analyzed in this batch: HS21120297-01 HS21120297-02 HS21120297-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: 173665 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-173665** Units: **mg/L** Analysis Date: **16-Dec-2021 14:30**
Client ID: Run ID: **WetChem_HS_397783** SeqNo: **6425171** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-173665** Units: **mg/L** Analysis Date: **16-Dec-2021 14:30**
Client ID: Run ID: **WetChem_HS_397783** SeqNo: **6425170** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.24	0.50	20	0	101	85 - 115				

MS Sample ID: **HS21120297-02MS** Units: **mg/L** Analysis Date: **16-Dec-2021 14:30**
Client ID: **S5** Run ID: **WetChem_HS_397783** SeqNo: **6425168** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.13	0.50	20	0.172	115	75 - 125				

MSD Sample ID: **HS21120297-02MSD** Units: **mg/L** Analysis Date: **16-Dec-2021 14:30**
Client ID: **S5** Run ID: **WetChem_HS_397783** SeqNo: **6425169** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.1	0.50	20	0.172	115	75 - 125	23.13	0.147	20	

The following samples were analyzed in this batch: HS21120297-01 HS21120297-02 HS21120297-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: R397056 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-120621** Units: **mg/L** Analysis Date: **06-Dec-2021 15:15**
Client ID: Run ID: **Balance1_397056** SeqNo: **6407891** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-120621** Units: **mg/L** Analysis Date: **06-Dec-2021 15:15**
Client ID: Run ID: **Balance1_397056** SeqNo: **6407892** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	96	2.50	100	0	96.0	85 - 115				

DUP Sample ID: **HS21120295-01DUP** Units: **mg/L** Analysis Date: **06-Dec-2021 15:15**
Client ID: Run ID: **Balance1_397056** SeqNo: **6407886** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	4400	2.50					4250	3.47	5	

The following samples were analyzed in this batch: HS21120297-01 HS21120297-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: R397139 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-120621** Units: **mg/L** Analysis Date: **06-Dec-2021 15:20**
Client ID: Run ID: **Balance1_397139** SeqNo: **6409797** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-120621** Units: **mg/L** Analysis Date: **06-Dec-2021 15:20**
Client ID: Run ID: **Balance1_397139** SeqNo: **6409798** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	992	10.0	1000	0	99.2	85 - 115				

DUP Sample ID: **HS21120297-02DUP** Units: **mg/L** Analysis Date: **06-Dec-2021 15:20**
Client ID: **S5** Run ID: **Balance1_397139** SeqNo: **6409796** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	104	10.0					100	3.92	5	

DUP Sample ID: **HS21111572-01DUP** Units: **mg/L** Analysis Date: **06-Dec-2021 15:20**
Client ID: Run ID: **Balance1_397139** SeqNo: **6409776** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1294	10.0					1274	1.56	5	

The following samples were analyzed in this batch: HS21120297-01 HS21120297-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: R397211 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R397211** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411617** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R397211** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: Run ID: **Balance1_397211** SeqNo: **6411616** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	992	10.0	1000	0	99.2	85 - 115				

DUP Sample ID: **HS21120297-02DUP** Units: **mg/L** Analysis Date: **06-Dec-2021 18:00**
Client ID: **S5** Run ID: **Balance1_397211** SeqNo: **6411618** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	142	10.0					140	1.42	20	

The following samples were analyzed in this batch: HS21120297-01 HS21120297-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: R397888 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-121721** Units: **mg/L** Analysis Date: **17-Dec-2021 14:50**
Client ID: Run ID: **Balance1_397888** SeqNo: **6428195** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-121721** Units: **mg/L** Analysis Date: **17-Dec-2021 14:50**
Client ID: Run ID: **Balance1_397888** SeqNo: **6428197** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39.5	2.00	40	0	98.8	78 - 114				

LCSD Sample ID: **WLCSDW-121721** Units: **mg/L** Analysis Date: **17-Dec-2021 14:50**
Client ID: Run ID: **Balance1_397888** SeqNo: **6428196** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37.2	2.00	40	0	93.0	78 - 114	39.5	6	18	

MS Sample ID: **HS21120488-01MS** Units: **mg/L** Analysis Date: **17-Dec-2021 14:50**
Client ID: Run ID: **Balance1_397888** SeqNo: **6428191** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	41.3	2.00	40	3.213	95.2	78 - 114				

The following samples were analyzed in this batch: HS21120297-01 HS21120297-02 HS21120297-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120297

QC BATCH REPORT

Batch ID: R398062 (0) **Instrument:** ICS-Integrion **Method:** NITRATE/NITRITE BY E300.0, REV 2.1, 1993

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **20-Dec-2021 08:54**
Client ID: Run ID: **ICS-Integrion_398062** SeqNo: **6432004** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **20-Dec-2021 09:01**
Client ID: Run ID: **ICS-Integrion_398062** SeqNo: **6432005** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	8.5	0.200	8	0	106	90 - 110				

MS Sample ID: **HS21120295-01MS** Units: **mg/L** Analysis Date: **20-Dec-2021 11:13**
Client ID: Run ID: **ICS-Integrion_398062** SeqNo: **6432009** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	20.6	1.00	20	0	103	80 - 120				

MSD Sample ID: **HS21120295-01MSD** Units: **mg/L** Analysis Date: **20-Dec-2021 11:21**
Client ID: Run ID: **ICS-Integrion_398062** SeqNo: **6432010** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	20.72	1.00	20	0	104	80 - 120	20.6	0.605	20	

The following samples were analyzed in this batch: HS21120297-01 HS21120297-02 HS21120297-03

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Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: **HS21120297**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
North Carolina	624-2021	31-Dec-2021
Texas	T104704231-21-28	30-Apr-2022

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Client: ERM, Inc
Project: Gas to Energy - E1A Study
Work Order: HS21120297

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS21120297-01	S3	Login	12/6/2021 12:38:50 PM	PMG	MET019
HS21120297-01	S3	Login	12/6/2021 12:38:50 PM	PMG	EXT134
HS21120297-01	S3	Login	12/6/2021 12:38:50 PM	PMG	WET146
HS21120297-01	S3	Login	12/6/2021 12:38:50 PM	PMG	WET146
HS21120297-01	S3	Login	12/6/2021 12:38:50 PM	PMG	WET146
HS21120297-01	S3	Login	12/6/2021 12:38:50 PM	PMG	WET146
HS21120297-01	S3	Login	12/6/2021 12:38:50 PM	PMG	WET146
HS21120297-02	S5	Login	12/6/2021 12:38:50 PM	PMG	MET019
HS21120297-02	S5	Login	12/6/2021 12:38:50 PM	PMG	EXT134
HS21120297-02	S5	Login	12/6/2021 12:38:50 PM	PMG	WET146
HS21120297-02	S5	Login	12/6/2021 12:38:50 PM	PMG	WET146
HS21120297-02	S5	Login	12/6/2021 12:38:50 PM	PMG	WET146
HS21120297-02	S5	Login	12/6/2021 12:38:50 PM	PMG	WET146
HS21120297-02	S5	Login	12/6/2021 12:38:50 PM	PMG	WET146

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Sample Receipt Checklist

Work Order ID: HS21120297 **Date/Time Received:** **06-Dec-2021 11:18**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By: */S/ Paresh M. Giga* (eSignature) 06-Dec-2021 12:21 (Date/Time) **Reviewed by:** */S/ Corey Grandits* (eSignature) 09-Dec-2021 16:44 (Date/Time)

Matrices: **Water** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:252580
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	24.0C U/C	IR31	
Cooler(s)/Kit(s):	47642		
Date/Time sample(s) sent to storage:	12/6/2021 12:55		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: Limited volume for 8270SIM - 1 x Amber per sample

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody Form

Page 1 of 1

COC ID: 252580

HS21120297

ERM, Inc

Gas to Energy - E1A Study

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	Gas to Energy - EIA Study
Work Order		Project Number	
Company Name	ERM	Bill To Company	ERM
Send Report To	Selina Pradhan	Invoice Attn	AP
Address	300 West Summit Avenue	Address	300 West Summit Avenue
City/State/Zip	Charlotte | NC | 28203	City/State/Zip	Charlotte | NC | 28203
Phone		Phone	
Fax		Fax	
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	S3	29/11/21	11:13 am	S	2,3	8	✓		✓	✓	✓	✓			✓		
2	S5	29/11/21	2:30 pm	S	2,3	8	✓		✓	✓	✓	✓			✓		
3	S10	29/11/21	1:00 pm	S	2,3	5			✓	✓	✓	✓					
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Michael Lowe

Shipment Method:

Required Turnaround Time: (Check Box) ☐ Other ☒ STD (10 Wk Days) ☐ 5 Wk Days ☐ 2 wk Days ☐ 24 hour

Results Due Date:

Relinquished by: Michael Lowe Date: 30/11/21 Time: 11:31 am Received by:

Relinquished by: Date: Time: Received by (Laboratory):

Logged by (Laboratory): Date: Time: Checked by (Laboratory): 12/6/2021 11:18

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
47642	24.5°C
	4.5°C

QC Package: (Check One Box Below)

☒ Level I: Std QC ☐ TRRP Checklist
☐ Level II: Std QC/Raw Data ☐ TRRP Level IV
☐ Level IV: SW846/CLP
☐ Other

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

47642

CUSTODY SEAL

Date: Time:
Name:
Company:

Seal Broken By:
Date: 12/06/21

47642

LB1026 (6/11) OMN

EXPRESS WORLDWIDE WPX DHL

From: GUYANA GEOSCIENCES
CHRISTY ROONEY
115 DUKE & BARRACK ST
KINGSTON
GEORGETOWN GEORGETOWN
Guyana (Brit.Gt)

Origin:
GEO

To: ALS LABORATORY
COREY GRAVES (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210
77099 HOUSTON Texas
United States of America

47642

US-IAH-HOU

C [redacted]

Ref: 954631200

39.0 kg 1/2

Red 38
Blue 39

13+23+14

WAYBILL 22 8990 2020

(2L)US77099+48000001

(J) 3D01 4600 0092 2429 1452

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

January 12, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS21120935**

Laboratory Results for: **Gas to Energy - E1A Study**

Dear Selina Pradhan,

ALS Environmental received 5 sample(s) on Dec 14, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: DAYNA.FISHER
Corey Grandits
Project Manager

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Work Order: HS21120935

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21120935-01	S7	Water		03-Dec-2021 10:50	14-Dec-2021 13:30	☐
HS21120935-02	S8	Water		03-Dec-2021 10:40	14-Dec-2021 13:30	☐
HS21120935-03	S9	Water		03-Dec-2021 07:30	14-Dec-2021 13:30	☐
HS21120935-04	S4	Water		03-Dec-2021 12:10	14-Dec-2021 13:30	☐
HS21120935-05	S6	Water		03-Dec-2021 09:12	14-Dec-2021 13:30	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - E1A Study
Work Order: HS21120935

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 173652

Sample ID: LCSD-173652

- The RPD between the LCS and LCSD was outside of the control limit.

Sample ID: S7 (HS21120935-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S8 (HS21120935-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S9 (HS21120935-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S4 (HS21120935-04)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S6 (HS21120935-05)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Metals by Method SW6020A

Batch ID: 174015

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 173862

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method Calculation

Batch ID: R398483

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - E1A Study
Work Order: HS21120935

WetChemistry by Method M2540C

Batch ID: R398809

Sample ID: S4 (HS21120935-04)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S6 (HS21120935-05)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S7 (HS21120935-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S8 (HS21120935-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S9 (HS21120935-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method E1664A

Batch ID: R398580

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E300

Batch ID: R398439

Sample ID: MBLK

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

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Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - E1A Study
Work Order: HS21120935

WetChemistry by Method M2540D

Batch ID: R397882

Sample ID: S4 (HS21120935-04)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S6 (HS21120935-05)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S7 (HS21120935-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S8 (HS21120935-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S9 (HS21120935-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method M2540B

Batch ID: R398414

Sample ID: S4 (HS21120935-04)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S6 (HS21120935-05)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S7 (HS21120935-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S8 (HS21120935-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: S9 (HS21120935-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method M4500 NH3 D

Batch ID: 174027

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - E1A Study
Work Order: HS21120935

WetChemistry by Method E365.3

Batch ID: 173837

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S7
Collection Date: 03-Dec-2021 10:50

ANALYTICAL REPORT
WorkOrder:HS21120935
Lab ID:HS21120935-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 16-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Acenaphthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Acenaphthylene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Chrysene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Dibenzofuran	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Fluorene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Naphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Phenanthrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 19:44
Surr: 2-Fluorobiphenyl	*100*			*40-140*	*%REC*	*1*	*10-Jan-2022 19:44*
Surr: 4-Terphenyl-d14	*106*			*40-140*	*%REC*	*1*	*10-Jan-2022 19:44*
Surr: Nitrobenzene-d5	*80.0*			*40-140*	*%REC*	*1*	*10-Jan-2022 19:44*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 28-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	28-Dec-2021 21:51
Arsenic	**0.000749**	J	**0.000400**	**0.00200**	**mg/L**	1	28-Dec-2021 21:51
Beryllium	**0.00102**	J	**0.000200**	**0.00200**	**mg/L**	1	28-Dec-2021 21:51
Cadmium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:51
Chromium	**0.00169**	J	**0.000400**	**0.00400**	**mg/L**	1	28-Dec-2021 21:51
Cobalt	**0.00367**	J	**0.000200**	**0.00500**	**mg/L**	1	28-Dec-2021 21:51
Copper	U		0.00100	0.00200	mg/L	1	28-Dec-2021 21:51
Lead	**0.000711**	J	**0.000600**	**0.00200**	**mg/L**	1	28-Dec-2021 21:51
Molybdenum	U		0.000600	0.00500	mg/L	1	28-Dec-2021 21:51
Nickel	**0.00957**		**0.000600**	**0.00200**	**mg/L**	1	28-Dec-2021 21:51
Selenium	U		0.00110	0.00200	mg/L	1	28-Dec-2021 21:51
Silver	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:51
Thallium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:51
Vanadium	**0.000627**	J	**0.000600**	**0.00500**	**mg/L**	1	28-Dec-2021 21:51
Zinc	**0.0566**		**0.00200**	**0.00400**	**mg/L**	1	28-Dec-2021 21:51

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S7
Collection Date: 03-Dec-2021 10:50

ANALYTICAL REPORT
WorkOrder:HS21120935
Lab ID:HS21120935-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 22-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	22-Dec-2021 15:41
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**1.0**		**0.10**	**0.50**	**mg/L**	1	28-Dec-2021 17:04
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.63**	J	**0.610**	**2.00**	**mg/L**	1	29-Dec-2021 13:55
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.203**	J	**0.150**	**1.00**	**mg/L**	5	27-Dec-2021 22:30
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 21-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	21-Dec-2021 15:00
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**322**	H	**5.00**	**10.0**	**mg/L**	1	27-Dec-2021 08:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**264**	H	**5.00**	**10.0**	**mg/L**	1	27-Dec-2021 12:31
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non-Filterable)	U	H	2.50	2.50	mg/L	1	17-Dec-2021 10:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 28-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.81**		**0.10**	**0.50**	**mg/L**	1	28-Dec-2021 17:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S8
Collection Date: 03-Dec-2021 10:40

ANALYTICAL REPORT
WorkOrder:HS21120935
Lab ID:HS21120935-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 16-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Acenaphthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Acenaphthylene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Chrysene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Dibenzofuran	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Fluorene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Naphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Phenanthrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:03
Surr: 2-Fluorobiphenyl	*92.6*			*40-140*	*%REC*	*1*	*10-Jan-2022 20:03*
Surr: 4-Terphenyl-d14	*93.8*			*40-140*	*%REC*	*1*	*10-Jan-2022 20:03*
Surr: Nitrobenzene-d5	*72.4*			*40-140*	*%REC*	*1*	*10-Jan-2022 20:03*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 28-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	28-Dec-2021 21:53
Arsenic	**0.000497**	J	**0.000400**	**0.00200**	**mg/L**	1	28-Dec-2021 21:53
Beryllium	**0.000207**	J	**0.000200**	**0.00200**	**mg/L**	1	28-Dec-2021 21:53
Cadmium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:53
Chromium	**0.000742**	J	**0.000400**	**0.00400**	**mg/L**	1	28-Dec-2021 21:53
Cobalt	**0.00220**	J	**0.000200**	**0.00500**	**mg/L**	1	28-Dec-2021 21:53
Copper	U		0.00100	0.00200	mg/L	1	28-Dec-2021 21:53
Lead	U		0.000600	0.00200	mg/L	1	28-Dec-2021 21:53
Molybdenum	U		0.000600	0.00500	mg/L	1	28-Dec-2021 21:53
Nickel	**0.00498**		**0.000600**	**0.00200**	**mg/L**	1	28-Dec-2021 21:53
Selenium	U		0.00110	0.00200	mg/L	1	28-Dec-2021 21:53
Silver	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:53
Thallium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:53
Vanadium	**0.000691**	J	**0.000600**	**0.00500**	**mg/L**	1	28-Dec-2021 21:53
Zinc	**0.0225**		**0.00200**	**0.00400**	**mg/L**	1	28-Dec-2021 21:53

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S8
Collection Date: 03-Dec-2021 10:40

ANALYTICAL REPORT
WorkOrder:HS21120935
Lab ID:HS21120935-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 22-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	22-Dec-2021 15:42
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.65**		**0.10**	**0.50**	**mg/L**	1	28-Dec-2021 17:04
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.21**	J	**0.610**	**2.00**	**mg/L**	1	29-Dec-2021 13:55
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.217**	J	**0.150**	**1.00**	**mg/L**	5	27-Dec-2021 22:53
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 21-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	21-Dec-2021 15:00
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**186**	H	**5.00**	**10.0**	**mg/L**	1	27-Dec-2021 08:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**106**	H	**5.00**	**10.0**	**mg/L**	1	27-Dec-2021 12:31
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**2.80**	H	**2.50**	**2.50**	**mg/L**	1	17-Dec-2021 10:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 28-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.43**	J	**0.10**	**0.50**	**mg/L**	1	28-Dec-2021 17:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S9
Collection Date: 03-Dec-2021 07:30

ANALYTICAL REPORT
WorkOrder:HS21120935
Lab ID:HS21120935-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 16-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Acenaphthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Acenaphthylene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Chrysene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Dibenzofuran	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Fluorene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Naphthalene	**0.030**	H	**0.010**	**0.010**	**ug/L**	1	10-Jan-2022 20:23
Phenanthrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:23
Surr: 2-Fluorobiphenyl	*102*			*40-140*	*%REC*	*1*	*10-Jan-2022 20:23*
Surr: 4-Terphenyl-d14	*125*			*40-140*	*%REC*	*1*	*10-Jan-2022 20:23*
Surr: Nitrobenzene-d5	*89.2*			*40-140*	*%REC*	*1*	*10-Jan-2022 20:23*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 28-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	28-Dec-2021 21:55
Arsenic	**0.00132**	J	**0.000400**	**0.00200**	**mg/L**	1	28-Dec-2021 21:55
Beryllium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:55
Cadmium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:55
Chromium	**0.00150**	J	**0.000400**	**0.00400**	**mg/L**	1	28-Dec-2021 21:55
Cobalt	**0.000712**	J	**0.000200**	**0.00500**	**mg/L**	1	28-Dec-2021 21:55
Copper	U		0.00100	0.00200	mg/L	1	28-Dec-2021 21:55
Lead	U		0.000600	0.00200	mg/L	1	28-Dec-2021 21:55
Molybdenum	U		0.000600	0.00500	mg/L	1	28-Dec-2021 21:55
Nickel	**0.00140**	J	**0.000600**	**0.00200**	**mg/L**	1	28-Dec-2021 21:55
Selenium	U		0.00110	0.00200	mg/L	1	28-Dec-2021 21:55
Silver	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:55
Thallium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:55
Vanadium	**0.00125**	J	**0.000600**	**0.00500**	**mg/L**	1	28-Dec-2021 21:55
Zinc	**0.00428**		**0.00200**	**0.00400**	**mg/L**	1	28-Dec-2021 21:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S9
Collection Date: 03-Dec-2021 07:30

ANALYTICAL REPORT
WorkOrder:HS21120935
Lab ID:HS21120935-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 22-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	22-Dec-2021 15:44
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**1.5**		**0.10**	**0.50**	**mg/L**	1	28-Dec-2021 17:04
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**2.86**		**0.610**	**2.00**	**mg/L**	1	29-Dec-2021 13:55
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.380**	J	**0.150**	**1.00**	**mg/L**	5	27-Dec-2021 23:00
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 21-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	21-Dec-2021 15:00
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**56.0**	H	**5.00**	**10.0**	**mg/L**	1	27-Dec-2021 08:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**32.0**	H	**5.00**	**10.0**	**mg/L**	1	27-Dec-2021 12:31
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**22.7**	H	**2.50**	**2.50**	**mg/L**	1	17-Dec-2021 10:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 28-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**1.1**		**0.10**	**0.50**	**mg/L**	1	28-Dec-2021 17:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S4
Collection Date: 03-Dec-2021 12:10

ANALYTICAL REPORT
WorkOrder:HS21120935
Lab ID:HS21120935-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 16-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Acenaphthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Acenaphthylene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Chrysene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Dibenzofuran	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Fluorene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Naphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Phenanthrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 20:42
Surr: 2-Fluorobiphenyl	*85.6*			*40-140*	*%REC*	*1*	*10-Jan-2022 20:42*
Surr: 4-Terphenyl-d14	*97.7*			*40-140*	*%REC*	*1*	*10-Jan-2022 20:42*
Surr: Nitrobenzene-d5	*94.1*			*40-140*	*%REC*	*1*	*10-Jan-2022 20:42*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 28-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	28-Dec-2021 21:57
Arsenic	U		0.000400	0.00200	mg/L	1	28-Dec-2021 21:57
Beryllium	**0.000761**	J	**0.000200**	**0.00200**	**mg/L**	1	28-Dec-2021 21:57
Cadmium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:57
Chromium	**0.000452**	J	**0.000400**	**0.00400**	**mg/L**	1	28-Dec-2021 21:57
Cobalt	**0.00331**	J	**0.000200**	**0.00500**	**mg/L**	1	28-Dec-2021 21:57
Copper	U		0.00100	0.00200	mg/L	1	28-Dec-2021 21:57
Lead	U		0.000600	0.00200	mg/L	1	28-Dec-2021 21:57
Molybdenum	U		0.000600	0.00500	mg/L	1	28-Dec-2021 21:57
Nickel	**0.00748**		**0.000600**	**0.00200**	**mg/L**	1	28-Dec-2021 21:57
Selenium	U		0.00110	0.00200	mg/L	1	28-Dec-2021 21:57
Silver	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:57
Thallium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:57
Vanadium	**0.000601**	J	**0.000600**	**0.00500**	**mg/L**	1	28-Dec-2021 21:57
Zinc	**0.0239**		**0.00200**	**0.00400**	**mg/L**	1	28-Dec-2021 21:57

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S4
Collection Date: 03-Dec-2021 12:10

ANALYTICAL REPORT
WorkOrder:HS21120935
Lab ID:HS21120935-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 22-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	22-Dec-2021 15:46
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.54**		**0.10**	**0.50**	**mg/L**	1	28-Dec-2021 17:04
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**6.15**		**0.610**	**2.00**	**mg/L**	1	29-Dec-2021 13:55
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.218**	J	**0.150**	**1.00**	**mg/L**	5	27-Dec-2021 23:08
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 21-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	21-Dec-2021 15:00
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**118**	H	**5.00**	**10.0**	**mg/L**	1	27-Dec-2021 08:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**108**	H	**5.00**	**10.0**	**mg/L**	1	27-Dec-2021 12:31
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non-Filterable)	U	H	2.50	2.50	mg/L	1	17-Dec-2021 10:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 28-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.32**	J	**0.10**	**0.50**	**mg/L**	1	28-Dec-2021 17:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S6
Collection Date: 03-Dec-2021 09:12

ANALYTICAL REPORT
WorkOrder:HS21120935
Lab ID:HS21120935-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 16-Dec-2021		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Acenaphthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Acenaphthylene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Chrysene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Dibenzofuran	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Fluoranthene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Fluorene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Naphthalene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Phenanthrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Pyrene	U	H	0.010	0.010	ug/L	1	10-Jan-2022 21:01
Surr: 2-Fluorobiphenyl	*92.2*			*40-140*	*%REC*	*1*	*10-Jan-2022 21:01*
Surr: 4-Terphenyl-d14	*105*			*40-140*	*%REC*	*1*	*10-Jan-2022 21:01*
Surr: Nitrobenzene-d5	*82.0*			*40-140*	*%REC*	*1*	*10-Jan-2022 21:01*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 28-Dec-2021		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	28-Dec-2021 21:59
Arsenic	**0.000590**	J	**0.000400**	**0.00200**	**mg/L**	1	28-Dec-2021 21:59
Beryllium	**0.000223**	J	**0.000200**	**0.00200**	**mg/L**	1	28-Dec-2021 21:59
Cadmium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:59
Chromium	**0.000674**	J	**0.000400**	**0.00400**	**mg/L**	1	28-Dec-2021 21:59
Cobalt	**0.00115**	J	**0.000200**	**0.00500**	**mg/L**	1	28-Dec-2021 21:59
Copper	U		0.00100	0.00200	mg/L	1	28-Dec-2021 21:59
Lead	**0.00106**	J	**0.000600**	**0.00200**	**mg/L**	1	28-Dec-2021 21:59
Molybdenum	U		0.000600	0.00500	mg/L	1	28-Dec-2021 21:59
Nickel	**0.00271**		**0.000600**	**0.00200**	**mg/L**	1	28-Dec-2021 21:59
Selenium	U		0.00110	0.00200	mg/L	1	28-Dec-2021 21:59
Silver	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:59
Thallium	U		0.000200	0.00200	mg/L	1	28-Dec-2021 21:59
Vanadium	**0.000926**	J	**0.000600**	**0.00500**	**mg/L**	1	28-Dec-2021 21:59
Zinc	**0.0149**		**0.00200**	**0.00400**	**mg/L**	1	28-Dec-2021 21:59

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Sample ID: S6
Collection Date: 03-Dec-2021 09:12

ANALYTICAL REPORT
WorkOrder:HS21120935
Lab ID:HS21120935-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 22-Dec-2021		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	22-Dec-2021 15:47
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.59**		**0.10**	**0.50**	**mg/L**	1	28-Dec-2021 17:04
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**4.53**		**0.610**	**2.00**	**mg/L**	1	29-Dec-2021 13:55
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.211**	J	**0.150**	**1.00**	**mg/L**	5	27-Dec-2021 23:15
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 21-Dec-2021		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	21-Dec-2021 15:00
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**114**	H	**5.00**	**10.0**	**mg/L**	1	27-Dec-2021 08:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**78.0**	H	**5.00**	**10.0**	**mg/L**	1	27-Dec-2021 12:31
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**11.2**	H	**2.50**	**2.50**	**mg/L**	1	17-Dec-2021 10:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 28-Dec-2021		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.38**	J	**0.10**	**0.50**	**mg/L**	1	28-Dec-2021 17:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

Batch ID: 173652 **Start Date:** 16 Dec 2021 09:30 **End Date:** 16 Dec 2021 15:00
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120935-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120935-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120935-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120935-04	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS21120935-05	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 173837 **Start Date:** 21 Dec 2021 11:00 **End Date:** 21 Dec 2021 13:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120935-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120935-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120935-03		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120935-04		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS21120935-05		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

Batch ID: 173862 **Start Date:** 22 Dec 2021 08:00 **End Date:** 22 Dec 2021 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120935-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120935-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120935-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120935-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120935-05		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174015 **Start Date:** 28 Dec 2021 12:00 **End Date:** 28 Dec 2021 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120935-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120935-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120935-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120935-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS21120935-05		10 (mL)	10 (mL)	1	120 plastic HNO3

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

Batch ID: 174027 **Start Date:** 28 Dec 2021 10:30 **End Date:** 28 Dec 2021 14:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21120935-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120935-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120935-03		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120935-04		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS21120935-05		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 173652 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50		16 Dec 2021 12:59	10 Jan 2022 19:44	1
HS21120935-02	S8	03 Dec 2021 10:40		16 Dec 2021 12:59	10 Jan 2022 20:03	1
HS21120935-03	S9	03 Dec 2021 07:30		16 Dec 2021 12:59	10 Jan 2022 20:23	1
HS21120935-04	S4	03 Dec 2021 12:10		16 Dec 2021 12:59	10 Jan 2022 20:42	1
HS21120935-05	S6	03 Dec 2021 09:12		16 Dec 2021 12:59	10 Jan 2022 21:01	1
Batch ID: 173837 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50		21 Dec 2021 11:00	21 Dec 2021 15:00	1
HS21120935-02	S8	03 Dec 2021 10:40		21 Dec 2021 11:00	21 Dec 2021 15:00	1
HS21120935-03	S9	03 Dec 2021 07:30		21 Dec 2021 11:00	21 Dec 2021 15:00	1
HS21120935-04	S4	03 Dec 2021 12:10		21 Dec 2021 11:00	21 Dec 2021 15:00	1
HS21120935-05	S6	03 Dec 2021 09:12		21 Dec 2021 11:00	21 Dec 2021 15:00	1
Batch ID: 173862 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50		22 Dec 2021 08:00	22 Dec 2021 15:41	1
HS21120935-02	S8	03 Dec 2021 10:40		22 Dec 2021 08:00	22 Dec 2021 15:42	1
HS21120935-03	S9	03 Dec 2021 07:30		22 Dec 2021 08:00	22 Dec 2021 15:44	1
HS21120935-04	S4	03 Dec 2021 12:10		22 Dec 2021 08:00	22 Dec 2021 15:46	1
HS21120935-05	S6	03 Dec 2021 09:12		22 Dec 2021 08:00	22 Dec 2021 15:47	1
Batch ID: 174015 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50		28 Dec 2021 16:00	28 Dec 2021 21:51	1
HS21120935-02	S8	03 Dec 2021 10:40		28 Dec 2021 16:00	28 Dec 2021 21:53	1
HS21120935-03	S9	03 Dec 2021 07:30		28 Dec 2021 16:00	28 Dec 2021 21:55	1
HS21120935-04	S4	03 Dec 2021 12:10		28 Dec 2021 16:00	28 Dec 2021 21:57	1
HS21120935-05	S6	03 Dec 2021 09:12		28 Dec 2021 16:00	28 Dec 2021 21:59	1
Batch ID: 174027 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50		28 Dec 2021 10:30	28 Dec 2021 17:00	1
HS21120935-02	S8	03 Dec 2021 10:40		28 Dec 2021 10:30	28 Dec 2021 17:00	1
HS21120935-03	S9	03 Dec 2021 07:30		28 Dec 2021 10:30	28 Dec 2021 17:00	1
HS21120935-04	S4	03 Dec 2021 12:10		28 Dec 2021 10:30	28 Dec 2021 17:00	1
HS21120935-05	S6	03 Dec 2021 09:12		28 Dec 2021 10:30	28 Dec 2021 17:00	1
Batch ID: R397882 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50			17 Dec 2021 10:00	1
HS21120935-02	S8	03 Dec 2021 10:40			17 Dec 2021 10:00	1
HS21120935-03	S9	03 Dec 2021 07:30			17 Dec 2021 10:00	1
HS21120935-04	S4	03 Dec 2021 12:10			17 Dec 2021 10:00	1
HS21120935-05	S6	03 Dec 2021 09:12			17 Dec 2021 10:00	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R398414 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50			27 Dec 2021 08:00	1
HS21120935-02	S8	03 Dec 2021 10:40			27 Dec 2021 08:00	1
HS21120935-03	S9	03 Dec 2021 07:30			27 Dec 2021 08:00	1
HS21120935-04	S4	03 Dec 2021 12:10			27 Dec 2021 08:00	1
HS21120935-05	S6	03 Dec 2021 09:12			27 Dec 2021 08:00	1
Batch ID: R398439 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50			27 Dec 2021 22:30	5
HS21120935-02	S8	03 Dec 2021 10:40			27 Dec 2021 22:53	5
HS21120935-03	S9	03 Dec 2021 07:30			27 Dec 2021 23:00	5
HS21120935-04	S4	03 Dec 2021 12:10			27 Dec 2021 23:08	5
HS21120935-05	S6	03 Dec 2021 09:12			27 Dec 2021 23:15	5
Batch ID: R398483 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50			28 Dec 2021 17:04	1
HS21120935-02	S8	03 Dec 2021 10:40			28 Dec 2021 17:04	1
HS21120935-03	S9	03 Dec 2021 07:30			28 Dec 2021 17:04	1
HS21120935-04	S4	03 Dec 2021 12:10			28 Dec 2021 17:04	1
HS21120935-05	S6	03 Dec 2021 09:12			28 Dec 2021 17:04	1
Batch ID: R398580 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50			29 Dec 2021 13:55	1
HS21120935-02	S8	03 Dec 2021 10:40			29 Dec 2021 13:55	1
HS21120935-03	S9	03 Dec 2021 07:30			29 Dec 2021 13:55	1
HS21120935-04	S4	03 Dec 2021 12:10			29 Dec 2021 13:55	1
HS21120935-05	S6	03 Dec 2021 09:12			29 Dec 2021 13:55	1
Batch ID: R398809 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS21120935-01	S7	03 Dec 2021 10:50			27 Dec 2021 12:31	1
HS21120935-02	S8	03 Dec 2021 10:40			27 Dec 2021 12:31	1
HS21120935-03	S9	03 Dec 2021 07:30			27 Dec 2021 12:31	1
HS21120935-04	S4	03 Dec 2021 12:10			27 Dec 2021 12:31	1
HS21120935-05	S6	03 Dec 2021 09:12			27 Dec 2021 12:31	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 173862 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-173862** Units: **mg/L** Analysis Date: **22-Dec-2021 14:49**
Client ID: Run ID: **HG03_398202** SeqNo: **6436353** PrepDate: **22-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-173862** Units: **mg/L** Analysis Date: **22-Dec-2021 14:54**
Client ID: Run ID: **HG03_398202** SeqNo: **6436354** PrepDate: **22-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00487	0.000200	0.005	0	97.4	80 - 120				

MS Sample ID: **HS21120804-01MS** Units: **mg/L** Analysis Date: **22-Dec-2021 15:00**
Client ID: Run ID: **HG03_398202** SeqNo: **6436356** PrepDate: **22-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00478	0.000200	0.005	0.00019	91.8	75 - 125				

MSD Sample ID: **HS21120804-01MSD** Units: **mg/L** Analysis Date: **22-Dec-2021 15:01**
Client ID: Run ID: **HG03_398202** SeqNo: **6436357** PrepDate: **22-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00462	0.000200	0.005	0.00019	88.6	75 - 125	0.00478	3.4	20	

The following samples were analyzed in this batch: HS21120935-01 HS21120935-02 HS21120935-03 HS21120935-04 HS21120935-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 174015 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-174015** Units: **mg/L** Analysis Date: **28-Dec-2021 21:06**
Client ID: Run ID: **ICPMS06_398465** SeqNo: **6443236** PrepDate: **28-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 174015 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-174015** Units: **mg/L** Analysis Date: **28-Dec-2021 21:08**
Client ID: Run ID: **ICPMS06_398465** SeqNo: **6443237** PrepDate: **28-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04729	0.00200	0.05	0	94.6	80 - 120				
Arsenic	0.0478	0.00200	0.05	0	95.6	80 - 120				
Beryllium	0.04718	0.00200	0.05	0	94.4	80 - 120				
Cadmium	0.05088	0.00200	0.05	0	102	80 - 120				
Chromium	0.04674	0.00400	0.05	0	93.5	80 - 120				
Cobalt	0.04622	0.00500	0.05	0	92.4	80 - 120				
Copper	0.04904	0.00200	0.05	0	98.1	80 - 120				
Lead	0.04906	0.00200	0.05	0	98.1	80 - 120				
Molybdenum	0.04578	0.00500	0.05	0	91.6	80 - 120				
Nickel	0.04956	0.00200	0.05	0	99.1	80 - 120				
Selenium	0.05046	0.00200	0.05	0	101	80 - 120				
Silver	0.04755	0.00200	0.05	0	95.1	80 - 120				
Thallium	0.05111	0.00200	0.05	0	102	80 - 120				
Vanadium	0.0473	0.00500	0.05	0	94.6	80 - 120				
Zinc	0.05227	0.00400	0.05	0	105	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 174015 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS21120823-03MS** Units: **mg/L** Analysis Date: **28-Dec-2021 21:14**
Client ID: Run ID: **ICPMS06_398465** SeqNo: **6443240** PrepDate: **28-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05001	0.00200	0.05	-0.000012	100	80 - 120				
Arsenic	0.0518	0.00200	0.05	0.000766	102	80 - 120				
Beryllium	0.05036	0.00200	0.05	0.000059	101	80 - 120				
Cadmium	0.05044	0.00200	0.05	0.000015	101	80 - 120				
Chromium	0.05084	0.00400	0.05	0.001215	99.2	80 - 120				
Cobalt	0.04709	0.00500	0.05	0.000217	93.7	80 - 120				
Copper	0.04846	0.00200	0.05	0.00018	96.6	80 - 120				
Lead	0.052	0.00200	0.05	0.000232	104	80 - 120				
Molybdenum	0.05217	0.00500	0.05	0.002428	99.5	80 - 120				
Nickel	0.0507	0.00200	0.05	0.000771	99.9	80 - 120				
Selenium	0.05205	0.00200	0.05	0.000392	103	80 - 120				
Silver	0.04754	0.00200	0.05	-0.000012	95.1	80 - 120				
Thallium	0.0526	0.00200	0.05	0.000075	105	80 - 120				
Vanadium	0.0563	0.00500	0.05	0.004544	104	80 - 120				
Zinc	0.05134	0.00400	0.05	0.001737	99.2	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 174015 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS21120823-03MSD** Units: **mg/L** Analysis Date: **28-Dec-2021 21:16**
Client ID: Run ID: **ICPMS06_398465** SeqNo: **6443241** PrepDate: **28-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Antimony	0.05025	0.00200	0.05	-0.000012	101	80 - 120	0.05001	0.481	20	
Arsenic	0.0523	0.00200	0.05	0.000766	103	80 - 120	0.0518	0.943	20	
Beryllium	0.05041	0.00200	0.05	0.000059	101	80 - 120	0.05036	0.101	20	
Cadmium	0.0513	0.00200	0.05	0.000015	103	80 - 120	0.05044	1.67	20	
Chromium	0.05102	0.00400	0.05	0.001215	99.6	80 - 120	0.05084	0.351	20	
Cobalt	0.04772	0.00500	0.05	0.000217	95.0	80 - 120	0.04709	1.35	20	
Copper	0.04983	0.00200	0.05	0.00018	99.3	80 - 120	0.04846	2.8	20	
Lead	0.05215	0.00200	0.05	0.000232	104	80 - 120	0.052	0.278	20	
Molybdenum	0.05203	0.00500	0.05	0.002428	99.2	80 - 120	0.05217	0.273	20	
Nickel	0.05058	0.00200	0.05	0.000771	99.6	80 - 120	0.0507	0.255	20	
Selenium	0.05206	0.00200	0.05	0.000392	103	80 - 120	0.05205	0.00384	20	
Silver	0.04726	0.00200	0.05	-0.000012	94.5	80 - 120	0.04754	0.61	20	
Thallium	0.053	0.00200	0.05	0.000075	106	80 - 120	0.0526	0.756	20	
Vanadium	0.05656	0.00500	0.05	0.004544	104	80 - 120	0.0563	0.471	20	
Zinc	0.05299	0.00400	0.05	0.001737	103	80 - 120	0.05134	3.16	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 174015 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS21120823-03SD** Units: **mg/L** Analysis Date: **28-Dec-2021 21:12**
Client ID: Run ID: **ICPMS06_398465** SeqNo: **6443239** PrepDate: **28-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					-0.000012	0	10	
Arsenic	U	0.0100					0.000766	0	10	
Beryllium	U	0.0100					0.000059	0	10	
Cadmium	U	0.0100					0.000015	0	10	
Chromium	U	0.0200					0.001215	0	10	
Cobalt	U	0.0250					0.000217	0	10	
Copper	U	0.0100					0.00018	0	10	
Lead	U	0.0100					0.000232	0	10	
Molybdenum	U	0.0250					0.002428	0	10	
Nickel	U	0.0100					0.000771	0	10	
Selenium	U	0.0100					0.000392	0	10	
Silver	U	0.0100					-0.000012	0	10	
Thallium	U	0.0100					0.000075	0	10	
Vanadium	0.007521	0.0250					0.004544	0	10	J
Zinc	U	0.0200					0.001737	0	10	

The following samples were analyzed in this batch: HS21120935-01 HS21120935-02 HS21120935-03 HS21120935-04 HS21120935-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 173652 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-173652** Units: **ug/L** Analysis Date: **10-Jan-2022 16:51**
Client ID: Run ID: **SV-6_400185** SeqNo: **6459722** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.08126*	*0*	*0.08*	*0*	*102*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.05899*	*0*	*0.08*	*0*	*73.7*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.05727*	*0*	*0.08*	*0*	*71.6*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 173652 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-173652** Units: **ug/L** Analysis Date: **10-Jan-2022 17:10**
Client ID: Run ID: **SV-6_400185** SeqNo: **6459723** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.08114	0.010	0.08	0	101	40 - 140				
2-Methylnaphthalene	0.0667	0.010	0.08	0	83.4	40 - 140				
Acenaphthene	0.05152	0.010	0.08	0	64.4	40 - 140				
Acenaphthylene	0.05075	0.010	0.08	0	63.4	40 - 140				
Anthracene	0.07409	0.010	0.08	0	92.6	40 - 140				
Benz(a)anthracene	0.04861	0.010	0.08	0	60.8	40 - 140				
Benzo(a)pyrene	0.05945	0.010	0.08	0	74.3	40 - 140				
Benzo(b)fluoranthene	0.076	0.010	0.08	0	95.0	40 - 140				
Benzo(g,h,i)perylene	0.05868	0.010	0.08	0	73.4	40 - 140				
Benzo(k)fluoranthene	0.07573	0.010	0.08	0	94.7	40 - 140				
Chrysene	0.05931	0.010	0.08	0	74.1	40 - 140				
Dibenz(a,h)anthracene	0.0617	0.010	0.08	0	77.1	40 - 140				
Dibenzofuran	0.06196	0.010	0.08	0	77.4	40 - 140				
Fluoranthene	0.04174	0.010	0.08	0	52.2	40 - 140				
Fluorene	0.05999	0.010	0.08	0	75.0	40 - 140				
Indeno(1,2,3-cd)pyrene	0.05297	0.010	0.08	0	66.2	40 - 140				
Naphthalene	0.06464	0.010	0.08	0	80.8	40 - 140				
Phenanthrene	0.07947	0.010	0.08	0	99.3	40 - 140				
Pyrene	0.04476	0.010	0.08	0	55.9	40 - 140				
Surr: 2-Fluorobiphenyl	*0.08215*	*0*	*0.08*	*0*	*103*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.06682*	*0*	*0.08*	*0*	*83.5*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.07565*	*0*	*0.08*	*0*	*94.6*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 173652 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-173652** Units: **ug/L** Analysis Date: **10-Jan-2022 17:29**
Client ID: Run ID: **SV-6_400185** SeqNo: **6459724** PrepDate: **16-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.08334	0.010	0.08	0	104	40 - 140	0.08114	2.67	20	
2-Methylnaphthalene	0.05578	0.010	0.08	0	69.7	40 - 140	0.0667	17.8	20	
Acenaphthene	0.06317	0.010	0.08	0	79.0	40 - 140	0.05152	20.3	20	R
Acenaphthylene	0.05567	0.010	0.08	0	69.6	40 - 140	0.05075	9.24	20	
Anthracene	0.075	0.010	0.08	0	93.7	40 - 140	0.07409	1.21	20	
Benz(a)anthracene	0.05175	0.010	0.08	0	64.7	40 - 140	0.04861	6.26	20	
Benzo(a)pyrene	0.06521	0.010	0.08	0	81.5	40 - 140	0.05945	9.24	20	
Benzo(b)fluoranthene	0.07334	0.010	0.08	0	91.7	40 - 140	0.076	3.56	20	
Benzo(g,h,i)perylene	0.05917	0.010	0.08	0	74.0	40 - 140	0.05868	0.825	20	
Benzo(k)fluoranthene	0.08658	0.010	0.08	0	108	40 - 140	0.07573	13.4	20	
Chrysene	0.0599	0.010	0.08	0	74.9	40 - 140	0.05931	0.993	20	
Dibenz(a,h)anthracene	0.05561	0.010	0.08	0	69.5	40 - 140	0.0617	10.4	20	
Dibenzofuran	0.06158	0.010	0.08	0	77.0	40 - 140	0.06196	0.607	20	
Fluoranthene	0.04418	0.010	0.08	0	55.2	40 - 140	0.04174	5.68	20	
Fluorene	0.04982	0.010	0.08	0	62.3	40 - 140	0.05999	18.5	20	
Indeno(1,2,3-cd)pyrene	0.05337	0.010	0.08	0	66.7	40 - 140	0.05297	0.76	20	
Naphthalene	0.06441	0.010	0.08	0	80.5	40 - 140	0.06464	0.356	20	
Phenanthrene	0.08409	0.010	0.08	0	105	40 - 140	0.07947	5.65	20	
Pyrene	0.05142	0.010	0.08	0	64.3	40 - 140	0.04476	13.8	20	
Surr: 2-Fluorobiphenyl	*0.08005*	*0*	*0.08*	*0*	*100*	*40 - 140*	*0.08215*	*2.59*	*20*	
Surr: 4-Terphenyl-d14	*0.0651*	*0*	*0.08*	*0*	*81.4*	*40 - 140*	*0.06682*	*2.61*	*20*	
Surr: Nitrobenzene-d5	*0.07719*	*0*	*0.08*	*0*	*96.5*	*40 - 140*	*0.07565*	*2.01*	*20*	

The following samples were analyzed in this batch: HS21120935-01 HS21120935-02 HS21120935-03 HS21120935-04 HS21120935-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 173837 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-173837** Units: **mg/L** Analysis Date: **21-Dec-2021 15:00**
Client ID: Run ID: **UV-2450_398122** SeqNo: **6433403** PrepDate: **21-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-173837** Units: **mg/L** Analysis Date: **21-Dec-2021 15:00**
Client ID: Run ID: **UV-2450_398122** SeqNo: **6433402** PrepDate: **21-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.271	0.0500	0.25	0	108	80 - 120				

MS Sample ID: **HS21120336-01MS** Units: **mg/L** Analysis Date: **21-Dec-2021 15:00**
Client ID: Run ID: **UV-2450_398122** SeqNo: **6433400** PrepDate: **21-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.268	0.0500	0.25	-0.003	108	80 - 120				

MSD Sample ID: **HS21120336-01MSD** Units: **mg/L** Analysis Date: **21-Dec-2021 15:00**
Client ID: Run ID: **UV-2450_398122** SeqNo: **6433401** PrepDate: **21-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.27	0.0500	0.25	-0.003	109	80 - 120	0.268	0.743	20	

The following samples were analyzed in this batch: HS21120935-01 HS21120935-02 HS21120935-03 HS21120935-04 HS21120935-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: 174027 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-174027** Units: **mg/L** Analysis Date: **28-Dec-2021 17:00**
Client ID: Run ID: **WetChem_HS_398487** SeqNo: **6442805** PrepDate: **28-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-174027** Units: **mg/L** Analysis Date: **28-Dec-2021 17:00**
Client ID: Run ID: **WetChem_HS_398487** SeqNo: **6442804** PrepDate: **28-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	22.25	0.50	20	0	111	85 - 115				

MS Sample ID: **HS21121437-01MS** Units: **mg/L** Analysis Date: **28-Dec-2021 17:00**
Client ID: Run ID: **WetChem_HS_398487** SeqNo: **6442802** PrepDate: **28-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.53	0.50	20	0.608	115	75 - 125				

MSD Sample ID: **HS21121437-01MSD** Units: **mg/L** Analysis Date: **28-Dec-2021 17:00**
Client ID: Run ID: **WetChem_HS_398487** SeqNo: **6442803** PrepDate: **28-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.54	0.50	20	0.608	115	75 - 125	23.53	0.034	20	

The following samples were analyzed in this batch: HS21120935-01 HS21120935-02 HS21120935-03 HS21120935-04 HS21120935-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: R397882 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-121721** Units: **mg/L** Analysis Date: **17-Dec-2021 10:00**
Client ID: Run ID: **Balance1_397882** SeqNo: **6428155** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-121721** Units: **mg/L** Analysis Date: **17-Dec-2021 10:00**
Client ID: Run ID: **Balance1_397882** SeqNo: **6428156** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	91	2.50	100	0	91.0	85 - 115				

DUP Sample ID: **HS21120974-06DUP** Units: **mg/L** Analysis Date: **17-Dec-2021 10:00**
Client ID: Run ID: **Balance1_397882** SeqNo: **6428154** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	27.33	2.50					27	1.23	5	

The following samples were analyzed in this batch: HS21120935-01 HS21120935-02 HS21120935-03 HS21120935-04 HS21120935-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: R398414 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R398414** Units: **mg/L** Analysis Date: **27-Dec-2021 08:00**
Client ID: Run ID: **Balance1_398414** SeqNo: **6441266** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R398414** Units: **mg/L** Analysis Date: **27-Dec-2021 08:00**
Client ID: Run ID: **Balance1_398414** SeqNo: **6441265** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	1034	10.0	1000	0	103	85 - 115				

DUP Sample ID: **HS21121226-01DUP** Units: **mg/L** Analysis Date: **27-Dec-2021 08:00**
Client ID: Run ID: **Balance1_398414** SeqNo: **6441267** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0					0	0	20	

The following samples were analyzed in this batch: HS21120935-01 HS21120935-02 HS21120935-03 HS21120935-04 HS21120935-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: R398439 (0) **Instrument:** ICS-Integrion **Method:** NITRATE/NITRITE BY E300.0, REV 2.1, 1993

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **27-Dec-2021 21:15**
Client ID: Run ID: **ICS-Integrion_398439** SeqNo: **6441815** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **27-Dec-2021 21:22**
Client ID: Run ID: **ICS-Integrion_398439** SeqNo: **6441816** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	8.098	0.200	8	0	101	90 - 110				

MS Sample ID: **HS21120935-01MS** Units: **mg/L** Analysis Date: **27-Dec-2021 22:37**
Client ID: **S7** Run ID: **ICS-Integrion_398439** SeqNo: **6441820** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	18.31	1.00	20	0.203	90.5	80 - 120				

MS Sample ID: **HS21120867-08MS** Units: **mg/L** Analysis Date: **28-Dec-2021 00:46**
Client ID: Run ID: **ICS-Integrion_398439** SeqNo: **6441836** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	22.79	1.00	20	4.856	89.7	80 - 120				

MSD Sample ID: **HS21120935-01MSD** Units: **mg/L** Analysis Date: **27-Dec-2021 22:45**
Client ID: **S7** Run ID: **ICS-Integrion_398439** SeqNo: **6441821** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	18.92	1.00	20	0.203	93.6	80 - 120	18.31	3.25	20	

MSD Sample ID: **HS21120867-08MSD** Units: **mg/L** Analysis Date: **28-Dec-2021 00:53**
Client ID: Run ID: **ICS-Integrion_398439** SeqNo: **6441837** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	23.49	1.00	20	4.856	93.2	80 - 120	22.79	3.03	20	

The following samples were analyzed in this batch: HS21120935-01 HS21120935-02 HS21120935-03 HS21120935-04 HS21120935-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: R398580 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-122921** Units: **mg/L** Analysis Date: **29-Dec-2021 13:55**
Client ID: Run ID: **Balance1_398580** SeqNo: **6445230** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-122921** Units: **mg/L** Analysis Date: **29-Dec-2021 13:55**
Client ID: Run ID: **Balance1_398580** SeqNo: **6445232** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37.9	2.00	40	0	94.8	78 - 114				

LCSD Sample ID: **WLCSDW-122921** Units: **mg/L** Analysis Date: **29-Dec-2021 13:55**
Client ID: Run ID: **Balance1_398580** SeqNo: **6445231** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37.7	2.00	40	0	94.2	78 - 114	37.9	0.529	18	

MS Sample ID: **HS21120816-01 MS** Units: **mg/L** Analysis Date: **29-Dec-2021 13:55**
Client ID: Run ID: **Balance1_398580** SeqNo: **6445217** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	35.6	2.00	40	1.224	85.9	78 - 114				

The following samples were analyzed in this batch: HS21120935-01 HS21120935-02 HS21120935-03 HS21120935-04 HS21120935-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: HS21120935

QC BATCH REPORT

Batch ID: R398809 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-122721** Units: **mg/L** Analysis Date: **27-Dec-2021 12:31**
Client ID: Run ID: **Balance1_398809** SeqNo: **6450775** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-122721** Units: **mg/L** Analysis Date: **27-Dec-2021 12:31**
Client ID: Run ID: **Balance1_398809** SeqNo: **6450776** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1044	10.0	1000	0	104	85 - 115				

DUP Sample ID: **HS21121186-01DUP** Units: **mg/L** Analysis Date: **27-Dec-2021 12:31**
Client ID: Run ID: **Balance1_398809** SeqNo: **6450773** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	798	10.0					766	4.09	5	

DUP Sample ID: **HS21120935-01DUP** Units: **mg/L** Analysis Date: **27-Dec-2021 12:31**
Client ID: **S7** Run ID: **Balance1_398809** SeqNo: **6450755** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	262	10.0					264	0.76	5	

The following samples were analyzed in this batch: HS21120935-01 HS21120935-02 HS21120935-03 HS21120935-04 HS21120935-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
WorkOrder: **HS21120935**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - E1A Study
Work Order: HS21120935

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS21120935-01	S7	Login	12/16/2021 10:32:24 AM	PMG	MET019
HS21120935-01	S7	Login	12/16/2021 10:32:24 AM	PMG	EXT134
HS21120935-01	S7	Login	12/16/2021 10:32:24 AM	PMG	WET148
HS21120935-01	S7	Login	12/16/2021 10:32:24 AM	PMG	WET148
HS21120935-01	S7	Login	12/16/2021 10:32:24 AM	PMG	WET148
HS21120935-01	S7	Login	12/16/2021 10:32:24 AM	PMG	WET148
HS21120935-01	S7	Login	12/16/2021 10:32:24 AM	PMG	WET148

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Sample Receipt Checklist

Work Order ID: HS21120935 **Date/Time Received:** **14-Dec-2021 13:30**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By: */S/ Paresh M. Giga* (eSignature) 16-Dec-2021 10:38 (Date/Time) **Reviewed by:** */S/ Corey Grandits* (eSignature) 27-Dec-2021 10:54 (Date/Time)

Matrices: **Water** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:252577
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	17.9C; 18.1C U/C	IR31	
Cooler(s)/Kit(s):	47652/47912		
Date/Time sample(s) sent to storage:	12/16/2021 11:00		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: Cooler 47912 has no chain, samples logged in per container labels.
S4 - 12/3/21 @ 12:10 & S6 - 12/3/21 @ 09:12 + extra bottles for S9.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 252577

HS21120935

ERM, Inc

Gas to Energy - E1A Study

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name	Gas to Energy - EIA Study	
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte | NC | 28203	City/State/Zip	Charlotte | NC | 28203	
Phone		Phone		
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	emnaaccountspayable@erm.com	

								A	B	C	D	E	F	G	H	I	J	Hold
No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	8270SIM_Water (PAHs)										
							B	DISS_O 4500-O G (Dissolved Oxygen)										
							C	ICP_TWater (6020/7470 Metals (16))										
							D	Nitrogen, Total_Water										
							E	O&G_1664_Water_HS (Oil & Grease)										
							F	P_TWater (Phosphorous)										
							G	pH_Water_9040C										
							H	Salinity										
							I	TSS 2540D, TDS 2540C, & TS 2540G										
							J											
1	S7	3/12/21	10:50 AM	S	2,3	8	✓		✓	✓	✓	✓				✓		
2	S8	3/12/21	10:40 AM	S	2,3	8	✓		✓	✓	✓	✓				✓		
3	S9	3/12/21	7:30 AM	S	2,3	5	✓		✓	✓	✓							
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Sampler(s) Please Print & Sign: Michael Louie

Shipment Method:

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by: Michael Louie Date: 06/12/21 Time: 3:30pm Received by:

Relinquished by: Date: Time: Received by (Laboratory):

Logged by (Laboratory): Date: Time: Checked by (Laboratory): 12/14/2021, 13:30

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
47652	17.9° C

QC Package: (Check One Box Below)

- [X] Level II Std QC
- [ ] Level III Std QC/Raw Data
- [ ] Level IV SW846/CLP
- [ ] Other
- [ ] TRRP Checklist
- [ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel +1 281 530 5656
Fax. +1 281 530 5887

CUSTOD
Date: 6/12/21
Name: M. Lucas
Company: GEMCO

Date: 12/14/21

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel +1 281 530 5656
Fax. +1 281 530 5887

47652.

Seal Broken By:
Date: 12/14/21.

NW0 (1 /9) 320187

EXPRESS WORLDWIDE WPX DHL

GUYANA LOGISTICS SUPPORT SERVICE
CHRISTY RODNEY
110 DUKPA BARRACK STREET S
KINGSTON
GEORGETOWN GEORGETOWN
Guyana (BRITISH)

Orig
GEO

ALS LABORATORY
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210

77099 HOUSTON Texas
United States of America

US-IAH-HOU

Dlvy Time

Ref 954631200

Pcs/Shpt Weight
37.0/77.0 lbs

Pieces
1 / 2

25x15x15 (41 lbs)

Contents WATER SAMPLES AND EMPTY BOTTLES

WAYBILL 44 5113 7585

(2L)US77099+48000001

(420)5800 7052 7113 0236

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ALS
10450 Stancliff Rd., Suit
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

e 210 4R12.

CUSTODY SEAL

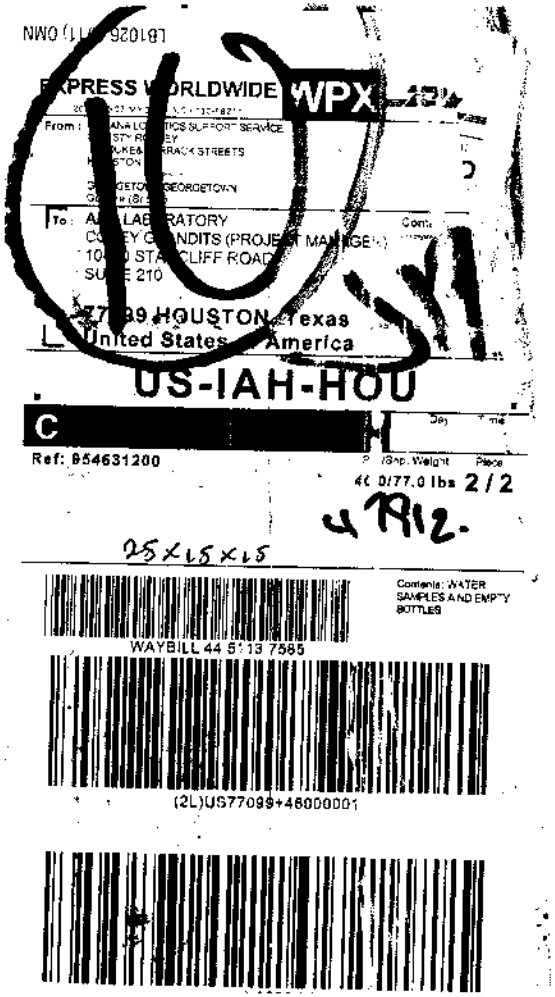
Date: 6/12/21 Time: 11:33am
Name: Michael Lowe
Company: CEMCO

Seal Broken By:
Date: 12/14/21

CUSTODY SEAL

Date: 6/12/21 Time: 11:33am
Name: Michael Lowe
Company: CEMCO

Seal Broken By:
Date: 12/14/21.



No Cec

RIGHT SOLUTIONS | RIGHT PARTNER

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

January 07, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS21121498**

Laboratory Results for: **Gas to Energy - EIA Study**

Dear Selina Pradhan,

ALS Environmental received 3 sample(s) on Dec 28, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: Gas to Energy - EIA Study
Work Order: HS21121498

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS21121498-01	D2	Soil		20-Dec-2021 11:00	28-Dec-2021 12:30	☐
HS21121498-02	D3	Soil		20-Dec-2021 11:15	28-Dec-2021 12:30	☐
HS21121498-03	D4	Soil		20-Dec-2021 11:30	28-Dec-2021 12:30	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - EIA Study
Work Order: HS21121498

Work Order Comments

- The analysis for Sulfide was subcontracted to ALS Holland, MI. Final report attached.

ECD Organics by Method SW8081

Batch ID: 174070

Sample ID: D2 (HS21121498-01)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: D3 (HS21121498-02)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: D3 (HS21121498-02MS)

- The MS and/or MSD recovery is unavailable due to dilution required for sample matrix interference.
- The multi-response compounds toxaphene and chlordane were not included in the spiking solution for the MS/MSD.

Sample ID: D4 (HS21121498-03)

- This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: MBLK-174070

- Chlordane, Toxaphene & Mirex LCS/LCSD provided as batch quality control. 2nd & Closing CCV failure for Toxaphene, 4,4 DDT, 4,4 DDD, Heptachlor & Methoxychlor. Confirmed by re-analyses ECD11 220104.

ECD Organics by Method SW8082

Batch ID: 174069

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW6020A

Batch ID: 174192

Sample ID: HS21120934-07MS

- MS and MSD are for an unrelated sample

Metals by Method SW7471B

Batch ID: 174081

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9060

Batch ID: 174160

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
Sample ID: D2
Collection Date: 20-Dec-2021 11:00

ANALYTICAL REPORT
WorkOrder:HS21121498
Lab ID:HS21121498-01
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**		Prep:SW3541 / 30-Dec-2021			Analyst: JBA
4,4´-DDD		U	1.6	1.6	ug/Kg	5	31-Dec-2021 20:51
4,4´-DDE		U	1.6	1.6	ug/Kg	5	31-Dec-2021 20:51
4,4´-DDT		U	1.6	1.6	ug/Kg	5	31-Dec-2021 20:51
Aldrin		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
alpha-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
beta-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
Chlordane		U	8.3	8.3	ug/Kg	5	31-Dec-2021 20:51
delta-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
Dieldrin		U	1.6	1.6	ug/Kg	5	31-Dec-2021 20:51
Endosulfan I		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
Endosulfan II		U	1.6	1.6	ug/Kg	5	31-Dec-2021 20:51
Endosulfan sulfate		U	1.6	1.6	ug/Kg	5	31-Dec-2021 20:51
Endrin		U	1.6	1.6	ug/Kg	5	31-Dec-2021 20:51
Endrin aldehyde		U	1.6	1.6	ug/Kg	5	31-Dec-2021 20:51
Endrin ketone		U	1.6	1.6	ug/Kg	5	31-Dec-2021 20:51
gamma-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
Heptachlor		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
Heptachlor epoxide		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
Methoxychlor		U	8.3	8.3	ug/Kg	5	31-Dec-2021 20:51
Toxaphene		U	8.3	8.3	ug/Kg	5	31-Dec-2021 20:51
alpha-Chlordane		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
gamma-Chlordane		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
Surr: Decachlorobiphenyl	*125*			*59-144*	*%REC*	*5*	*31-Dec-2021 20:51*
Surr: Tetrachloro-m-xylene	*114*			*56.9-130*	*%REC*	*5*	*31-Dec-2021 20:51*
MISCELLANEOUS PESTICIDES BY SW8081B		**Method:SW8081**		Prep:SW3541 / 30-Dec-2021			Analyst: JBA
Mirex		U	0.83	0.83	ug/Kg	5	31-Dec-2021 20:51
PCBS BY SW8082A		**Method:SW8082**		Prep:SW3541 / 30-Dec-2021			Analyst: JBA
Aroclor 1016		U	0.41	1.6	ug/Kg	1	30-Dec-2021 23:10
Aroclor 1221		U	0.55	1.6	ug/Kg	1	30-Dec-2021 23:10
Aroclor 1232		U	0.44	1.6	ug/Kg	1	30-Dec-2021 23:10
Aroclor 1242		U	0.58	1.6	ug/Kg	1	30-Dec-2021 23:10
Aroclor 1248		U	0.58	1.6	ug/Kg	1	30-Dec-2021 23:10
Aroclor 1254		U	0.46	1.6	ug/Kg	1	30-Dec-2021 23:10
Aroclor 1260		U	0.24	1.6	ug/Kg	1	30-Dec-2021 23:10
Surr: Decachlorobiphenyl	*89.7*			*54-143*	*%REC*	*1*	*30-Dec-2021 23:10*
Surr: Tetrachloro-m-xylene	*80.4*			*50-140*	*%REC*	*1*	*30-Dec-2021 23:10*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
Sample ID: D2
Collection Date: 20-Dec-2021 11:00

ANALYTICAL REPORT
WorkOrder:HS21121498
Lab ID:HS21121498-01
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 06-Jan-2022		Analyst: JC
Antimony	U		0.0611	0.470	mg/Kg	1	06-Jan-2022 14:12
Arsenic	**7.83**		**0.0658**	**0.470**	**mg/Kg**	1	06-Jan-2022 14:12
Beryllium	**0.594**		**0.0197**	**0.470**	**mg/Kg**	1	06-Jan-2022 14:12
Cadmium	U		0.0254	0.470	mg/Kg	1	06-Jan-2022 14:12
Chromium	**13.7**		**0.0216**	**0.470**	**mg/Kg**	1	06-Jan-2022 14:12
Cobalt	**5.23**		**0.0141**	**0.470**	**mg/Kg**	1	06-Jan-2022 14:12
Copper	**4.80**		**0.0357**	**0.188**	**mg/Kg**	1	06-Jan-2022 14:12
Lead	**10.0**		**0.0122**	**0.470**	**mg/Kg**	1	06-Jan-2022 14:12
Molybdenum	**0.171**	J	**0.0169**	**0.470**	**mg/Kg**	1	06-Jan-2022 14:12
Nickel	**8.83**		**0.0451**	**0.470**	**mg/Kg**	1	06-Jan-2022 14:12
Selenium	**0.342**	J	**0.0856**	**0.470**	**mg/Kg**	1	06-Jan-2022 14:12
Silver	U		0.0141	0.470	mg/Kg	1	06-Jan-2022 14:12
Thallium	U		0.210	0.470	mg/Kg	1	06-Jan-2022 14:12
Vanadium	**22.8**		**0.0705**	**0.470**	**mg/Kg**	1	06-Jan-2022 14:12
Zinc	**35.3**		**0.160**	**0.470**	**mg/Kg**	1	06-Jan-2022 14:12
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 30-Dec-2021		Analyst: MSC
Mercury	**0.0280**		**0.000512**	**0.00362**	**mg/Kg**	1	30-Dec-2021 13:24
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 04-Jan-2022		Analyst: JAC
Total Organic Carbon	**0.311**		**0.0595**	**0.0595**	**wt%-dry**	1	04-Jan-2022 15:00
SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0		NA	1	07-Jan-2022 10:15

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
Sample ID: D3
Collection Date: 20-Dec-2021 11:15

ANALYTICAL REPORT
WorkOrder:HS21121498
Lab ID:HS21121498-02
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**		Prep:SW3541 / 30-Dec-2021			Analyst: JBA
4,4´-DDD		U	1.6	1.6	ug/Kg	5	31-Dec-2021 19:45
4,4´-DDE		U	1.6	1.6	ug/Kg	5	31-Dec-2021 19:45
4,4´-DDT		U	1.6	1.6	ug/Kg	5	31-Dec-2021 19:45
Aldrin		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
alpha-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
beta-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
Chlordane		U	8.3	8.3	ug/Kg	5	31-Dec-2021 19:45
delta-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
Dieldrin		U	1.6	1.6	ug/Kg	5	31-Dec-2021 19:45
Endosulfan I		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
Endosulfan II		U	1.6	1.6	ug/Kg	5	31-Dec-2021 19:45
Endosulfan sulfate		U	1.6	1.6	ug/Kg	5	31-Dec-2021 19:45
Endrin		U	1.6	1.6	ug/Kg	5	31-Dec-2021 19:45
Endrin aldehyde		U	1.6	1.6	ug/Kg	5	31-Dec-2021 19:45
Endrin ketone		U	1.6	1.6	ug/Kg	5	31-Dec-2021 19:45
gamma-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
Heptachlor		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
Heptachlor epoxide		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
Methoxychlor		U	8.3	8.3	ug/Kg	5	31-Dec-2021 19:45
Toxaphene		U	8.3	8.3	ug/Kg	5	31-Dec-2021 19:45
alpha-Chlordane		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
gamma-Chlordane		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
Surr: Decachlorobiphenyl	*113*			*59-144*	*%REC*	*5*	*31-Dec-2021 19:45*
Surr: Tetrachloro-m-xylene	*68.7*			*56.9-130*	*%REC*	*5*	*31-Dec-2021 19:45*
MISCELLANEOUS PESTICIDES BY SW8081B		**Method:SW8081**		Prep:SW3541 / 30-Dec-2021			Analyst: JBA
Mirex		U	0.83	0.83	ug/Kg	5	31-Dec-2021 19:45
PCBS BY SW8082A		**Method:SW8082**		Prep:SW3541 / 30-Dec-2021			Analyst: JBA
Aroclor 1016		U	0.42	1.7	ug/Kg	1	30-Dec-2021 23:27
Aroclor 1221		U	0.56	1.7	ug/Kg	1	30-Dec-2021 23:27
Aroclor 1232		U	0.45	1.7	ug/Kg	1	30-Dec-2021 23:27
Aroclor 1242		U	0.59	1.7	ug/Kg	1	30-Dec-2021 23:27
Aroclor 1248		U	0.59	1.7	ug/Kg	1	30-Dec-2021 23:27
Aroclor 1254		U	0.47	1.7	ug/Kg	1	30-Dec-2021 23:27
Aroclor 1260		U	0.24	1.7	ug/Kg	1	30-Dec-2021 23:27
Surr: Decachlorobiphenyl	*96.7*			*54-143*	*%REC*	*1*	*30-Dec-2021 23:27*
Surr: Tetrachloro-m-xylene	*82.5*			*50-140*	*%REC*	*1*	*30-Dec-2021 23:27*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
Sample ID: D3
Collection Date: 20-Dec-2021 11:15

ANALYTICAL REPORT
WorkOrder:HS21121498
Lab ID:HS21121498-02
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 06-Jan-2022		Analyst: JC
Antimony	U		0.0615	0.473	mg/Kg	1	06-Jan-2022 14:16
Arsenic	**2.83**		**0.0663**	**0.473**	**mg/Kg**	1	06-Jan-2022 14:16
Beryllium	**0.0588**	J	**0.0199**	**0.473**	**mg/Kg**	1	06-Jan-2022 14:16
Cadmium	U		0.0256	0.473	mg/Kg	1	06-Jan-2022 14:16
Chromium	**0.670**		**0.0218**	**0.473**	**mg/Kg**	1	06-Jan-2022 14:16
Cobalt	**0.273**	J	**0.0142**	**0.473**	**mg/Kg**	1	06-Jan-2022 14:16
Copper	**0.195**		**0.0360**	**0.189**	**mg/Kg**	1	06-Jan-2022 14:16
Lead	**2.12**		**0.0123**	**0.473**	**mg/Kg**	1	06-Jan-2022 14:16
Molybdenum	**0.0566**	J	**0.0170**	**0.473**	**mg/Kg**	1	06-Jan-2022 14:16
Nickel	**0.286**	J	**0.0454**	**0.473**	**mg/Kg**	1	06-Jan-2022 14:16
Selenium	U		0.0861	0.473	mg/Kg	1	06-Jan-2022 14:16
Silver	U		0.0142	0.473	mg/Kg	1	06-Jan-2022 14:16
Thallium	U		0.211	0.473	mg/Kg	1	06-Jan-2022 14:16
Vanadium	**3.21**		**0.0710**	**0.473**	**mg/Kg**	1	06-Jan-2022 14:16
Zinc	**1.17**		**0.161**	**0.473**	**mg/Kg**	1	06-Jan-2022 14:16
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 30-Dec-2021		Analyst: MSC
Mercury	**0.00677**		**0.000482**	**0.00341**	**mg/Kg**	1	30-Dec-2021 13:26
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 04-Jan-2022		Analyst: JAC
Total Organic Carbon	**0.0646**		**0.0588**	**0.0588**	**wt%-dry**	1	04-Jan-2022 15:00
SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0		NA	1	07-Jan-2022 10:15

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
Sample ID: D4
Collection Date: 20-Dec-2021 11:30

ANALYTICAL REPORT
WorkOrder:HS21121498
Lab ID:HS21121498-03
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**		Prep:SW3541 / 30-Dec-2021			Analyst: JBA
4,4´-DDD		U	1.6	1.6	ug/Kg	5	31-Dec-2021 21:13
4,4´-DDE		U	1.6	1.6	ug/Kg	5	31-Dec-2021 21:13
4,4´-DDT		U	1.6	1.6	ug/Kg	5	31-Dec-2021 21:13
Aldrin		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
alpha-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
beta-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
Chlordane		U	8.3	8.3	ug/Kg	5	31-Dec-2021 21:13
delta-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
Dieldrin		U	1.6	1.6	ug/Kg	5	31-Dec-2021 21:13
Endosulfan I		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
Endosulfan II		U	1.6	1.6	ug/Kg	5	31-Dec-2021 21:13
Endosulfan sulfate		U	1.6	1.6	ug/Kg	5	31-Dec-2021 21:13
Endrin		U	1.6	1.6	ug/Kg	5	31-Dec-2021 21:13
Endrin aldehyde		U	1.6	1.6	ug/Kg	5	31-Dec-2021 21:13
Endrin ketone		U	1.6	1.6	ug/Kg	5	31-Dec-2021 21:13
gamma-BHC		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
Heptachlor		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
Heptachlor epoxide		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
Methoxychlor		U	8.3	8.3	ug/Kg	5	31-Dec-2021 21:13
Toxaphene		U	8.3	8.3	ug/Kg	5	31-Dec-2021 21:13
alpha-Chlordane		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
gamma-Chlordane		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
Surr: Decachlorobiphenyl	*121*			*59-144*	*%REC*	*5*	*31-Dec-2021 21:13*
Surr: Tetrachloro-m-xylene	*123*			*56.9-130*	*%REC*	*5*	*31-Dec-2021 21:13*
MISCELLANEOUS PESTICIDES BY SW8081B		**Method:SW8081**		Prep:SW3541 / 30-Dec-2021			Analyst: JBA
Mirex		U	0.83	0.83	ug/Kg	5	31-Dec-2021 21:13
PCBS BY SW8082A		**Method:SW8082**		Prep:SW3541 / 30-Dec-2021			Analyst: JBA
Aroclor 1016		U	0.41	1.6	ug/Kg	1	31-Dec-2021 00:19
Aroclor 1221		U	0.55	1.6	ug/Kg	1	31-Dec-2021 00:19
Aroclor 1232		U	0.44	1.6	ug/Kg	1	31-Dec-2021 00:19
Aroclor 1242		U	0.58	1.6	ug/Kg	1	31-Dec-2021 00:19
Aroclor 1248		U	0.58	1.6	ug/Kg	1	31-Dec-2021 00:19
Aroclor 1254		U	0.46	1.6	ug/Kg	1	31-Dec-2021 00:19
Aroclor 1260		U	0.24	1.6	ug/Kg	1	31-Dec-2021 00:19
Surr: Decachlorobiphenyl	*87.3*			*54-143*	*%REC*	*1*	*31-Dec-2021 00:19*
Surr: Tetrachloro-m-xylene	*82.9*			*50-140*	*%REC*	*1*	*31-Dec-2021 00:19*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
Sample ID: D4
Collection Date: 20-Dec-2021 11:30

ANALYTICAL REPORT
WorkOrder:HS21121498
Lab ID:HS21121498-03
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 06-Jan-2022		Analyst: JC
Antimony	U		0.0648	0.498	mg/Kg	1	06-Jan-2022 14:19
Arsenic	**4.88**		**0.0697**	**0.498**	**mg/Kg**	1	06-Jan-2022 14:19
Beryllium	**0.722**		**0.0209**	**0.498**	**mg/Kg**	1	06-Jan-2022 14:19
Cadmium	U		0.0269	0.498	mg/Kg	1	06-Jan-2022 14:19
Chromium	**13.8**		**0.0229**	**0.498**	**mg/Kg**	1	06-Jan-2022 14:19
Cobalt	**5.97**		**0.0149**	**0.498**	**mg/Kg**	1	06-Jan-2022 14:19
Copper	**5.27**		**0.0379**	**0.199**	**mg/Kg**	1	06-Jan-2022 14:19
Lead	**9.96**		**0.0130**	**0.498**	**mg/Kg**	1	06-Jan-2022 14:19
Molybdenum	**0.104**	J	**0.0179**	**0.498**	**mg/Kg**	1	06-Jan-2022 14:19
Nickel	**10.2**		**0.0478**	**0.498**	**mg/Kg**	1	06-Jan-2022 14:19
Selenium	**0.382**	J	**0.0907**	**0.498**	**mg/Kg**	1	06-Jan-2022 14:19
Silver	U		0.0149	0.498	mg/Kg	1	06-Jan-2022 14:19
Thallium	U		0.222	0.498	mg/Kg	1	06-Jan-2022 14:19
Vanadium	**22.6**		**0.0747**	**0.498**	**mg/Kg**	1	06-Jan-2022 14:19
Zinc	**40.3**		**0.169**	**0.498**	**mg/Kg**	1	06-Jan-2022 14:19
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 30-Dec-2021		Analyst: MSC
Mercury	**0.0201**		**0.000500**	**0.00354**	**mg/Kg**	1	30-Dec-2021 13:28
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 04-Jan-2022		Analyst: JAC
Total Organic Carbon	**0.287**		**0.0586**	**0.0586**	**wt%-dry**	1	04-Jan-2022 15:00
SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS		**Method:NA**					Analyst: SUBFC
Subcontract Analysis	See Attached		0		NA	1	07-Jan-2022 10:15

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

Batch ID: 174069 **Start Date:** 30 Dec 2021 09:04 **End Date:** 30 Dec 2021 15:00
Method: PCB_3541_LO **Prep Code:** PCBPR_SOX_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21121498-01	1	30.39 (grams)	1 (mL)	0.03291	1-L glass, Neat
HS21121498-02	1	30.06 (grams)	1 (mL)	0.03327	1-L glass, Neat
HS21121498-03	1	30.52 (grams)	1 (mL)	0.03277	1-L glass, Neat

Batch ID: 174070 **Start Date:** 30 Dec 2021 09:08 **End Date:** 30 Dec 2021 14:30
Method: PEST_LOW_SOIL 3541 **Prep Code:** PESTPR_S_3541LO

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21121498-01	1	30.26 (g)	1 (mL)	0.03305	1-L glass, Neat
HS21121498-02	1	30.14 (g)	1 (mL)	0.03318	1-L glass, Neat
HS21121498-03	1	30.14 (g)	1 (mL)	0.03318	1-L glass, Neat

Batch ID: 174081 **Start Date:** 30 Dec 2021 11:24 **End Date:** 30 Dec 2021 13:30
Method: MERCURY PREP - SOLID - 7471B **Prep Code:** HG_S_LOWPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21121498-01		0.5506 (grams)	40 (mL)	72.65	1-L glass, Neat
HS21121498-02		0.5849 (grams)	40 (mL)	68.39	1-L glass, Neat
HS21121498-03		0.5641 (grams)	40 (mL)	70.91	1-L glass, Neat

Batch ID: 174160 **Start Date:** 04 Jan 2022 14:32 **End Date:** 04 Jan 2022 15:30
Method: TOC SOLID PREP **Prep Code:** TOC_SOLID_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21121498-01		0.2016 (grams)	0.2 (mL)	0.9921	1-L glass, Neat
HS21121498-02		0.2042 (grams)	0.2 (mL)	0.9794	1-L glass, Neat
HS21121498-03		0.2049 (grams)	0.2 (mL)	0.9761	1-L glass, Neat

Batch ID: 174192 **Start Date:** 06 Jan 2022 07:00 **End Date:** 06 Jan 2022 13:00
Method: METALS PREP - SOLIDS - SW3050B **Prep Code:** 3050_I_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS21121498-01		0.5317 (g)	50 (mL)	94.04	1-L glass, Neat
HS21121498-02		0.5282 (g)	50 (mL)	94.66	1-L glass, Neat
HS21121498-03		0.5018 (g)	50 (mL)	99.64	1-L glass, Neat

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174069 (1)	**Test Name :** PCBS BY SW8082A				**Matrix:** Soil	
HS21121498-01	D2	20 Dec 2021 11:00		30 Dec 2021 09:04	30 Dec 2021 23:10	1
HS21121498-02	D3	20 Dec 2021 11:15		30 Dec 2021 09:04	30 Dec 2021 23:27	1
HS21121498-03	D4	20 Dec 2021 11:30		30 Dec 2021 09:04	31 Dec 2021 00:19	1
Batch ID: 174070 (0)	**Test Name :** MISCELLANEOUS PESTICIDES BY SW8081B				**Matrix:** Soil	
HS21121498-01	D2	20 Dec 2021 11:00		30 Dec 2021 09:08	31 Dec 2021 20:51	5
HS21121498-01	D2	20 Dec 2021 11:00		30 Dec 2021 09:08	31 Dec 2021 20:51	5
HS21121498-02	D3	20 Dec 2021 11:15		30 Dec 2021 09:08	31 Dec 2021 19:45	5
HS21121498-02	D3	20 Dec 2021 11:15		30 Dec 2021 09:08	31 Dec 2021 19:45	5
HS21121498-03	D4	20 Dec 2021 11:30		30 Dec 2021 09:08	31 Dec 2021 21:13	5
HS21121498-03	D4	20 Dec 2021 11:30		30 Dec 2021 09:08	31 Dec 2021 21:13	5
Batch ID: 174081 (0)	**Test Name :** MERCURY BY SW7471B				**Matrix:** Soil	
HS21121498-01	D2	20 Dec 2021 11:00		30 Dec 2021 11:24	30 Dec 2021 13:24	1
HS21121498-02	D3	20 Dec 2021 11:15		30 Dec 2021 11:24	30 Dec 2021 13:26	1
HS21121498-03	D4	20 Dec 2021 11:30		30 Dec 2021 11:24	30 Dec 2021 13:28	1
Batch ID: 174160 (0)	**Test Name :** TOTAL ORGANIC CARBON BY SW9060A				**Matrix:** Soil	
HS21121498-01	D2	20 Dec 2021 11:00		04 Jan 2022 14:32	04 Jan 2022 15:00	1
HS21121498-02	D3	20 Dec 2021 11:15		04 Jan 2022 14:32	04 Jan 2022 15:00	1
HS21121498-03	D4	20 Dec 2021 11:30		04 Jan 2022 14:32	04 Jan 2022 15:00	1
Batch ID: 174192 (0)	**Test Name :** METALS BY SW6020A				**Matrix:** Soil	
HS21121498-01	D2	20 Dec 2021 11:00		06 Jan 2022 13:00	06 Jan 2022 14:12	1
HS21121498-02	D3	20 Dec 2021 11:15		06 Jan 2022 13:00	06 Jan 2022 14:16	1
HS21121498-03	D4	20 Dec 2021 11:30		06 Jan 2022 13:00	06 Jan 2022 14:19	1
Batch ID: R399031 (0)	**Test Name :** SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS				**Matrix:** Soil	
HS21121498-01	D2	20 Dec 2021 11:00			07 Jan 2022 10:15	1
HS21121498-02	D3	20 Dec 2021 11:15			07 Jan 2022 10:15	1
HS21121498-03	D4	20 Dec 2021 11:30			07 Jan 2022 10:15	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174069 (1) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MBLK Sample ID: **MBLK-174069** Units: **ug/Kg** Analysis Date: **31-Dec-2021 00:53**
Client ID: Run ID: **ECD_7_398726** SeqNo: **6448809** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	U	1.7								
Aroclor 1221	U	1.7								
Aroclor 1232	U	1.7								
Aroclor 1242	U	1.7								
Aroclor 1248	U	1.7								
Aroclor 1254	U	1.7								
Aroclor 1260	U	1.7								
Surr: Decachlorobiphenyl	*0.6872*	*0.16*	*0.6667*	*0*	*103*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.6717*	*0.16*	*0.6667*	*0*	*101*	*50 - 140*				

LCS Sample ID: **LCS-174069** Units: **ug/Kg** Analysis Date: **31-Dec-2021 01:10**
Client ID: Run ID: **ECD_7_398726** SeqNo: **6448810** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	15.38	1.7	16.67	0	92.3	53 - 135				
Aroclor 1260	16.57	1.7	16.67	0	99.4	54 - 137				
Surr: Decachlorobiphenyl	*0.6907*	*0.16*	*0.6667*	*0*	*104*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.6809*	*0.16*	*0.6667*	*0*	*102*	*50 - 140*				

MS Sample ID: **HS21121498-02MS** Units: **ug/Kg** Analysis Date: **30-Dec-2021 23:44**
Client ID: **D3** Run ID: **ECD_7_398726** SeqNo: **6448806** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	13.26	1.7	16.48	0	80.4	53 - 135				
Aroclor 1260	16.32	1.7	16.48	0	99.0	54 - 137				
Surr: Decachlorobiphenyl	*0.6853*	*0.16*	*0.659*	*0*	*104*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.5761*	*0.16*	*0.659*	*0*	*87.4*	*50 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174069 (1) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MSD Sample ID: **HS21121498-02MSD** Units: **ug/Kg** Analysis Date: **31-Dec-2021 00:01**
Client ID: **D3** Run ID: **ECD_7_398726** SeqNo: **6448807** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	11.07	1.7	16.47	0	67.2	53 - 135	13.26	18	30	
Aroclor 1260	15.96	1.7	16.47	0	96.9	54 - 137	16.32	2.25	30	
Surr: Decachlorobiphenyl	*0.6533*	*0.16*	*0.6588*	*0*	*99.2*	*54 - 143*	*0.6853*	*4.79*	*30*	
Surr: Tetrachloro-m-xylene	*0.5233*	*0.16*	*0.6588*	*0*	*79.4*	*50 - 140*	*0.5761*	*9.62*	*30*	

The following samples were analyzed in this batch: HS21121498-01 HS21121498-02 HS21121498-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174070 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MBLK Sample ID: **MBLK-174070** Units: **ug/Kg** Analysis Date: **31-Dec-2021 12:24**
Client ID: Run ID: **ECD_11_398903** SeqNo: **6452939** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	U	0.33								
4,4´-DDE	U	0.33								
4,4´-DDT	U	0.33								
Aldrin	U	0.17								
alpha-BHC	U	0.17								
alpha-Chlordane	U	0.17								
beta-BHC	U	0.17								
Chlordane	U	1.7								
delta-BHC	U	0.17								
Dieldrin	U	0.33								
Endosulfan I	U	0.17								
Endosulfan II	U	0.33								
Endosulfan sulfate	U	0.33								
Endrin	U	0.33								
Endrin aldehyde	U	0.33								
Endrin ketone	U	0.33								
gamma-BHC	U	0.17								
gamma-Chlordane	U	0.17								
Heptachlor	U	0.17								
Heptachlor epoxide	U	0.17								
Methoxychlor	U	1.7								
Toxaphene	U	1.7								
Surr: Decachlorobiphenyl	*0.8268*	*0*	*0.6667*	*0*	*124*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.7637*	*0*	*0.6667*	*0*	*115*	*56.9 - 130*				

MBLK Sample ID: **MBLK-174070** Units: **ug/Kg** Analysis Date: **31-Dec-2021 12:24**
Client ID: Run ID: **ECD_11_398903** SeqNo: **6452945** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
alpha-Chlordane	U	0.17								
gamma-Chlordane	U	0.17								
Mirex	U	0.17								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174070 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS-174070** Units: **ug/Kg** Analysis Date: **31-Dec-2021 09:50**
Client ID: Run ID: **ECD_11_398903** SeqNo: **6452932** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	1.739	0.33	1.667	0	104	53 - 138				
4,4´-DDE	1.745	0.33	1.667	0	105	57 - 136				
4,4´-DDT	1.696	0.33	1.667	0	102	53 - 139				
Aldrin	0.8357	0.17	0.8333	0	100	52 - 130				
alpha-BHC	0.8711	0.17	0.8333	0	105	52 - 130				
alpha-Chlordane	0.8545	0.17	0.8333	0	103	55 - 132				
beta-BHC	0.8001	0.17	0.8333	0	96.0	62 - 130				
delta-BHC	0.8948	0.17	0.8333	0	107	41 - 137				
Dieldrin	1.725	0.33	1.667	0	103	54 - 138				
Endosulfan I	0.8375	0.17	0.8333	0	101	55 - 132				
Endosulfan II	1.624	0.33	1.667	0	97.4	59 - 134				
Endosulfan sulfate	1.734	0.33	1.667	0	104	54 - 141				
Endrin	1.732	0.33	1.667	0	104	60 - 157				
Endrin aldehyde	1.591	0.33	1.667	0	95.5	56 - 146				
Endrin ketone	1.771	0.33	1.667	0	106	56 - 153				
gamma-BHC	0.8474	0.17	0.8333	0	102	52 - 133				
gamma-Chlordane	0.8792	0.17	0.8333	0	106	60 - 129				
Heptachlor	0.8994	0.17	0.8333	0	108	54 - 134				
Heptachlor epoxide	0.8673	0.17	0.8333	0	104	58 - 130				
Methoxychlor	8.047	1.7	8.33	0	96.6	60 - 140				
Surr: Decachlorobiphenyl	*0.7806*	*0*	*0.6667*	*0*	*117*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.729*	*0*	*0.6667*	*0*	*109*	*56.9 - 130*				

LCS Sample ID: **LCS2-174070** Units: **ug/Kg** Analysis Date: **31-Dec-2021 10:56**
Client ID: Run ID: **ECD_11_398903** SeqNo: **6452935** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chlordane	7.783	1.7	8.33	0	93.4	50 - 150				
Surr: Decachlorobiphenyl	*0.8578*	*0*	*0.6667*	*0*	*129*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.745*	*0*	*0.6667*	*0*	*112*	*56.9 - 130*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174070 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS3-174070** Units: **ug/Kg** Analysis Date: **31-Dec-2021 11:40**
Client ID: Run ID: **ECD_11_398903** SeqNo: **6452943** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mirex	0.7526	0.17	0.8333	0	90.3	50 - 150				

LCS Sample ID: **LCS1-174070** Units: **ug/Kg** Analysis Date: **31-Dec-2021 10:12**
Client ID: Run ID: **ECD_11_398903** SeqNo: **6452933** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Toxaphene	9.115	1.7	8.33	0	109	50 - 150				
Surr: Decachlorobiphenyl	*0.8137*	*0*	*0.6667*	*0*	*122*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.7575*	*0*	*0.6667*	*0*	*114*	*56.9 - 130*				

LCSD Sample ID: **LCSD2-174070** Units: **ug/Kg** Analysis Date: **31-Dec-2021 11:18**
Client ID: Run ID: **ECD_11_398903** SeqNo: **6452936** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chlordane	7.385	1.7	8.33	0	88.7	50 - 150	7.783	5.25	30	
Surr: Decachlorobiphenyl	*0.8459*	*0*	*0.6667*	*0*	*127*	*59 - 144*	*0.8578*	*1.4*	*30*	
Surr: Tetrachloro-m-xylene	*0.6906*	*0*	*0.6667*	*0*	*104*	*56.9 - 130*	*0.745*	*7.58*	*30*	

LCSD Sample ID: **LCSD3-174070** Units: **ug/Kg** Analysis Date: **31-Dec-2021 12:02**
Client ID: Run ID: **ECD_11_398903** SeqNo: **6452944** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mirex	0.7669	0.17	0.8333	0	92.0	50 - 150	0.7526	1.89	30	

LCSD Sample ID: **LCSD1-174070** Units: **ug/Kg** Analysis Date: **31-Dec-2021 10:34**
Client ID: Run ID: **ECD_11_398903** SeqNo: **6452934** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Toxaphene	9.567	1.7	8.33	0	115	50 - 150	9.115	4.84	30	
Surr: Decachlorobiphenyl	*0.8504*	*0*	*0.6667*	*0*	*128*	*59 - 144*	*0.8137*	*4.42*	*30*	
Surr: Tetrachloro-m-xylene	*0.779*	*0*	*0.6667*	*0*	*117*	*56.9 - 130*	*0.7575*	*2.79*	*30*	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174070 (0) **Instrument:** ECD_11 **Method:** ORGANOCHLORINE PESTICIDES BY SW8081B

MS Sample ID: **HS21121498-02MS** Units: **ug/Kg** Analysis Date: **31-Dec-2021 20:07**
Client ID: **D3** Run ID: **ECD_11_398903** SeqNo: **6452947** PrepDate: **30-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
4,4´-DDD	1.672	1.6	1.651	0	101	53 - 138			
4,4´-DDE	U	1.6	1.651	0	0	57 - 136			S
4,4´-DDT	U	1.6	1.651	0	0	53 - 139			S
Aldrin	U	0.83	0.8256	0	0	52 - 130			S
alpha-BHC	U	0.83	0.8256	0	0	52 - 130			S
alpha-Chlordane	U	0.83	0.8256	0	0	55 - 132			S
beta-BHC	U	0.83	0.8256	0	0	62 - 130			S
delta-BHC	U	0.83	0.8256	0	0	41 - 137			S
Dieldrin	U	1.6	1.651	0	0	54 - 138			S
Endosulfan I	U	0.83	0.8256	0	0	55 - 132			S
Endosulfan II	1.649	1.6	1.651	0	99.9	59 - 134			
Endosulfan sulfate	1.656	1.6	1.651	0	100	54 - 141			
Endrin	U	1.6	1.651	0	0	60 - 157			S
Endrin aldehyde	U	1.6	1.651	0	0	56 - 146			S
Endrin ketone	U	1.6	1.651	0	0	56 - 153			S
gamma-BHC	U	0.83	0.8256	0	0	52 - 133			S
gamma-Chlordane	0.8676	0.83	0.8256	0	105	60 - 129			
Heptachlor	U	0.83	0.8256	0	0	54 - 134			S
Heptachlor epoxide	U	0.83	0.8256	0	0	58 - 130			S
Methoxychlor	U	8.3	8.253	0	0	60 - 140			S
Surr: Decachlorobiphenyl	*0.8038*	*0*	*0.6605*	*0*	*122*	*59 - 144*			
Surr: Tetrachloro-m-xylene	*0.6227*	*0*	*0.6605*	*0*	*94.3*	*56.9 - 130*			

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174070 (0) **Instrument:** ECD_11 **Method:** ORGANOCHLORINE PESTICIDES BY SW8081B

MSD Sample ID: **HS21121498-02MSD** Units: **ug/Kg** Analysis Date: **31-Dec-2021 20:29**
Client ID: **D3** Run ID: **ECD_11_398903** SeqNo: **6452948** PrepDate: **30-Dec-2021** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	1.709	1.6	1.658	0	103	53 - 138	1.672	2.18	30	
4,4´-DDE	U	1.6	1.658	0	0	57 - 136	0	0	30	S
4,4´-DDT	U	1.6	1.658	0	0	53 - 139	0	0	30	S
Aldrin	U	0.83	0.8289	0	0	52 - 130	0	0	30	S
alpha-BHC	U	0.83	0.8289	0	0	52 - 130	0	0	30	S
alpha-Chlordane	U	0.83	0.8289	0	0	55 - 132	0	0	30	S
beta-BHC	U	0.83	0.8289	0	0	62 - 130	0	0	30	S
delta-BHC	0.8442	0.83	0.8289	0	102	41 - 137	0	22.6	30	
Dieldrin	U	1.6	1.658	0	0	54 - 138	0	0	30	S
Endosulfan I	U	0.83	0.8289	0	0	55 - 132	0	0	30	S
Endosulfan II	U	1.6	1.658	0	0	59 - 134	1.649	0	30	S
Endosulfan sulfate	1.84	1.6	1.658	0	111	54 - 141	1.656	10.5	30	
Endrin	1.837	1.6	1.658	0	111	60 - 157	0	12.3	30	
Endrin aldehyde	U	1.6	1.658	0	0	56 - 146	0	0	30	S
Endrin ketone	U	1.6	1.658	0	0	56 - 153	0	0	30	S
gamma-BHC	U	0.83	0.8289	0	0	52 - 133	0	0	30	S
gamma-Chlordane	0.8926	0.83	0.8289	0	108	60 - 129	0.8676	2.84	30	
Heptachlor	U	0.83	0.8289	0	0	54 - 134	0	0	30	S
Heptachlor epoxide	U	0.83	0.8289	0	0	58 - 130	0	0	30	S
Methoxychlor	U	8.3	8.286	0	0	60 - 140	0	0	30	S
Surr: Decachlorobiphenyl	*0.8337*	*0*	*0.6631*	*0*	*126*	*59 - 144*	*0.8038*	*3.65*	*30*	
Surr: Tetrachloro-m-xylene	*0.6494*	*0*	*0.6631*	*0*	*97.9*	*56.9 - 130*	*0.6227*	*4.2*	*30*	

The following samples were analyzed in this batch: HS21121498-01 HS21121498-02 HS21121498-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174081 (0) **Instrument: HG03** **Method: MERCURY BY SW7471B**

MBLK Sample ID: **MBLK-174081** Units: **ug/Kg** Analysis Date: **30-Dec-2021 13:03**
Client ID: Run ID: **HG03_398616** SeqNo: **6446737** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	1.362	3.57								J

LCS Sample ID: **LCS-174081** Units: **ug/Kg** Analysis Date: **30-Dec-2021 13:05**
Client ID: Run ID: **HG03_398616** SeqNo: **6446738** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	355.2	3.51	351.7	0	101	80 - 120				

MS Sample ID: **HS21121537-05MS** Units: **ug/Kg** Analysis Date: **30-Dec-2021 13:16**
Client ID: Run ID: **HG03_398616** SeqNo: **6446816** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	370.9	3.44	345.4	11.03	104	80 - 120				

MS Sample ID: **HS21121537-05MS** Units: **ug/Kg** Analysis Date: **30-Dec-2021 13:08**
Client ID: Run ID: **HG03_398616** SeqNo: **6446740** PrepDate: **30-Dec-2021** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	345.4	3.44	345.4	11.03	96.8	80 - 120				

The following samples were analyzed in this batch: HS21121498-01 HS21121498-02 HS21121498-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174192 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

MBLK Sample ID: **MBLK-174192** Units: **mg/Kg** Analysis Date: **06-Jan-2022 13:12**
Client ID: Run ID: **ICPMS04_398972** SeqNo: **6454782** PrepDate: **06-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.497								
Arsenic	U	0.497								
Beryllium	U	0.497								
Cadmium	U	0.497								
Chromium	U	0.497								
Cobalt	U	0.497								
Copper	U	0.199								
Lead	U	0.497								
Molybdenum	0.03221	0.497								J
Nickel	U	0.497								
Selenium	0.1142	0.497								J
Silver	U	0.497								
Thallium	U	0.497								
Vanadium	U	0.497								
Zinc	U	0.497								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174192 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

LCS Sample ID: **LCS-174192** Units: **mg/Kg** Analysis Date: **06-Jan-2022 13:14**
Client ID: Run ID: **ICPMS04_398972** SeqNo: **6454783** PrepDate: **06-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Antimony	10.22	0.499	9.972	0	103	80 - 120			
Arsenic	10.45	0.499	9.972	0	105	80 - 120			
Beryllium	9.873	0.499	9.972	0	99.0	80 - 120			
Cadmium	10.26	0.499	9.972	0	103	80 - 120			
Chromium	10.21	0.499	9.972	0	102	80 - 120			
Cobalt	10.26	0.499	9.972	0	103	80 - 120			
Copper	10.47	0.199	9.972	0	105	80 - 120			
Lead	10.38	0.499	9.972	0	104	80 - 120			
Molybdenum	10.04	0.499	9.972	0	101	80 - 120			
Nickel	10.67	0.499	9.972	0	107	80 - 120			
Selenium	10	0.499	9.972	0	100	80 - 120			
Silver	10.02	0.499	9.972	0	101	80 - 120			
Thallium	10.63	0.499	9.972	0	107	80 - 120			
Vanadium	10.67	0.499	9.972	0	107	80 - 120			
Zinc	10.49	0.499	9.972	0	105	80 - 120			

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174192 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

MS Sample ID: **HS21120934-07MS** Units: **mg/Kg** Analysis Date: **06-Jan-2022 13:21**
Client ID: Run ID: **ICPMS04_398972** SeqNo: **6454786** PrepDate: **06-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	4.349	0.480	9.608	0.1329	43.9	75 - 125				S
Arsenic	10.68	0.480	9.608	0.9921	101	75 - 125				
Beryllium	10.22	0.480	9.608	0.2274	104	75 - 125				
Cadmium	10.03	0.480	9.608	0.0382	104	75 - 125				
Chromium	15.07	0.480	9.608	4.553	109	75 - 125				
Cobalt	10.79	0.480	9.608	0.878	103	75 - 125				
Copper	11.19	0.192	9.608	1.356	102	75 - 125				
Lead	13.04	0.480	9.608	2.99	105	75 - 125				
Molybdenum	9.204	0.480	9.608	0.1512	94.2	75 - 125				
Nickel	13.01	0.480	9.608	2.576	109	75 - 125				
Selenium	9.811	0.480	9.608	0.2267	99.8	75 - 125				
Silver	9.603	0.480	9.608	0.03249	99.6	75 - 125				
Thallium	10.45	0.480	9.608	0.07897	108	75 - 125				
Vanadium	17.74	0.480	9.608	6.641	115	75 - 125				
Zinc	22.99	0.480	9.608	12.42	110	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174192 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

MSD Sample ID: **HS21120934-07MSD** Units: **mg/Kg** Analysis Date: **06-Jan-2022 13:23**
Client ID: Run ID: **ICPMS04_398972** SeqNo: **6454787** PrepDate: **06-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	4.785	0.489	9.787	0.1329	47.5	75 - 125	4.349	9.54	20	S
Arsenic	10.84	0.489	9.787	0.9921	101	75 - 125	10.68	1.48	20	
Beryllium	10.36	0.489	9.787	0.2274	103	75 - 125	10.22	1.3	20	
Cadmium	10.25	0.489	9.787	0.0382	104	75 - 125	10.03	2.2	20	
Chromium	14.26	0.489	9.787	4.553	99.2	75 - 125	15.07	5.5	20	
Cobalt	10.64	0.489	9.787	0.878	99.8	75 - 125	10.79	1.38	20	
Copper	11.24	0.196	9.787	1.356	101	75 - 125	11.19	0.395	20	
Lead	13.35	0.489	9.787	2.99	106	75 - 125	13.04	2.36	20	
Molybdenum	9.539	0.489	9.787	0.1512	95.9	75 - 125	9.204	3.58	20	
Nickel	12.66	0.489	9.787	2.576	103	75 - 125	13.01	2.7	20	
Selenium	9.589	0.489	9.787	0.2267	95.7	75 - 125	9.811	2.29	20	
Silver	9.813	0.489	9.787	0.03249	99.9	75 - 125	9.603	2.16	20	
Thallium	10.51	0.489	9.787	0.07897	107	75 - 125	10.45	0.554	20	
Vanadium	17.05	0.489	9.787	6.641	106	75 - 125	17.74	3.93	20	
Zinc	22.75	0.489	9.787	12.42	106	75 - 125	22.99	1.02	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174192 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

PDS Sample ID: **HS21120934-07PDS** Units: **mg/Kg** Analysis Date: **06-Jan-2022 13:25**
Client ID: Run ID: **ICPMS04_398972** SeqNo: **6454788** PrepDate: **06-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	10	0.492	9.846	0.1329	100	75 - 125				
Arsenic	11.21	0.492	9.846	0.9921	104	75 - 125				
Beryllium	10.38	0.492	9.846	0.2274	103	75 - 125				
Cadmium	10.11	0.492	9.846	0.0382	102	75 - 125				
Chromium	14.23	0.492	9.846	4.553	98.2	75 - 125				
Cobalt	10.68	0.492	9.846	0.878	99.6	75 - 125				
Copper	11.34	0.197	9.846	1.356	101	75 - 125				
Lead	13.41	0.492	9.846	2.99	106	75 - 125				
Molybdenum	9.996	0.492	9.846	0.1512	100.0	75 - 125				
Nickel	12.65	0.492	9.846	2.576	102	75 - 125				
Selenium	9.806	0.492	9.846	0.2267	97.3	75 - 125				
Silver	9.768	0.492	9.846	0.03249	98.9	75 - 125				
Thallium	10.92	0.492	9.846	0.07897	110	75 - 125				
Vanadium	17.12	0.492	9.846	6.641	106	75 - 125				
Zinc	22.39	0.492	9.846	12.42	101	75 - 125				

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Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174192 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

SD Sample ID: **HS21120934-07SD** Units: **mg/Kg** Analysis Date: **06-Jan-2022 13:18**
Client ID: Run ID: **ICPMS04_398972** SeqNo: **6454785** PrepDate: **06-Jan-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	2.46					0.1329	0	10	
Arsenic	0.9151	2.46					0.9921	0	10	J
Beryllium	0.2416	2.46					0.2274	0	10	J
Cadmium	U	2.46					0.0382	0	10	
Chromium	4.534	2.46					4.553	0.432	10	
Cobalt	0.8944	2.46					0.878	0	10	J
Copper	1.405	0.985					1.356	3.56	10	
Lead	3.063	2.46					2.99	2.47	10	
Molybdenum	0.2346	2.46					0.1512	0	10	J
Nickel	2.686	2.46					2.576	4.27	10	
Selenium	0.5379	2.46					0.2267	0	10	J
Silver	U	2.46					0.03249	0	10	
Thallium	U	2.46					0.07897	0	10	
Vanadium	6.28	2.46					6.641	5.43	10	
Zinc	12.84	2.46					12.42	3.43	10	

The following samples were analyzed in this batch: HS21121498-01 HS21121498-02 HS21121498-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS21121498

QC BATCH REPORT

Batch ID: 174160 (0) **Instrument: TOC_03** **Method: TOTAL ORGANIC CARBON BY SW9060A**

MBLK Sample ID: **MBLK-174160** Units: **wt%-dry** Analysis Date: **04-Jan-2022 15:00**
Client ID: Run ID: **TOC_03_398885** SeqNo: **6452629** PrepDate: **04-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	U	0.0589								

LCS Sample ID: **LCS-174160** Units: **wt%-dry** Analysis Date: **04-Jan-2022 15:00**
Client ID: Run ID: **TOC_03_398885** SeqNo: **6452627** PrepDate: **04-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.537	0.0567	3.779	0	93.6	80 - 120				

LCSD Sample ID: **LCSD-174160** Units: **wt%-dry** Analysis Date: **04-Jan-2022 15:00**
Client ID: Run ID: **TOC_03_398885** SeqNo: **6452628** PrepDate: **04-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.547	0.0561	3.738	0	94.9	80 - 120	3.537	0.272	20	

MS Sample ID: **HS21121505-01MS** Units: **wt%-dry** Analysis Date: **04-Jan-2022 15:00**
Client ID: Run ID: **TOC_03_398885** SeqNo: **6452625** PrepDate: **04-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.671	0.0567	3.777	0.1945	92.1	80 - 120				

MSD Sample ID: **HS21121505-01MSD** Units: **wt%-dry** Analysis Date: **04-Jan-2022 15:00**
Client ID: Run ID: **TOC_03_398885** SeqNo: **6452626** PrepDate: **04-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.361	0.0563	3.754	0.1945	84.3	80 - 120	3.671	8.83	20	

The following samples were analyzed in this batch: HS21121498-01 HS21121498-02 HS21121498-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: **HS21121498**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
Date	
mg/Kg	Milligrams per Kilogram
UG/KG	Micrograms per Kilograms

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

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Sample Receipt Checklist

Work Order ID: HS21121498 **Date/Time Received:** **28-Dec-2021 12:30**

Client Name: ERM NC **Received by:** **Jared R. Makan**

Completed By:	/S/ Eric Widjaja	28-Dec-2021 14:44	**Reviewed by:**	/S/ Corey Grandits	29-Dec-2021 14:38
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **Soil** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:253020
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	24.1°C UC/C		IR #31
Cooler(s)/Kit(s):	47304		
Date/Time sample(s) sent to storage:	12/18/2021 15:00		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody For

Page _____ of _____

COC ID: 253020

HS21121498

ERM, Inc

Gas to Energy - EIA Study

on, WV 58

80

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name	Gas to Energy - EIA study	
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte NC 28203	City/State/Zip	Charlotte NC 28203	
Phone	507-304-2187	Phone	(	
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	

A	8270SIM_Soil (PAHs)
B	8081 Pesticides
C	ICP_Soil_Low (6020/7471 Metals -16)
D	PCB_Soil_Total (8082 PCBs)
E	TS_S (Total Solids)
F	TOC_Soil (Total Organic Carbon)
G	Sub Sulfide 9030 ALS Holland MI
H	Sub ALS Kelso ASTM D422 - 15 Day TAT
I	
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	D2	20/12/21	11:00AM	D		2		✓	✓	✓		✓	✓				
2	D3	20/12/21	11:15AM	D		2		✓	✓	✓		✓	✓				
3	D4	20/12/21	11:30AM	D		2		✓	✓	✓		✓	✓				
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Michael Lowe

Shipment Method:

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other _____

Results Due Date:

Relinquished by: Michael Lowie Date: 21/12/21 Time: 9:15am Received by: Christy Rodney

Relinquished by: _____ Date: 12/28/21 Time: 12:30 Received by (Laboratory): J. Vincent

Logged by (Laboratory): _____ Date: _____ Time: _____ Checked by (Laboratory): _____

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
47304	24.1°C

QC Package: (Check One Box Below)

- [X] Level II Std QC
- [ ] Level III Std QC/Raw Data
- [ ] Level IV SW846/CLP
- [ ] Other
- [ ] TRRP Checklist
- [ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

1231 CFO

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

CUSTODY SEAL

Date: 12/21/21 Time: 9:00 AM
Name: Chase Lowe
Company: LEMCO

Seal Broken By: EW
Date: 12/28/21

CUSTODY SEAL

Date: 12/12/21 Time: 9:00 AM
Name: Michael Lowe
Company: LEMCO

Seal Broken By: EW
Date: 12/28/21

EXPRESS WORLDWIDE WPX

GEO

To ALS LABORATORY
CORE (PROJECT MANAGER)
10450 ROAD
SUITE 210

77099 HOUSTON Texas
United States of America

AH-HOU

Ref: 554831200

24.0 lbs 1/1

14 X 23 X 13 (31)

WAYBILL 49 0247 7661

(2L)US77099+48000001

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07-Jan-2022

Corey Grandits
ALS Environmental
10450 Stancliff Rd
Suite 210
Houston, TX 77099

Re: **HS21121498** Work Order: **21122601**

Dear Corey,

ALS Environmental received 3 samples on 30-Dec-2021 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 11.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Chad Whelton

Chad Whelton
Project Manager

Client: ALS Environmental
Project: HS21121498
Work Order: **21122601**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
21122601-01	D2	Soil	HS21121498-01	12/20/2021 11:00	12/30/2021 10:00	☐
21122601-02	D3	Soil	HS21121498-02	12/20/2021 11:15	12/30/2021 10:00	☐
21122601-03	D4	Soil	HS21121498-03	12/20/2021 11:30	12/30/2021 10:00	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ALS Environmental
Project: HS21121498
Work Order: 21122601

Case Narrative

Batch 189822, Method SW9034: Samples analyzed after hold time due to being received after expiration date.

Batch 190000, Method SW9034: Samples analyzed after hold time due to being received after expiration date.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ALS Environmental
Project: HS21121498
WorkOrder: **21122601**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
mg/Kg	Milligrams per Kilogram

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Client: ALS Environmental
Project: HS21121498 **Work Order:** 21122601
Sample ID: D2 **Lab ID:** 21122601-01
Collection Date: 12/20/2021 11:00 AM **Matrix:** SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SULFIDE			**SW9034**		Prep: SW9030B 1/6/22 13:30	Analyst: **TJH**
Sulfide (Acid Insoluble)	ND	H	99	mg/Kg	1	1/6/2022 05:00 PM
Sulfide (Acid Soluble)	ND	H	99	mg/Kg	1	1/3/2022 05:20 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ALS Environmental
Project: HS21121498 **Work Order:** 21122601
Sample ID: D3 **Lab ID:** 21122601-02
Collection Date: 12/20/2021 11:15 AM **Matrix:** SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SULFIDE			**SW9034**		Prep: SW9030B 1/6/22 13:30	Analyst: **TJH**
Sulfide (Acid Insoluble)	ND	H	100	mg/Kg	1	1/6/2022 05:00 PM
Sulfide (Acid Soluble)	ND	H	100	mg/Kg	1	1/3/2022 05:20 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ALS Environmental
Project: HS21121498 **Work Order:** 21122601
Sample ID: D4 **Lab ID:** 21122601-03
Collection Date: 12/20/2021 11:30 AM **Matrix:** SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SULFIDE			**SW9034**		Prep: SW9030B 1/6/22 13:30	Analyst: **TJH**
Sulfide (Acid Insoluble)	ND	H	99	mg/Kg	1	1/6/2022 05:00 PM
Sulfide (Acid Soluble)	ND	H	99	mg/Kg	1	1/3/2022 05:20 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: **189822** Instrument ID **WETCHEM** Method: **SW9034**

MBLK Sample ID: **MBLK-189822-189822** Units: **mg/Kg** Analysis Date: **1/3/2022 05:20 PM**
Client ID: Run ID: **WETCHEM_220103J** SeqNo: **8082169** Prep Date: **1/3/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	ND	100								

LCS Sample ID: **LCS-189822-189822** Units: **mg/Kg** Analysis Date: **1/3/2022 05:20 PM**
Client ID: Run ID: **WETCHEM_220103J** SeqNo: **8082170** Prep Date: **1/3/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	648	100	1075	0	60.3	32-99	0			

MS Sample ID: **21122601-01A MS** Units: **mg/Kg** Analysis Date: **1/3/2022 05:20 PM**
Client ID: **D2** Run ID: **WETCHEM_220103J** SeqNo: **8082172** Prep Date: **1/3/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	450.6	99	1062	35.71	39.1	32-99	0			H

MSD Sample ID: **21122601-01A MSD** Units: **mg/Kg** Analysis Date: **1/3/2022 05:20 PM**
Client ID: **D2** Run ID: **WETCHEM_220103J** SeqNo: **8082173** Prep Date: **1/3/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	459.7	98	1056	35.71	40.2	32-99	450.6	2.01	30	H

The following samples were analyzed in this batch: 21122601-01A 21122601-02A 21122601-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

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Client: ALS Environmental
Work Order: 21122601
Project: HS21121498

QC BATCH REPORT

Batch ID: **190000** Instrument ID **WETCHEM** Method: **SW9034**

MBLK	Sample ID: **MBLK-190000-190000**				Units: **mg/Kg**		Analysis Date: **1/6/2022 05:00 PM**			
Client ID:	Run ID: **WETCHEM_220106K**				SeqNo: **8089811**		Prep Date: **1/6/2022**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	ND	100								

MS	Sample ID: **21122601-01A MS**				Units: **mg/Kg**		Analysis Date: **1/6/2022 05:00 PM**			
Client ID: **D2**	Run ID: **WETCHEM_220106K**				SeqNo: **8089807**		Prep Date: **1/6/2022**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	898.2	100	1073	23.76	81.5	59-124	0			H

MSD	Sample ID: **21122601-01A MSD**				Units: **mg/Kg**		Analysis Date: **1/6/2022 05:00 PM**			
Client ID: **D2**	Run ID: **WETCHEM_220106K**				SeqNo: **8089808**		Prep Date: **1/6/2022**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	918.5	99	1069	23.76	83.7	59-124	898.2	2.23	30	H

The following samples were analyzed in this batch: 21122601-01A 21122601-02A 21122601-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

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2112601

10450 Stancliff Rd, Ste 210
Houston, TX 77099
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F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

SAMPLING STATE: **North Carolina** **COC ID:** **17776**

SUBCONTRACT TO:

ALS Laboratory Group
3352 128th Ave.
Holland, MI 494249263 **Phone:** +1 616 399 6070

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	Corey Grandits
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	Corey.Grandits@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS21121498
TSR:	Houston House Acct

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS21121498-01**	**D2**	**Soil**	**20 Dec 2021 11:00**
	9030 Sub Total Sulfide ALS Holland MI			12 Jan 2022
2.	**HS21121498-02**	**D3**	**Soil**	**20 Dec 2021 11:15**
	9030 Sub Total Sulfide ALS Holland MI			12 Jan 2022
3.	**HS21121498-03**	**D4**	**Soil**	**20 Dec 2021 11:30**
	9030 Sub Total Sulfide ALS Holland MI			12 Jan 2022

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: STD (Laboratory Standard QC: method blank and LCS required)

Relinquished By: J. Musgrave Date/Time: 12/29/21 18:00

Received By: FedEx Date/Time: 12/30/21 1000

Cooler ID(s): Temperature(s): 1.3°C IR3

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Sample Receipt Checklist

Client Name: **ALS - HOUSTON** Date/Time Received: **30-Dec-21 10:00**

Work Order: **21122601** Received by: **LYS**

Checklist completed by Lydia Sweet (eSignature) 30-Dec-21 (Date) Reviewed by: Chad Whelton (eSignature) 30-Dec-21 (Date)

Matrices: Soil

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.3/2.3c	IR3	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	12/30/2021 4:03:47 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

SRC Page 1 of 1

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10450 Stancliff Rd. Suite 210
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January 24, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22010314**

Laboratory Results for: **Gas to Energy - EIA Study**

Dear Selina Pradhan,

ALS Environmental received 3 sample(s) on Dec 28, 2021 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: Gas to Energy - EIA Study
Work Order: HS22010314

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22010314-01	D2	Soil		20-Dec-2021 11:00	28-Dec-2021 12:30	☐
HS22010314-02	D3	Soil		20-Dec-2021 11:15	28-Dec-2021 12:30	☐
HS22010314-03	D4	Soil		20-Dec-2021 11:30	28-Dec-2021 12:30	☐

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Client: ERM, Inc
Project: Gas to Energy - EIA Study
Work Order: HS22010314

CASE NARRATIVE

Work Order Comments

- The analysis for grainsize was subcontracted to ALS Kelso, WA.

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Client: ERM, Inc
Project: Gas to Energy - EIA Study
Sample ID: D2
Collection Date: 20-Dec-2021 11:00

ANALYTICAL REPORT
WorkOrder:HS22010314
Lab ID:HS22010314-01
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - GRAIN SIZE		**Method:NA**					Analyst: SUBK
Subcontract Analysis	See Attached		0		NA	1	24-Jan-2022 12:22

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM, Inc
Project: Gas to Energy - EIA Study
Sample ID: D3
Collection Date: 20-Dec-2021 11:15

ANALYTICAL REPORT
WorkOrder:HS22010314
Lab ID:HS22010314-02
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - GRAIN SIZE		**Method:NA**					Analyst: SUBK
Subcontract Analysis	See Attached		0		NA	1	24-Jan-2022 12:22

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM, Inc
Project: Gas to Energy - EIA Study
Sample ID: D4
Collection Date: 20-Dec-2021 11:30

ANALYTICAL REPORT
WorkOrder:HS22010314
Lab ID:HS22010314-03
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - GRAIN SIZE	**Method:NA**						Analyst: SUBK
Subcontract Analysis	See Attached		0		NA	1	24-Jan-2022 12:22

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: HS22010314

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R400851 (0)	**Test Name :** SUBCONTRACT ANALYSIS - GRAIN SIZE				**Matrix:** Soil	
HS22010314-01	D2	20 Dec 2021 11:00			24 Jan 2022 12:22	1
HS22010314-02	D3	20 Dec 2021 11:15			24 Jan 2022 12:22	1
HS22010314-03	D4	20 Dec 2021 11:30			24 Jan 2022 12:22	1

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Client: ERM, Inc
Project: Gas to Energy - EIA Study
WorkOrder: **HS22010314**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

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Client: ERM, Inc
Project: Gas to Energy - EIA Study
Work Order: HS22010314

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22010314-01	D2	Login	1/10/2022 1:31:26 PM	CGG	N045
HS22010314-01	D2	Login	1/10/2022 1:31:26 PM	CGG	N045
HS22010314-02	D3	Login	1/10/2022 1:31:26 PM	CGG	N045
HS22010314-02	D3	Login	1/10/2022 1:31:26 PM	CGG	N045
HS22010314-03	D4	Login	1/10/2022 1:31:26 PM	CGG	N045
HS22010314-03	D4	Login	1/10/2022 1:31:26 PM	CGG	N045

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Sample Receipt Checklist

Work Order ID: HS22010314 **Date/Time Received:** **28-Dec-2021 12:30**

Client Name: ERM NC **Received by:** **Jared R. Makan**

Completed By:	/S/ Eric Widjaja	28-Dec-2021 14:44	**Reviewed by:**	/S/ Corey Grandits	10-Jan-2022 13:33
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **Soil** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:253020
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	24.1°C UC/C		IR #31
Cooler(s)/Kit(s):	47304		
Date/Time sample(s) sent to storage:	12/18/2021 15:00		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes: Re-log SRC Grainsize

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody For

Page ____ of ____

COC ID: 253020

HS22010314

ERM, Inc

Gas to Energy - EIA Study

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name	Gas to Energy - EIA study	
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte NC 28203	City/State/Zip	Charlotte NC 28203	
Phone	507-304-2187	Phone	(	
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	

A	8270SIM_Soil (PAHs)
B	8081 Pesticides
C	ICP_Soil_Low (6020/7471 Metals-16)
D	PCB_Soil_Total (8082 PCBs)
E	TS_S (Total Solids)
F	TOC_Soil (Total Organic Carbon)
G	Sub Sulfide 9030 ALS Holland MI
H	Sub ALS Kelso ASTM D422 - 15 Day TAT
I	
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	D2	20/12/21	11:00AM	D		2		✓	✓	✓		✓	✓	X			
2	D3	20/12/21	11:15AM	D		2		✓	✓	✓		✓	✓	X			
3	D4	20/12/21	11:30AM	D		2		✓	✓	✓		✓	✓	X			
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Michael Lowe

Shipment Method:

Required Turnaround Time: (Check Box) ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other ____

Results Due Date:

Relinquished by: Michael Lowe Date: 21/12/21 Time: 9:15am Received by: Christy Rodney

Relinquished by: ____ Date: 12/23/21 Time: 12:30 Received by (Laboratory): J. Nineman

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
47304	UC 24.1°C

QC Package: (Check One Box Below)

☒ Level II Std QC ☐ Level III Std QC/Raw Data ☐ Level IV SW846/CLP ☐ Other ____ ☐ TRRP Checklist ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

12231 UFO

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www.alsglobal.com

January 24, 2022

Analytical Report for Service Request No: K2200392

Corey Grandits
ALS Environmental - Houston
10450 Stancliff Road
Suite 210
Houston, TX 77099

RE: HS22010314

Dear Corey,

Enclosed are the results of the sample(s) submitted to our laboratory January 12, 2022
For your reference, these analyses have been assigned our service request number **K2200392.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3260. You may also contact me via email at Luke.Rahn@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Luke Rahn
Project Manager

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Table of Contents

Acronyms
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State Certifications, Accreditations, And Licenses
Case Narrative
Chain of Custody
Total Solids
General Chemistry

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

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Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, the elution pattern does not match the calibration standard.
	chromatographic fingerprint does not resemble a petroleum product.

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ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Client: ALS Environmental - US
Project: HS22010314
Sample Matrix: Soil

Service Request: K2200392
Date Received: 01/12/2022

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Three soil samples were received for analysis at ALS Environmental on 01/12/2022. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by _____ Date 01/24/2022

RIGHT SOLUTIONS | RIGHT PARTNER

Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

K2200392

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

SAMPLING STATE: **North Carolina** **COC ID:** **17878**

SUBCONTRACT TO:

ALS Environmental Kelso
1317 S. 13th Avenue
Kelso, WA 98626 **Phone:** +1 360 501 3312

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	Corey Grandits
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	Corey.Grandits@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS22010314
TSR:	Houston House Acct

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS22010314-01**	**D2**	**Soil**	**20 Dec 2021 11:00**
	Sub Grainsize ALS Kelso ASTM D422			31 Jan 2022
2.	**HS22010314-02**	**D3**	**Soil**	**20 Dec 2021 11:15**
	Sub Grainsize ALS Kelso ASTM D422			31 Jan 2022
3.	**HS22010314-03**	**D4**	**Soil**	**20 Dec 2021 11:30**
	Sub Grainsize ALS Kelso ASTM D422			31 Jan 2022

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: STD (Laboratory Standard QC: method blank and LCS required)

Relinquished By: Paul Rein Date/Time: 1-10-22 16:20

Received By: ALS Kelso 1/12/22 11:30 Date/Time:

Cooler ID(s): Temperature(s):

PM VR

Cooler Receipt and Preservation Form

00392

Client ALS- Houston Service Request K22

Received: 1/12/22 Opened: 1/12/22 By: K Unloaded: 1/12/22 By: R

1. Samples were received via? *USPS* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 2 Front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N
4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column below.
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA (Y) N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. (NA) Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
1.3	—	IR01	17878	—	—	530052267915	

6. Packing material: *Inserts* (*Baggies*) (*Bubble Wrap*) *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Underfilled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: _____

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Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2200392
Project:	HS22010314	**Date Collected:**	12/20/21
Sample Matrix:	Soil	**Date Received:**	01/12/22
Analysis Method:	160.3 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
D2	K2200392-001	**49.4**	-	-	1	01/18/22 12:32	
D3	K2200392-002	**85.2**	-	-	1	01/18/22 12:32	
D4	K2200392-003	**53.5**	-	-	1	01/18/22 12:32	

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General Chemistry

ALS Environmental—Kelso Laboratory
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Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2200392
Project:	HS22010314	**Date Collected:**	12/20/21
Sample Matrix:	Soil	**Date Received:**	01/12/22
		Date Analyzed:	01/18/22

Particle Size Determination
ASTM D422

Sample Name: D2
Lab Code: K2200392-001

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0000	100.00
Sand, Very Coarse	**No.20 (0.850 mm)**	0.0320	99.91
Sand, Coarse	**No.40 (0.425 mm)**	0.4296	98.66
Sand, Medium	**No.60 (0.250 mm)**	2.0699	92.65
Sand, Fine	**No.140 (0.106 mm)**	2.6689	84.89
Sand, Very Fine	**No.200 (0.0750 mm)**	0.1030	84.59

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	84.65
0.005 mm	52.09
0.001 mm	32.65

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ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2200392
Project:	HS22010314	**Date Collected:**	12/20/21
Sample Matrix:	Soil	**Date Received:**	01/12/22
		Date Analyzed:	01/18/22

Particle Size Determination
ASTM D422

Sample Name: D3
Lab Code: K2200392-002

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0000	100.00
Sand, Very Coarse	**No.20 (0.850 mm)**	1.6218	95.94
Sand, Coarse	**No.40 (0.425 mm)**	13.4695	62.24
Sand, Medium	**No.60 (0.250 mm)**	20.5505	10.82
Sand, Fine	**No.140 (0.106 mm)**	3.8214	1.25
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0776	1.06

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	0.68
0.005 mm	0.00
0.001 mm	0.00

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ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2200392
Project:	HS22010314	**Date Collected:**	12/20/21
Sample Matrix:	Soil	**Date Received:**	01/12/22
		Date Analyzed:	01/18/22

Particle Size Determination
ASTM D422

Sample Name: D3
Lab Code: K2200392-002DUP

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0000	100.00
Sand, Very Coarse	**No.20 (0.850 mm)**	1.7170	95.76
Sand, Coarse	**No.40 (0.425 mm)**	14.3986	60.21
Sand, Medium	**No.60 (0.250 mm)**	19.8760	11.13
Sand, Fine	**No.140 (0.106 mm)**	4.1389	0.91
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0400	0.81

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	0.50
0.005 mm	0.00
0.001 mm	0.00

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ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2200392
Project:	HS22010314	**Date Collected:**	12/20/21
Sample Matrix:	Soil	**Date Received:**	01/12/22
		Date Analyzed:	01/18/22

Particle Size Determination
ASTM D422

Sample Name: D4
Lab Code: K2200392-003

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0000	100.00
Sand, Very Coarse	**No.20 (0.850 mm)**	0.3738	98.97
Sand, Coarse	**No.40 (0.425 mm)**	2.2158	92.85
Sand, Medium	**No.60 (0.250 mm)**	2.7962	85.14
Sand, Fine	**No.140 (0.106 mm)**	1.8626	80.00
Sand, Very Fine	**No.200 (0.0750 mm)**	0.5099	78.59

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	75.54
0.005 mm	46.72
0.001 mm	29.51

RIGHT SOLUTIONS | RIGHT PARTNER

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
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February 08, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22010744**

Laboratory Results for: **R3**

Dear Selina Pradhan,

ALS Environmental received 1 sample(s) on Jan 18, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: R3
Work Order: HS22010744

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22010744-01	R3	Water		11-Jan-2022 11:50	18-Jan-2022 16:20	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R3
Work Order: HS22010744

Work Order Comments

- Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

  The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 174584

Sample ID: R3 (HS22010744-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: LCSD-174584

- The RPD between the LCS and LCSD was outside of the control limit.

Metals by Method SW6020A

Batch ID: 174798

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 174628

Sample ID: R3 (HS22010744-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R401417

Sample ID: R3 (HS22010744-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method Calculation

Batch ID: R401497

Sample ID: R3 (HS22010744-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R400864

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R3
Work Order: HS22010744

WetChemistry by Method SW9040C

Batch ID: R400595

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540D

Batch ID: R401564

Sample ID: R3 (HS22010744-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method E300

Batch ID: R401440

Sample ID: R3 (HS22010744-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.
- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

WetChemistry by Method SM2520

Batch ID: R401403

Sample ID: R3 (HS22010744-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540B

Batch ID: R400673

Sample ID: R3 (HS22010744-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method E1664A

Batch ID: R401287

Sample ID: R3 (HS22010744-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 174956

Sample ID: R3 (HS22010744-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
Work Order: HS22010744

CASE NARRATIVE

WetChemistry by Method M4500 NH3 D

Batch ID: 174778

Sample ID: R3 (HS22010744-01)

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
Sample ID: R3
Collection Date: 11-Jan-2022 11:50

ANALYTICAL REPORT
WorkOrder:HS22010744
Lab ID:HS22010744-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 20-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Acenaphthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Acenaphthylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Chrysene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Dibenzofuran	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Fluorene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Naphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Phenanthrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:12
Surr: 2-Fluorobiphenyl	*81.4*			*40-140*	*%REC*	*1*	*25-Jan-2022 19:12*
Surr: 4-Terphenyl-d14	*119*			*40-140*	*%REC*	*1*	*25-Jan-2022 19:12*
Surr: Nitrobenzene-d5	*96.3*			*40-140*	*%REC*	*1*	*25-Jan-2022 19:12*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 27-Jan-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	28-Jan-2022 20:44
Arsenic	**0.000525**	J	**0.000400**	**0.00200**	**mg/L**	1	28-Jan-2022 20:44
Beryllium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 20:44
Cadmium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 20:44
Chromium	**0.00175**	J	**0.000400**	**0.00400**	**mg/L**	1	28-Jan-2022 20:44
Cobalt	**0.000713**	J	**0.000200**	**0.00500**	**mg/L**	1	28-Jan-2022 20:44
Copper	U		0.00100	0.00200	mg/L	1	28-Jan-2022 20:44
Lead	U		0.000600	0.00200	mg/L	1	28-Jan-2022 20:44
Molybdenum	U		0.000600	0.00500	mg/L	1	28-Jan-2022 20:44
Nickel	**0.00112**	J	**0.000600**	**0.00200**	**mg/L**	1	28-Jan-2022 20:44
Selenium	U		0.00110	0.00200	mg/L	1	28-Jan-2022 20:44
Silver	U		0.000200	0.00200	mg/L	1	28-Jan-2022 20:44
Thallium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 20:44
Vanadium	**0.00175**	J	**0.000600**	**0.00500**	**mg/L**	1	28-Jan-2022 20:44
Zinc	**0.0224**		**0.00200**	**0.00400**	**mg/L**	1	28-Jan-2022 20:44

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
Sample ID: R3
Collection Date: 11-Jan-2022 11:50

ANALYTICAL REPORT
WorkOrder:HS22010744
Lab ID:HS22010744-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Jan-2022 13:09
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**0.74**		**0.10**	**0.50**	**mg/L**	1	03-Feb-2022 09:30
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**7.76**		**0.610**	**2.00**	**mg/L**	1	31-Jan-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.367**	J	**0.150**	**1.00**	**mg/L**	5	01-Feb-2022 20:17
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 01-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0310**	J	**0.0200**	**0.0500**	**mg/L**	1	01-Feb-2022 16:20
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**48.0**	H	**5.00**	**10.0**	**mg/L**	1	19-Jan-2022 11:36
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**60.0**	H	**5.00**	**10.0**	**mg/L**	1	31-Jan-2022 18:43
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**14.8**	H	**2.50**	**2.50**	**mg/L**	1	03-Feb-2022 20:25
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 25-Jan-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.37**	J	**0.10**	**0.50**	**mg/L**	1	26-Jan-2022 12:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.5**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	01-Feb-2022 16:30
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**4.80**	H	**0.100**	**0.100**	**pH Units**	1	19-Jan-2022 10:36
Temp Deg C @pH	**23.9**	H	**0**	**0**	**DEG C**	1	19-Jan-2022 10:36

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

Batch ID: 174584 **Start Date:** 20 Jan 2022 09:30 **End Date:** 20 Jan 2022 14:00
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010744-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 174628 **Start Date:** 21 Jan 2022 08:30 **End Date:** 21 Jan 2022 11:30
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010744-01		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174778 **Start Date:** 25 Jan 2022 12:00 **End Date:** 25 Jan 2022 15:30
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010744-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 174798 **Start Date:** 27 Jan 2022 12:00 **End Date:** 28 Jan 2022 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010744-01		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174956 **Start Date:** 01 Feb 2022 12:30 **End Date:** 01 Feb 2022 14:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010744-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174584 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50		20 Jan 2022 08:25	25 Jan 2022 19:12	1
Batch ID: 174628 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50		21 Jan 2022 08:30	21 Jan 2022 13:09	1
Batch ID: 174778 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50		25 Jan 2022 12:00	26 Jan 2022 12:30	1
Batch ID: 174798 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50		27 Jan 2022 16:00	28 Jan 2022 20:44	1
Batch ID: 174956 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50		01 Feb 2022 12:30	01 Feb 2022 16:20	1
Batch ID: R400595 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50			19 Jan 2022 10:36	1
Batch ID: R400673 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50			19 Jan 2022 11:36	1
Batch ID: R400864 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50			24 Jan 2022 14:46	1
Batch ID: R401287 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50			31 Jan 2022 13:00	1
Batch ID: R401403 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50			01 Feb 2022 16:30	1
Batch ID: R401417 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50			31 Jan 2022 18:43	1
Batch ID: R401440 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50			01 Feb 2022 20:17	5
Batch ID: R401497 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50			03 Feb 2022 09:30	1
Batch ID: R401564 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22010744-01	R3	11 Jan 2022 11:50			03 Feb 2022 20:25	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174628 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-174628** Units: **mg/L** Analysis Date: **21-Jan-2022 12:52**
Client ID: Run ID: **HG03_400757** SeqNo: **6472201** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-174628** Units: **mg/L** Analysis Date: **21-Jan-2022 12:54**
Client ID: Run ID: **HG03_400757** SeqNo: **6472202** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00522	0.000200	0.005	0	104	80 - 120				

MS Sample ID: **HS22010729-03MS** Units: **mg/L** Analysis Date: **21-Jan-2022 13:03**
Client ID: Run ID: **HG03_400757** SeqNo: **6472188** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00529	0.000200	0.005	0.000056	105	75 - 125				

MSD Sample ID: **HS22010729-03MSD** Units: **mg/L** Analysis Date: **21-Jan-2022 13:04**
Client ID: Run ID: **HG03_400757** SeqNo: **6472189** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00537	0.000200	0.005	0.000056	106	75 - 125	0.00529	1.5	20	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-174798** Units: **mg/L** Analysis Date: **28-Jan-2022 20:13**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481556** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-174798** Units: **mg/L** Analysis Date: **28-Jan-2022 20:15**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481557** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05114	0.00200	0.05	0	102	80 - 120				
Arsenic	0.05388	0.00200	0.05	0	108	80 - 120				
Beryllium	0.04712	0.00200	0.05	0	94.2	80 - 120				
Cadmium	0.05529	0.00200	0.05	0	111	80 - 120				
Chromium	0.05463	0.00400	0.05	0	109	80 - 120				
Cobalt	0.05431	0.00500	0.05	0	109	80 - 120				
Copper	0.05672	0.00200	0.05	0	113	80 - 120				
Lead	0.05165	0.00200	0.05	0	103	80 - 120				
Molybdenum	0.05216	0.00500	0.05	0	104	80 - 120				
Nickel	0.05635	0.00200	0.05	0	113	80 - 120				
Selenium	0.05214	0.00200	0.05	0	104	80 - 120				
Silver	0.05297	0.00200	0.05	0	106	80 - 120				
Thallium	0.0522	0.00200	0.05	0	104	80 - 120				
Vanadium	0.05405	0.00500	0.05	0	108	80 - 120				
Zinc	0.05936	0.00400	0.05	0	119	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22011087-01MS** Units: **mg/L** Analysis Date: **28-Jan-2022 20:21**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481560** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05187	0.00200	0.05	0.0002	103	80 - 120				
Arsenic	0.065	0.00200	0.05	0.009776	110	80 - 120				
Beryllium	0.04962	0.00200	0.05	0.000025	99.2	80 - 120				
Cadmium	0.05543	0.00200	0.05	0.000044	111	80 - 120				
Chromium	0.05582	0.00400	0.05	0.00065	110	80 - 120				
Cobalt	0.05972	0.00500	0.05	0.005619	108	80 - 120				
Copper	0.05468	0.00200	0.05	-0.000006	109	80 - 120				
Lead	0.05556	0.00200	0.05	0.000342	110	80 - 120				
Molybdenum	0.06888	0.00500	0.05	0.01375	110	80 - 120				
Nickel	0.05822	0.00200	0.05	0.003775	109	80 - 120				
Selenium	0.05268	0.00200	0.05	-0.000078	106	80 - 120				
Silver	0.05269	0.00200	0.05	0.000004	105	80 - 120				
Thallium	0.0558	0.00200	0.05	0.000097	111	80 - 120				
Vanadium	0.05751	0.00500	0.05	0.001194	113	80 - 120				
Zinc	0.08396	0.00400	0.05	0.02619	116	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22011087-01MSD** Units: **mg/L** Analysis Date: **28-Jan-2022 20:23**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481561** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0527	0.00200	0.05	0.0002	105	80 - 120	0.05187	1.59	20	
Arsenic	0.06515	0.00200	0.05	0.009776	111	80 - 120	0.065	0.232	20	
Beryllium	0.04851	0.00200	0.05	0.000025	97.0	80 - 120	0.04962	2.26	20	
Cadmium	0.05528	0.00200	0.05	0.000044	110	80 - 120	0.05543	0.284	20	
Chromium	0.05676	0.00400	0.05	0.00065	112	80 - 120	0.05582	1.67	20	
Cobalt	0.05944	0.00500	0.05	0.005619	108	80 - 120	0.05972	0.457	20	
Copper	0.05495	0.00200	0.05	-0.000006	110	80 - 120	0.05468	0.509	20	
Lead	0.05639	0.00200	0.05	0.000342	112	80 - 120	0.05556	1.49	20	
Molybdenum	0.0692	0.00500	0.05	0.01375	111	80 - 120	0.06888	0.475	20	
Nickel	0.05869	0.00200	0.05	0.003775	110	80 - 120	0.05822	0.792	20	
Selenium	0.05383	0.00200	0.05	-0.000078	108	80 - 120	0.05268	2.17	20	
Silver	0.05248	0.00200	0.05	0.000004	105	80 - 120	0.05269	0.39	20	
Thallium	0.05757	0.00200	0.05	0.000097	115	80 - 120	0.0558	3.12	20	
Vanadium	0.05777	0.00500	0.05	0.001194	113	80 - 120	0.05751	0.442	20	
Zinc	0.08476	0.00400	0.05	0.02619	117	80 - 120	0.08396	0.944	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22011087-01SD** Units: **mg/L** Analysis Date: **28-Jan-2022 20:19**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481559** PrepDate: **27-Jan-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.0002	0	10	
Arsenic	0.009605	0.0100					0.009776	0	10	J
Beryllium	U	0.0100					0.000025	0	10	
Cadmium	U	0.0100					0.000044	0	10	
Chromium	U	0.0200					0.00065	0	10	
Cobalt	0.005448	0.0250					0.005619	0	10	J
Copper	U	0.0100					-0.000006	0	10	
Lead	U	0.0100					0.000342	0	10	
Molybdenum	0.01389	0.0250					0.01375	0	10	J
Nickel	0.003989	0.0100					0.003775	0	10	J
Selenium	U	0.0100					-0.000078	0	10	
Silver	U	0.0100					0.000004	0	10	
Thallium	U	0.0100					0.000097	0	10	
Vanadium	U	0.0250					0.001194	0	10	
Zinc	0.02685	0.0200					0.02619	2.52	10	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174584 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-174584** Units: **ug/L** Analysis Date: **25-Jan-2022 16:11**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477629** PrepDate: **20-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.05029*	*0*	*0.08*	*0*	*62.9*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.08202*	*0*	*0.08*	*0*	*103*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.05288*	*0*	*0.08*	*0*	*66.1*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174584 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-174584** Units: **ug/L** Analysis Date: **25-Jan-2022 16:31**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477630** PrepDate: **20-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.08529	0.010	0.08	0	107	40 - 140				
2-Methylnaphthalene	0.0526	0.010	0.08	0	65.8	40 - 140				
Acenaphthene	0.041	0.010	0.08	0	51.3	40 - 140				
Acenaphthylene	0.0746	0.010	0.08	0	93.2	40 - 140				
Anthracene	0.071	0.010	0.08	0	88.7	40 - 140				
Benz(a)anthracene	0.05025	0.010	0.08	0	62.8	40 - 140				
Benzo(a)pyrene	0.08057	0.010	0.08	0	101	40 - 140				
Benzo(b)fluoranthene	0.06742	0.010	0.08	0	84.3	40 - 140				
Benzo(g,h,i)perylene	0.09255	0.010	0.08	0	116	40 - 140				
Benzo(k)fluoranthene	0.08739	0.010	0.08	0	109	40 - 140				
Chrysene	0.08363	0.010	0.08	0	105	40 - 140				
Dibenz(a,h)anthracene	0.07165	0.010	0.08	0	89.6	40 - 140				
Dibenzofuran	0.06795	0.010	0.08	0	84.9	40 - 140				
Fluoranthene	0.08095	0.010	0.08	0	101	40 - 140				
Fluorene	0.07447	0.010	0.08	0	93.1	40 - 140				
Indeno(1,2,3-cd)pyrene	0.07094	0.010	0.08	0	88.7	40 - 140				
Naphthalene	0.08158	0.010	0.08	0	102	40 - 140				
Phenanthrene	0.05782	0.010	0.08	0	72.3	40 - 140				
Pyrene	0.07876	0.010	0.08	0	98.5	40 - 140				
Surr: 2-Fluorobiphenyl	*0.06388*	*0*	*0.08*	*0*	*79.9*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.08377*	*0*	*0.08*	*0*	*105*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.07492*	*0*	*0.08*	*0*	*93.6*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174584 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-174584** Units: **ug/L** Analysis Date: **25-Jan-2022 16:52**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477631** PrepDate: **20-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.09306	0.010	0.08	0	116	40 - 140	0.08529	8.71	20	
2-Methylnaphthalene	0.05915	0.010	0.08	0	73.9	40 - 140	0.0526	11.7	20	
Acenaphthene	0.0483	0.010	0.08	0	60.4	40 - 140	0.041	16.3	20	
Acenaphthylene	0.08932	0.010	0.08	0	112	40 - 140	0.0746	18	20	
Anthracene	0.06798	0.010	0.08	0	85.0	40 - 140	0.071	4.34	20	
Benz(a)anthracene	0.05203	0.010	0.08	0	65.0	40 - 140	0.05025	3.47	20	
Benzo(a)pyrene	0.0851	0.010	0.08	0	106	40 - 140	0.08057	5.47	20	
Benzo(b)fluoranthene	0.07022	0.010	0.08	0	87.8	40 - 140	0.06742	4.06	20	
Benzo(g,h,i)perylene	0.09764	0.010	0.08	0	122	40 - 140	0.09255	5.35	20	
Benzo(k)fluoranthene	0.0945	0.010	0.08	0	118	40 - 140	0.08739	7.82	20	
Chrysene	0.08922	0.010	0.08	0	112	40 - 140	0.08363	6.46	20	
Dibenz(a,h)anthracene	0.07392	0.010	0.08	0	92.4	40 - 140	0.07165	3.12	20	
Dibenzofuran	0.078	0.010	0.08	0	97.5	40 - 140	0.06795	13.8	20	
Fluoranthene	0.07488	0.010	0.08	0	93.6	40 - 140	0.08095	7.8	20	
Fluorene	0.08011	0.010	0.08	0	100	40 - 140	0.07447	7.3	20	
Indeno(1,2,3-cd)pyrene	0.07357	0.010	0.08	0	92.0	40 - 140	0.07094	3.64	20	
Naphthalene	0.08413	0.010	0.08	0	105	40 - 140	0.08158	3.08	20	
Phenanthrene	0.06321	0.010	0.08	0	79.0	40 - 140	0.05782	8.91	20	
Pyrene	0.08252	0.010	0.08	0	103	40 - 140	0.07876	4.67	20	
Surr: 2-Fluorobiphenyl	*0.08649*	*0*	*0.08*	*0*	*108*	*40 - 140*	*0.06388*	*30.1*	*20*	R
Surr: 4-Terphenyl-d14	*0.07991*	*0*	*0.08*	*0*	*99.9*	*40 - 140*	*0.08377*	*4.72*	*20*	
Surr: Nitrobenzene-d5	*0.06413*	*0*	*0.08*	*0*	*80.2*	*40 - 140*	*0.07492*	*15.5*	*20*	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174778 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-174778** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: Run ID: **WetChem_HS_401034** SeqNo: **6477726** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-174778** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: Run ID: **WetChem_HS_401034** SeqNo: **6477725** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.97	0.50	20	0	99.8	85 - 115				

MS Sample ID: **HS22010747-01MS** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: Run ID: **WetChem_HS_401034** SeqNo: **6477723** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.02	0.50	20	0.294	98.6	75 - 125				

MSD Sample ID: **HS22010747-01MSD** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: Run ID: **WetChem_HS_401034** SeqNo: **6477724** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.04	0.50	20	0.294	98.7	75 - 125	20.02	0.0899	20	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: 174956 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-174956** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485144** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-174956** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485143** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.272	0.0500	0.25	0	109	80 - 120				

MS Sample ID: **HS22010956-01MS** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485141** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.383	0.0500	0.25	0.167	86.4	80 - 120				

MSD Sample ID: **HS22010956-01MSD** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485142** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.376	0.0500	0.25	0.167	83.6	80 - 120	0.383	1.84	20	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: **R400595 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS22010733-01DUP** Units: **pH Units** Analysis Date: **19-Jan-2022 10:36**
Client ID: Run ID: **WetChem_HS_400595** SeqNo: **6468510** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	5.44	0.100					5.42	0.368	10	
Temp Deg C @pH	21.2	0					21.1	0.473	10	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: R400673 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R400673** Units: **mg/L** Analysis Date: **19-Jan-2022 11:36**
Client ID: Run ID: **Balance1_400673** SeqNo: **6470256** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R400673** Units: **mg/L** Analysis Date: **19-Jan-2022 11:36**
Client ID: Run ID: **Balance1_400673** SeqNo: **6470255** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	1090	10.0	1000	0	109	85 - 115				

DUP Sample ID: **HS22010744-01DUP** Units: **mg/L** Analysis Date: **19-Jan-2022 11:36**
Client ID: **R3** Run ID: **Balance1_400673** SeqNo: **6470257** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	48	10.0					48	0	20	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: **R400864 (0)** **Instrument:** **ManTech01** **Method:** **DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS22010827-01DUP** Units: **mg/L** Analysis Date: **24-Jan-2022 14:46**
Client ID: Run ID: **ManTech01_400864** SeqNo: **6473925** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.75	1.00					11.72	0.256	20	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: R401287 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482817** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482819** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	34.4	2.00	40	0	86.0	78 - 114				

LCSD Sample ID: **WLCSDW-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482818** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	34.3	2.00	40	0	85.8	78 - 114	34.4	0.291	18	

MS Sample ID: **HS22010744-01MS** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: **R3** Run ID: **Balance1_401287** SeqNo: **6482797** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	46.1	2.00	40	7.755	95.9	78 - 114				

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: **R401403 (0)** **Instrument:** **WetChem_HS** **Method:** **SALINITY**

DUP Sample ID: **HS22010744-01DUP** Units: **ppt** Analysis Date: **01-Feb-2022 16:30**
Client ID: **R3** Run ID: **WetChem_HS_401403** SeqNo: **6485199** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: R401417 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485527** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485528** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1096	10.0	1000	0	110	85 - 115				

DUP Sample ID: **HS22011101-06DUP** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485521** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	794	10.0					796	0.252	5	

DUP Sample ID: **HS22010747-01DUP** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485509** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	394	10.0					390	1.02	5	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: R401440 (0) **Instrument:** ICS2100 **Method:** NITRATE/NITRITE BY E300.0, REV 2.1, 1993

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **01-Feb-2022 17:33**
Client ID: Run ID: **ICS2100_401440** SeqNo: **6486000** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	0.3858	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **01-Feb-2022 17:41**
Client ID: Run ID: **ICS2100_401440** SeqNo: **6486001** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	8.118	0.200	8	0	101	90 - 110				

MS Sample ID: **HS22010744-01MS** Units: **mg/L** Analysis Date: **01-Feb-2022 20:24**
Client ID: **R3** Run ID: **ICS2100_401440** SeqNo: **6486007** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.98	1.00	20	0.367	98.1	80 - 120				

MSD Sample ID: **HS22010744-01MSD** Units: **mg/L** Analysis Date: **01-Feb-2022 20:32**
Client ID: **R3** Run ID: **ICS2100_401440** SeqNo: **6486008** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	20.6	1.00	20	0.367	101	80 - 120	19.98	3.06	20	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: HS22010744

QC BATCH REPORT

Batch ID: R401564 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488730** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488731** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	88	2.50	100	0	88.0	85 - 115				

DUP Sample ID: **HS22011194-03DUP** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488722** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	144	2.50					146	1.38	5	

DUP Sample ID: **HS22011193-01DUP** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488720** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	20.25	2.50					19.75	2.5	5	

The following samples were analyzed in this batch: HS22010744-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R3
WorkOrder: **HS22010744**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS22010744 **Date/Time Received:** **18-Jan-2022 16:20**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By:	/S/ Pablo Marinez	18-Jan-2022 18:10	**Reviewed by:**	/S/ Corey Grandits	20-Jan-2022 09:10
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **WATER** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☐	No ☑	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:252576
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s):	18.2°C UC/C	IR 01
Cooler(s)/Kit(s):	48069	
Date/Time sample(s) sent to storage:	1/18/22 18:30	

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: CoC missing ID & Collection Date/Time, logged per Sample Label (R3 11/1/22 11:50)

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

RIGHT SOLUTIONS | RIGHT PARTNER

Cincinnati, OH
+1 513 733 5336

Everett, WA
+1 425 356 2600

Fort Collins, CO
+1 970 490 1511

Holland, MI
+1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 252576

HS22010744

ERM, Inc
R3

NV

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name		
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte I NC I 28203	City/State/Zip	Charlotte I NC I 28203	
Phone		Phone		
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by: Date: Time: Received by:

Relinquished by: Date: Time: Received by (Laboratory): PG 011322 16:20

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
48069	1.8-2

QC Package: (Check One Box Below)

- [X] Level II Std QC
- [ ] Level III Std QC/Raw Data
- [ ] Level IV SW846/CLP
- [ ] Other
- [ ] TRRP Checklist
- [ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.

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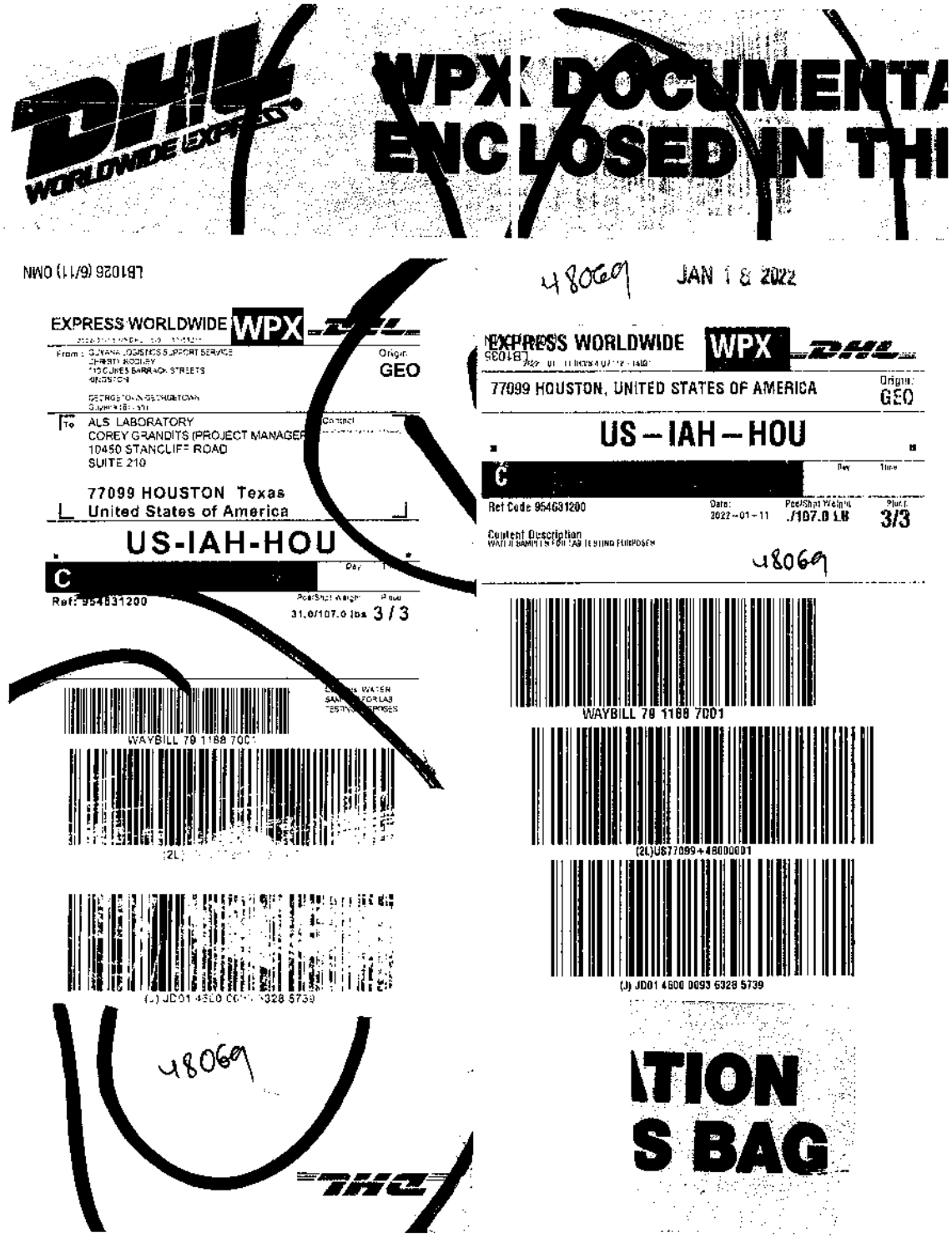

RIGHT SOLUTIONS | RIGHT PARTNER

10450 Stancliff Rd. Suite 210
Houston, TX 77099
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February 08, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22010746**

Laboratory Results for: **C1 & R4**

Dear Selina Pradhan,

ALS Environmental received 2 sample(s) on Jan 18, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: C1 & R4
Work Order: HS22010746

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22010746-01	C1	Water		11-Jan-2022 07:04	18-Jan-2022 16:20	☐
HS22010746-02	R4	Water		11-Jan-2022 08:54	18-Jan-2022 16:20	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: C1 & R4
Work Order: HS22010746

Work Order Comments

- Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

  The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 174584

Sample ID: C1 (HS22010746-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: LCSD-174584

- The RPD between the LCS and LCSD was outside of the control limit.

Sample ID: R4 (HS22010746-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Metals by Method SW6020A

Batch ID: 174798

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 174628

Sample ID: C1 (HS22010746-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R4 (HS22010746-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2520

Batch ID: R401403

Sample ID: C1 (HS22010746-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: HS22010744-01DUP

- DUP is for an unrelated sample

Sample ID: R4 (HS22010746-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: C1 & R4
Work Order: HS22010746

WetChemistry by Method E300

Batch ID: R401440

Sample ID: C1 (HS22010746-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.
- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Sample ID: R4 (HS22010746-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.
- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

WetChemistry by Method M2540D

Batch ID: R401564

Sample ID: C1 (HS22010746-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R4 (HS22010746-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method Calculation

Batch ID: R401497

Sample ID: C1 (HS22010746-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R4 (HS22010746-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R401417

Sample ID: C1 (HS22010746-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R4 (HS22010746-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: C1 & R4
Work Order: HS22010746

WetChemistry by Method E1664A

Batch ID: R401287

Sample ID: C1 (HS22010746-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R4 (HS22010746-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R400595

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R400864

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540B

Batch ID: R400673

Sample ID: C1 (HS22010746-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R4 (HS22010746-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method E365.3

Batch ID: 174956

Sample ID: C1 (HS22010746-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R4 (HS22010746-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
Work Order: HS22010746

CASE NARRATIVE

WetChemistry by Method M4500 NH3 D

Batch ID: 174778

Sample ID: C1 (HS22010746-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R4 (HS22010746-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
Sample ID: C1
Collection Date: 11-Jan-2022 07:04

ANALYTICAL REPORT
WorkOrder:HS22010746
Lab ID:HS22010746-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 20-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Acenaphthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Acenaphthylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Chrysene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Dibenzofuran	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Fluorene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Naphthalene	**0.028**	H	**0.010**	**0.010**	**ug/L**	1	25-Jan-2022 19:32
Phenanthrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:32
Surr: 2-Fluorobiphenyl	*75.7*			*40-140*	*%REC*	*1*	*25-Jan-2022 19:32*
Surr: 4-Terphenyl-d14	*117*			*40-140*	*%REC*	*1*	*25-Jan-2022 19:32*
Surr: Nitrobenzene-d5	*57.7*			*40-140*	*%REC*	*1*	*25-Jan-2022 19:32*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 27-Jan-2022		Analyst: JHD
Antimony	**0.000469**	J	**0.000400**	**0.00200**	**mg/L**	1	28-Jan-2022 23:28
Arsenic	**0.00477**		**0.000400**	**0.00200**	**mg/L**	1	28-Jan-2022 23:28
Beryllium	**0.000576**	J	**0.000200**	**0.00200**	**mg/L**	1	28-Jan-2022 23:28
Cadmium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:28
Chromium	**0.0102**		**0.000400**	**0.00400**	**mg/L**	1	28-Jan-2022 23:28
Cobalt	**0.00427**	J	**0.000200**	**0.00500**	**mg/L**	1	28-Jan-2022 23:28
Copper	**0.00526**		**0.00100**	**0.00200**	**mg/L**	1	28-Jan-2022 23:28
Lead	**0.00712**		**0.000600**	**0.00200**	**mg/L**	1	28-Jan-2022 23:28
Molybdenum	U		0.000600	0.00500	mg/L	1	28-Jan-2022 23:28
Nickel	**0.00710**		**0.000600**	**0.00200**	**mg/L**	1	28-Jan-2022 23:28
Selenium	U		0.00110	0.00200	mg/L	1	28-Jan-2022 23:28
Silver	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:28
Thallium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:28
Vanadium	**0.0166**		**0.000600**	**0.00500**	**mg/L**	1	28-Jan-2022 23:28
Zinc	**0.0491**		**0.00200**	**0.00400**	**mg/L**	1	28-Jan-2022 23:28

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
Sample ID: C1
Collection Date: 11-Jan-2022 07:04

ANALYTICAL REPORT
WorkOrder:HS22010746
Lab ID:HS22010746-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Jan-2022 13:11
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**0.73**		**0.10**	**0.50**	**mg/L**	1	03-Feb-2022 09:30
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**8.98**		**0.610**	**2.00**	**mg/L**	1	31-Jan-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.327**	J	**0.150**	**1.00**	**mg/L**	5	01-Feb-2022 20:40
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 01-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.143**		**0.0200**	**0.0500**	**mg/L**	1	01-Feb-2022 16:20
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**1,130**	H	**5.00**	**10.0**	**mg/L**	1	19-Jan-2022 11:36
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**826**	H	**5.00**	**10.0**	**mg/L**	1	31-Jan-2022 18:43
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**474**	H	**2.50**	**2.50**	**mg/L**	1	03-Feb-2022 20:25
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 25-Jan-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.40**	J	**0.10**	**0.50**	**mg/L**	1	26-Jan-2022 12:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.2**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	01-Feb-2022 16:30
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**6.65**	H	**0.100**	**0.100**	**pH Units**	1	19-Jan-2022 10:36
Temp Deg C @pH	**23.0**	H	**0**	**0**	**DEG C**	1	19-Jan-2022 10:36

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
Sample ID: R4
Collection Date: 11-Jan-2022 08:54

ANALYTICAL REPORT
WorkOrder:HS22010746
Lab ID:HS22010746-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 20-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Acenaphthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Acenaphthylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Chrysene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Dibenzofuran	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Fluorene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Naphthalene	**0.025**	H	**0.010**	**0.010**	**ug/L**	1	25-Jan-2022 19:53
Phenanthrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 19:53
Surr: 2-Fluorobiphenyl	*77.2*			*40-140*	*%REC*	*1*	*25-Jan-2022 19:53*
Surr: 4-Terphenyl-d14	*119*			*40-140*	*%REC*	*1*	*25-Jan-2022 19:53*
Surr: Nitrobenzene-d5	*99.2*			*40-140*	*%REC*	*1*	*25-Jan-2022 19:53*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 27-Jan-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	28-Jan-2022 23:30
Arsenic	U		0.000400	0.00200	mg/L	1	28-Jan-2022 23:30
Beryllium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:30
Cadmium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:30
Chromium	**0.00190**	J	**0.000400**	**0.00400**	**mg/L**	1	28-Jan-2022 23:30
Cobalt	**0.000242**	J	**0.000200**	**0.00500**	**mg/L**	1	28-Jan-2022 23:30
Copper	**0.00109**	J	**0.00100**	**0.00200**	**mg/L**	1	28-Jan-2022 23:30
Lead	**0.000618**	J	**0.000600**	**0.00200**	**mg/L**	1	28-Jan-2022 23:30
Molybdenum	U		0.000600	0.00500	mg/L	1	28-Jan-2022 23:30
Nickel	**0.00122**	J	**0.000600**	**0.00200**	**mg/L**	1	28-Jan-2022 23:30
Selenium	U		0.00110	0.00200	mg/L	1	28-Jan-2022 23:30
Silver	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:30
Thallium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:30
Vanadium	**0.00199**	J	**0.000600**	**0.00500**	**mg/L**	1	28-Jan-2022 23:30
Zinc	**0.0124**		**0.00200**	**0.00400**	**mg/L**	1	28-Jan-2022 23:30

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
Sample ID: R4
Collection Date: 11-Jan-2022 08:54

ANALYTICAL REPORT
WorkOrder:HS22010746
Lab ID:HS22010746-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Jan-2022 13:13
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**0.69**		**0.10**	**0.50**	**mg/L**	1	03-Feb-2022 09:30
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**7.82**		**0.610**	**2.00**	**mg/L**	1	31-Jan-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.372**	J	**0.150**	**1.00**	**mg/L**	5	01-Feb-2022 20:47
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 01-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0230**	J	**0.0200**	**0.0500**	**mg/L**	1	01-Feb-2022 16:20
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**56.0**	H	**5.00**	**10.0**	**mg/L**	1	19-Jan-2022 11:36
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**56.0**	H	**5.00**	**10.0**	**mg/L**	1	31-Jan-2022 18:43
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**16.0**	H	**2.50**	**2.50**	**mg/L**	1	03-Feb-2022 20:25
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 25-Jan-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.32**	J	**0.10**	**0.50**	**mg/L**	1	26-Jan-2022 12:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.5**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	01-Feb-2022 16:30
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**6.17**	H	**0.100**	**0.100**	**pH Units**	1	19-Jan-2022 10:36
Temp Deg C @pH	**23.7**	H	**0**	**0**	**DEG C**	1	19-Jan-2022 10:36

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

Batch ID: 174584 **Start Date:** 20 Jan 2022 09:30 **End Date:** 20 Jan 2022 14:00
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010746-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22010746-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 174628 **Start Date:** 21 Jan 2022 08:30 **End Date:** 21 Jan 2022 11:30
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010746-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22010746-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174778 **Start Date:** 25 Jan 2022 12:00 **End Date:** 25 Jan 2022 15:30
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010746-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22010746-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 174798 **Start Date:** 27 Jan 2022 12:00 **End Date:** 28 Jan 2022 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010746-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22010746-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174956 **Start Date:** 01 Feb 2022 12:30 **End Date:** 01 Feb 2022 14:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010746-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22010746-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174584 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04		20 Jan 2022 08:25	25 Jan 2022 19:32	1
HS22010746-02	R4	11 Jan 2022 08:54		20 Jan 2022 08:25	25 Jan 2022 19:53	1
Batch ID: 174628 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04		21 Jan 2022 08:30	21 Jan 2022 13:11	1
HS22010746-02	R4	11 Jan 2022 08:54		21 Jan 2022 08:30	21 Jan 2022 13:13	1
Batch ID: 174778 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04		25 Jan 2022 12:00	26 Jan 2022 12:30	1
HS22010746-02	R4	11 Jan 2022 08:54		25 Jan 2022 12:00	26 Jan 2022 12:30	1
Batch ID: 174798 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04		27 Jan 2022 16:00	28 Jan 2022 23:28	1
HS22010746-02	R4	11 Jan 2022 08:54		27 Jan 2022 16:00	28 Jan 2022 23:30	1
Batch ID: 174956 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04		01 Feb 2022 12:30	01 Feb 2022 16:20	1
HS22010746-02	R4	11 Jan 2022 08:54		01 Feb 2022 12:30	01 Feb 2022 16:20	1
Batch ID: R400595 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04			19 Jan 2022 10:36	1
HS22010746-02	R4	11 Jan 2022 08:54			19 Jan 2022 10:36	1
Batch ID: R400673 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04			19 Jan 2022 11:36	1
HS22010746-02	R4	11 Jan 2022 08:54			19 Jan 2022 11:36	1
Batch ID: R400864 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04			24 Jan 2022 14:46	1
HS22010746-02	R4	11 Jan 2022 08:54			24 Jan 2022 14:46	1
Batch ID: R401287 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04			31 Jan 2022 13:00	1
HS22010746-02	R4	11 Jan 2022 08:54			31 Jan 2022 13:00	1
Batch ID: R401403 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04			01 Feb 2022 16:30	1
HS22010746-02	R4	11 Jan 2022 08:54			01 Feb 2022 16:30	1
Batch ID: R401417 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04			31 Jan 2022 18:43	1
HS22010746-02	R4	11 Jan 2022 08:54			31 Jan 2022 18:43	1
Batch ID: R401440 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04			01 Feb 2022 20:40	5
HS22010746-02	R4	11 Jan 2022 08:54			01 Feb 2022 20:47	5

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R401497 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04			03 Feb 2022 09:30	1
HS22010746-02	R4	11 Jan 2022 08:54			03 Feb 2022 09:30	1
Batch ID: R401564 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22010746-01	C1	11 Jan 2022 07:04			03 Feb 2022 20:25	1
HS22010746-02	R4	11 Jan 2022 08:54			03 Feb 2022 20:25	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174628 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-174628** Units: **mg/L** Analysis Date: **21-Jan-2022 12:52**
Client ID: Run ID: **HG03_400757** SeqNo: **6472201** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-174628** Units: **mg/L** Analysis Date: **21-Jan-2022 12:54**
Client ID: Run ID: **HG03_400757** SeqNo: **6472202** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00522	0.000200	0.005	0	104	80 - 120				

MS Sample ID: **HS22010729-03MS** Units: **mg/L** Analysis Date: **21-Jan-2022 13:03**
Client ID: Run ID: **HG03_400757** SeqNo: **6472188** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00529	0.000200	0.005	0.000056	105	75 - 125				

MSD Sample ID: **HS22010729-03MSD** Units: **mg/L** Analysis Date: **21-Jan-2022 13:04**
Client ID: Run ID: **HG03_400757** SeqNo: **6472189** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00537	0.000200	0.005	0.000056	106	75 - 125	0.00529	1.5	20	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-174798** Units: **mg/L** Analysis Date: **28-Jan-2022 20:13**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481556** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-174798** Units: **mg/L** Analysis Date: **28-Jan-2022 20:15**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481557** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05114	0.00200	0.05	0	102	80 - 120				
Arsenic	0.05388	0.00200	0.05	0	108	80 - 120				
Beryllium	0.04712	0.00200	0.05	0	94.2	80 - 120				
Cadmium	0.05529	0.00200	0.05	0	111	80 - 120				
Chromium	0.05463	0.00400	0.05	0	109	80 - 120				
Cobalt	0.05431	0.00500	0.05	0	109	80 - 120				
Copper	0.05672	0.00200	0.05	0	113	80 - 120				
Lead	0.05165	0.00200	0.05	0	103	80 - 120				
Molybdenum	0.05216	0.00500	0.05	0	104	80 - 120				
Nickel	0.05635	0.00200	0.05	0	113	80 - 120				
Selenium	0.05214	0.00200	0.05	0	104	80 - 120				
Silver	0.05297	0.00200	0.05	0	106	80 - 120				
Thallium	0.0522	0.00200	0.05	0	104	80 - 120				
Vanadium	0.05405	0.00500	0.05	0	108	80 - 120				
Zinc	0.05936	0.00400	0.05	0	119	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22011087-01MS** Units: **mg/L** Analysis Date: **28-Jan-2022 20:21**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481560** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05187	0.00200	0.05	0.0002	103	80 - 120				
Arsenic	0.065	0.00200	0.05	0.009776	110	80 - 120				
Beryllium	0.04962	0.00200	0.05	0.000025	99.2	80 - 120				
Cadmium	0.05543	0.00200	0.05	0.000044	111	80 - 120				
Chromium	0.05582	0.00400	0.05	0.00065	110	80 - 120				
Cobalt	0.05972	0.00500	0.05	0.005619	108	80 - 120				
Copper	0.05468	0.00200	0.05	-0.000006	109	80 - 120				
Lead	0.05556	0.00200	0.05	0.000342	110	80 - 120				
Molybdenum	0.06888	0.00500	0.05	0.01375	110	80 - 120				
Nickel	0.05822	0.00200	0.05	0.003775	109	80 - 120				
Selenium	0.05268	0.00200	0.05	-0.000078	106	80 - 120				
Silver	0.05269	0.00200	0.05	0.000004	105	80 - 120				
Thallium	0.0558	0.00200	0.05	0.000097	111	80 - 120				
Vanadium	0.05751	0.00500	0.05	0.001194	113	80 - 120				
Zinc	0.08396	0.00400	0.05	0.02619	116	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22011087-01MSD** Units: **mg/L** Analysis Date: **28-Jan-2022 20:23**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481561** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0527	0.00200	0.05	0.0002	105	80 - 120	0.05187	1.59	20	
Arsenic	0.06515	0.00200	0.05	0.009776	111	80 - 120	0.065	0.232	20	
Beryllium	0.04851	0.00200	0.05	0.000025	97.0	80 - 120	0.04962	2.26	20	
Cadmium	0.05528	0.00200	0.05	0.000044	110	80 - 120	0.05543	0.284	20	
Chromium	0.05676	0.00400	0.05	0.00065	112	80 - 120	0.05582	1.67	20	
Cobalt	0.05944	0.00500	0.05	0.005619	108	80 - 120	0.05972	0.457	20	
Copper	0.05495	0.00200	0.05	-0.000006	110	80 - 120	0.05468	0.509	20	
Lead	0.05639	0.00200	0.05	0.000342	112	80 - 120	0.05556	1.49	20	
Molybdenum	0.0692	0.00500	0.05	0.01375	111	80 - 120	0.06888	0.475	20	
Nickel	0.05869	0.00200	0.05	0.003775	110	80 - 120	0.05822	0.792	20	
Selenium	0.05383	0.00200	0.05	-0.000078	108	80 - 120	0.05268	2.17	20	
Silver	0.05248	0.00200	0.05	0.000004	105	80 - 120	0.05269	0.39	20	
Thallium	0.05757	0.00200	0.05	0.000097	115	80 - 120	0.0558	3.12	20	
Vanadium	0.05777	0.00500	0.05	0.001194	113	80 - 120	0.05751	0.442	20	
Zinc	0.08476	0.00400	0.05	0.02619	117	80 - 120	0.08396	0.944	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22011087-01SD** Units: **mg/L** Analysis Date: **28-Jan-2022 20:19**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481559** PrepDate: **27-Jan-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.0002	0	10	
Arsenic	0.009605	0.0100					0.009776	0	10	J
Beryllium	U	0.0100					0.000025	0	10	
Cadmium	U	0.0100					0.000044	0	10	
Chromium	U	0.0200					0.00065	0	10	
Cobalt	0.005448	0.0250					0.005619	0	10	J
Copper	U	0.0100					-0.000006	0	10	
Lead	U	0.0100					0.000342	0	10	
Molybdenum	0.01389	0.0250					0.01375	0	10	J
Nickel	0.003989	0.0100					0.003775	0	10	J
Selenium	U	0.0100					-0.000078	0	10	
Silver	U	0.0100					0.000004	0	10	
Thallium	U	0.0100					0.000097	0	10	
Vanadium	U	0.0250					0.001194	0	10	
Zinc	0.02685	0.0200					0.02619	2.52	10	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174584 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-174584** Units: **ug/L** Analysis Date: **25-Jan-2022 16:11**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477629** PrepDate: **20-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.05029*	*0*	*0.08*	*0*	*62.9*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.08202*	*0*	*0.08*	*0*	*103*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.05288*	*0*	*0.08*	*0*	*66.1*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174584 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-174584** Units: **ug/L** Analysis Date: **25-Jan-2022 16:31**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477630** PrepDate: **20-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.08529	0.010	0.08	0	107	40 - 140				
2-Methylnaphthalene	0.0526	0.010	0.08	0	65.8	40 - 140				
Acenaphthene	0.041	0.010	0.08	0	51.3	40 - 140				
Acenaphthylene	0.0746	0.010	0.08	0	93.2	40 - 140				
Anthracene	0.071	0.010	0.08	0	88.7	40 - 140				
Benz(a)anthracene	0.05025	0.010	0.08	0	62.8	40 - 140				
Benzo(a)pyrene	0.08057	0.010	0.08	0	101	40 - 140				
Benzo(b)fluoranthene	0.06742	0.010	0.08	0	84.3	40 - 140				
Benzo(g,h,i)perylene	0.09255	0.010	0.08	0	116	40 - 140				
Benzo(k)fluoranthene	0.08739	0.010	0.08	0	109	40 - 140				
Chrysene	0.08363	0.010	0.08	0	105	40 - 140				
Dibenz(a,h)anthracene	0.07165	0.010	0.08	0	89.6	40 - 140				
Dibenzofuran	0.06795	0.010	0.08	0	84.9	40 - 140				
Fluoranthene	0.08095	0.010	0.08	0	101	40 - 140				
Fluorene	0.07447	0.010	0.08	0	93.1	40 - 140				
Indeno(1,2,3-cd)pyrene	0.07094	0.010	0.08	0	88.7	40 - 140				
Naphthalene	0.08158	0.010	0.08	0	102	40 - 140				
Phenanthrene	0.05782	0.010	0.08	0	72.3	40 - 140				
Pyrene	0.07876	0.010	0.08	0	98.5	40 - 140				
Surr: 2-Fluorobiphenyl	*0.06388*	*0*	*0.08*	*0*	*79.9*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.08377*	*0*	*0.08*	*0*	*105*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.07492*	*0*	*0.08*	*0*	*93.6*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174584 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-174584** Units: **ug/L** Analysis Date: **25-Jan-2022 16:52**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477631** PrepDate: **20-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.09306	0.010	0.08	0	116	40 - 140	0.08529	8.71	20	
2-Methylnaphthalene	0.05915	0.010	0.08	0	73.9	40 - 140	0.0526	11.7	20	
Acenaphthene	0.0483	0.010	0.08	0	60.4	40 - 140	0.041	16.3	20	
Acenaphthylene	0.08932	0.010	0.08	0	112	40 - 140	0.0746	18	20	
Anthracene	0.06798	0.010	0.08	0	85.0	40 - 140	0.071	4.34	20	
Benz(a)anthracene	0.05203	0.010	0.08	0	65.0	40 - 140	0.05025	3.47	20	
Benzo(a)pyrene	0.0851	0.010	0.08	0	106	40 - 140	0.08057	5.47	20	
Benzo(b)fluoranthene	0.07022	0.010	0.08	0	87.8	40 - 140	0.06742	4.06	20	
Benzo(g,h,i)perylene	0.09764	0.010	0.08	0	122	40 - 140	0.09255	5.35	20	
Benzo(k)fluoranthene	0.0945	0.010	0.08	0	118	40 - 140	0.08739	7.82	20	
Chrysene	0.08922	0.010	0.08	0	112	40 - 140	0.08363	6.46	20	
Dibenz(a,h)anthracene	0.07392	0.010	0.08	0	92.4	40 - 140	0.07165	3.12	20	
Dibenzofuran	0.078	0.010	0.08	0	97.5	40 - 140	0.06795	13.8	20	
Fluoranthene	0.07488	0.010	0.08	0	93.6	40 - 140	0.08095	7.8	20	
Fluorene	0.08011	0.010	0.08	0	100	40 - 140	0.07447	7.3	20	
Indeno(1,2,3-cd)pyrene	0.07357	0.010	0.08	0	92.0	40 - 140	0.07094	3.64	20	
Naphthalene	0.08413	0.010	0.08	0	105	40 - 140	0.08158	3.08	20	
Phenanthrene	0.06321	0.010	0.08	0	79.0	40 - 140	0.05782	8.91	20	
Pyrene	0.08252	0.010	0.08	0	103	40 - 140	0.07876	4.67	20	
Surr: 2-Fluorobiphenyl	*0.08649*	*0*	*0.08*	*0*	*108*	*40 - 140*	*0.06388*	*30.1*	*20*	R
Surr: 4-Terphenyl-d14	*0.07991*	*0*	*0.08*	*0*	*99.9*	*40 - 140*	*0.08377*	*4.72*	*20*	
Surr: Nitrobenzene-d5	*0.06413*	*0*	*0.08*	*0*	*80.2*	*40 - 140*	*0.07492*	*15.5*	*20*	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174778 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-174778** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: Run ID: **WetChem_HS_401034** SeqNo: **6477726** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-174778** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: Run ID: **WetChem_HS_401034** SeqNo: **6477725** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.97	0.50	20	0	99.8	85 - 115				

MS Sample ID: **HS22010747-01MS** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: Run ID: **WetChem_HS_401034** SeqNo: **6477723** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.02	0.50	20	0.294	98.6	75 - 125				

MSD Sample ID: **HS22010747-01MSD** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: Run ID: **WetChem_HS_401034** SeqNo: **6477724** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.04	0.50	20	0.294	98.7	75 - 125	20.02	0.0899	20	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: 174956 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-174956** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485144** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-174956** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485143** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.272	0.0500	0.25	0	109	80 - 120				

MS Sample ID: **HS22010956-01MS** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485141** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.383	0.0500	0.25	0.167	86.4	80 - 120				

MSD Sample ID: **HS22010956-01MSD** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485142** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.376	0.0500	0.25	0.167	83.6	80 - 120	0.383	1.84	20	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: **R400595 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS22010733-01DUP** Units: **pH Units** Analysis Date: **19-Jan-2022 10:36**
Client ID: Run ID: **WetChem_HS_400595** SeqNo: **6468510** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	5.44	0.100					5.42	0.368	10	
Temp Deg C @pH	21.2	0					21.1	0.473	10	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: R400673 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R400673** Units: **mg/L** Analysis Date: **19-Jan-2022 11:36**
Client ID: Run ID: **Balance1_400673** SeqNo: **6470256** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R400673** Units: **mg/L** Analysis Date: **19-Jan-2022 11:36**
Client ID: Run ID: **Balance1_400673** SeqNo: **6470255** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	1090	10.0	1000	0	109	85 - 115				

DUP Sample ID: **HS22010744-01DUP** Units: **mg/L** Analysis Date: **19-Jan-2022 11:36**
Client ID: Run ID: **Balance1_400673** SeqNo: **6470257** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	48	10.0					48	0	20	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: **R400864 (0)** **Instrument:** **ManTech01** **Method:** **DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS22010827-01DUP** Units: **mg/L** Analysis Date: **24-Jan-2022 14:46**
Client ID: Run ID: **ManTech01_400864** SeqNo: **6473925** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.75	1.00					11.72	0.256	20	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: R401287 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482817** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482819** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	34.4	2.00	40	0	86.0	78 - 114				

LCSD Sample ID: **WLCSDW-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482818** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	34.3	2.00	40	0	85.8	78 - 114	34.4	0.291	18	

MS Sample ID: **HS22010744-01MS** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482797** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	46.1	2.00	40	7.755	95.9	78 - 114				

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: **R401403 (0)** **Instrument:** **WetChem_HS** **Method:** **SALINITY**

DUP Sample ID: **HS22010744-01DUP** Units: **ppt** Analysis Date: **01-Feb-2022 16:30**
Client ID: Run ID: **WetChem_HS_401403** SeqNo: **6485199** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: R401417 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485527** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485528** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1096	10.0	1000	0	110	85 - 115				

DUP Sample ID: **HS22011101-06DUP** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485521** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	794	10.0					796	0.252	5	

DUP Sample ID: **HS22010747-01DUP** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485509** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	394	10.0					390	1.02	5	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: R401440 (0) **Instrument: ICS2100** **Method: NITRATE/NITRITE BY E300.0, REV 2.1, 1993**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **01-Feb-2022 17:33**
Client ID: Run ID: **ICS2100_401440** SeqNo: **6486000** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	0.3858	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **01-Feb-2022 17:41**
Client ID: Run ID: **ICS2100_401440** SeqNo: **6486001** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	8.118	0.200	8	0	101	90 - 110				

MS Sample ID: **HS22010744-01MS** Units: **mg/L** Analysis Date: **01-Feb-2022 20:24**
Client ID: Run ID: **ICS2100_401440** SeqNo: **6486007** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.98	1.00	20	0.367	98.1	80 - 120				

MSD Sample ID: **HS22010744-01MSD** Units: **mg/L** Analysis Date: **01-Feb-2022 20:32**
Client ID: Run ID: **ICS2100_401440** SeqNo: **6486008** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	20.6	1.00	20	0.367	101	80 - 120	19.98	3.06	20	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: HS22010746

QC BATCH REPORT

Batch ID: R401564 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488730** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488731** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	88	2.50	100	0	88.0	85 - 115				

DUP Sample ID: **HS22011194-03DUP** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488722** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	144	2.50					146	1.38	5	

DUP Sample ID: **HS22011193-01DUP** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488720** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	20.25	2.50					19.75	2.5	5	

The following samples were analyzed in this batch: HS22010746-01 HS22010746-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
WorkOrder: **HS22010746**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

RIGHT SOLUTIONS | RIGHT PARTNER

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1 & R4
Work Order: HS22010746

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22010746-01	C1	Login	1/18/2022 6:13:08 PM	PJM	MET073
HS22010746-01	C1	Login	1/18/2022 6:13:08 PM	PJM	EXT070
HS22010746-01	C1	Login	1/18/2022 6:13:08 PM	PJM	WET032
HS22010746-01	C1	Login	1/18/2022 6:13:08 PM	PJM	WET032
HS22010746-01	C1	Login	1/18/2022 6:13:08 PM	PJM	WET048
HS22010746-01	C1	Login	1/18/2022 6:13:08 PM	PJM	WET048
HS22010746-01	C1	Login	1/18/2022 6:13:08 PM	PJM	WET032

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS22010746 **Date/Time Received:** **18-Jan-2022 16:20**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By:	/S/ Pablo Marinez	18-Jan-2022 18:10	**Reviewed by:**	/S/ Corey Grandits	20-Jan-2022 09:11
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **WATER** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:252581
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	17.0°C UC/C	IR 01	
Cooler(s)/Kit(s):	48072		
Date/Time sample(s) sent to storage:	1/18/22 18:30		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: CoC missing ID & Collection Date/Time, logged per Sample Label
(C1 11/1/22 07:04) (R4 11/1/22 08:54)

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

RIGHT SOLUTIONS | RIGHT PARTNER

Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 252581

HS22010746

ERM, Inc
C1 & R4

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name		
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte I NC I 28203	City/State/Zip	Charlotte I NC I 28203	
Phone		Phone		
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] STD: 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other ____

Results Due Date:

Relinquished by: Date: Time:

Relinquished by: Date: Time:

Logged by (Laboratory): Date: Time:

Received by:

Received by (Laboratory): 11/8/2022 16:20

Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
48072	17.0

QC Package: (Check One Box Below)

- [X] Level II Std QC
- [ ] Level III Std QC/Raw Data
- [ ] Level IV SVM36/CLP
- [ ] Other
- [ ] TRRP Checklist
- [ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_3$ 7-Other 8-4°C 9-5035

ote:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.

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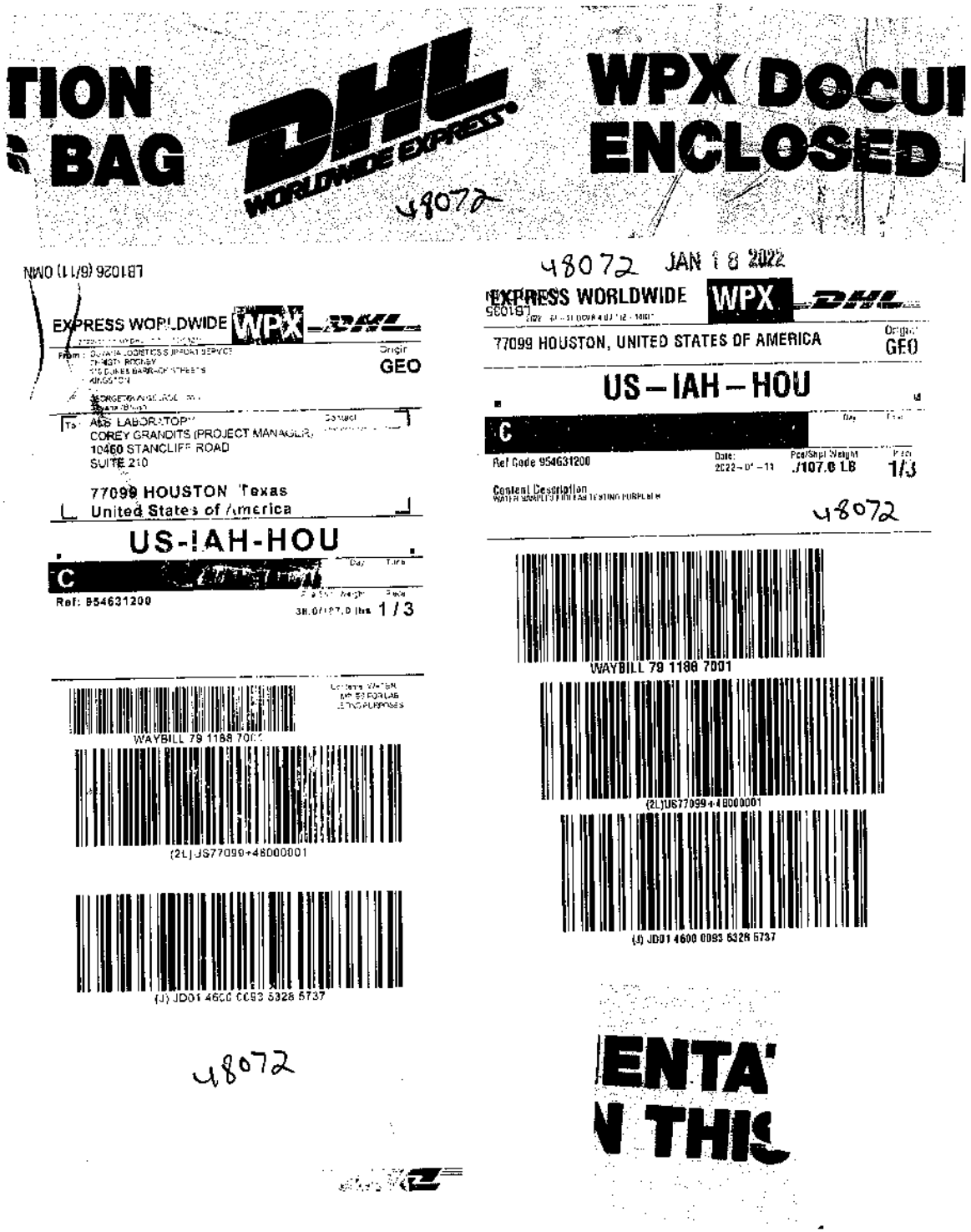

RIGHT SOLUTIONS | RIGHT PARTNER

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 08, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22010747**

Laboratory Results for: **R1 & R2**

Dear Selina Pradhan,

ALS Environmental received 2 sample(s) on Jan 18, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: R1 & R2
Work Order: HS22010747

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22010747-01	R1	Water		11-Jan-2022 11:02	18-Jan-2022 16:20	☐
HS22010747-02	R2	Water		11-Jan-2022 11:34	18-Jan-2022 16:20	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R1 & R2
Work Order: HS22010747

Work Order Comments

- Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

  The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 174584

Sample ID: R1 (HS22010747-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R2 (HS22010747-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: LCSD-174584

- The RPD between the LCS and LCSD was outside of the control limit.

Metals by Method SW6020A

Batch ID: 174798

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 174628

Sample ID: R1 (HS22010747-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R2 (HS22010747-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R401417

Sample ID: R1 (HS22010747-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R2 (HS22010747-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R1 & R2
Work Order: HS22010747

WetChemistry by Method Calculation

Batch ID: R401497

Sample ID: R1 (HS22010747-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R2 (HS22010747-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R400595

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R400864

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540D

Batch ID: R401564

Sample ID: R1 (HS22010747-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R2 (HS22010747-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method E300

Batch ID: R401440

Sample ID: R1 (HS22010747-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.
- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Sample ID: R2 (HS22010747-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.
- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R1 & R2
Work Order: HS22010747

WetChemistry by Method SM2520

Batch ID: R401403

Sample ID: R1 (HS22010747-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R2 (HS22010747-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540B

Batch ID: R400673

Sample ID: R1 (HS22010747-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R2 (HS22010747-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method E1664A

Batch ID: R401287

Sample ID: R1 (HS22010747-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R2 (HS22010747-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 174956

Sample ID: R1 (HS22010747-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R2 (HS22010747-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: R1 & R2
Work Order: HS22010747

WetChemistry by Method M4500 NH3 D

Batch ID: 174778

Sample ID: R1 (HS22010747-01)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Sample ID: R2 (HS22010747-02)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
Sample ID: R1
Collection Date: 11-Jan-2022 11:02

ANALYTICAL REPORT
WorkOrder:HS22010747
Lab ID:HS22010747-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 20-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Acenaphthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Acenaphthylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Chrysene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Dibenzofuran	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Fluorene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Naphthalene	**0.048**	H	**0.010**	**0.010**	**ug/L**	1	25-Jan-2022 20:13
Phenanthrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:13
Surr: 2-Fluorobiphenyl	*123*			*40-140*	*%REC*	*1*	*25-Jan-2022 20:13*
Surr: 4-Terphenyl-d14	*121*			*40-140*	*%REC*	*1*	*25-Jan-2022 20:13*
Surr: Nitrobenzene-d5	*94.2*			*40-140*	*%REC*	*1*	*25-Jan-2022 20:13*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 27-Jan-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	28-Jan-2022 23:32
Arsenic	**0.00670**		**0.000400**	**0.00200**	**mg/L**	1	28-Jan-2022 23:32
Beryllium	**0.000775**	J	**0.000200**	**0.00200**	**mg/L**	1	28-Jan-2022 23:32
Cadmium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:32
Chromium	**0.0142**		**0.000400**	**0.00400**	**mg/L**	1	28-Jan-2022 23:32
Cobalt	**0.00733**		**0.000200**	**0.00500**	**mg/L**	1	28-Jan-2022 23:32
Copper	**0.00639**		**0.00100**	**0.00200**	**mg/L**	1	28-Jan-2022 23:32
Lead	**0.0118**		**0.000600**	**0.00200**	**mg/L**	1	28-Jan-2022 23:32
Molybdenum	U		0.000600	0.00500	mg/L	1	28-Jan-2022 23:32
Nickel	**0.0106**		**0.000600**	**0.00200**	**mg/L**	1	28-Jan-2022 23:32
Selenium	U		0.00110	0.00200	mg/L	1	28-Jan-2022 23:32
Silver	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:32
Thallium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:32
Vanadium	**0.0248**		**0.000600**	**0.00500**	**mg/L**	1	28-Jan-2022 23:32
Zinc	**0.0614**		**0.00200**	**0.00400**	**mg/L**	1	28-Jan-2022 23:32

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
Sample ID: R1
Collection Date: 11-Jan-2022 11:02

ANALYTICAL REPORT
WorkOrder:HS22010747
Lab ID:HS22010747-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Jan-2022 13:15
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**0.29**	J	**0.10**	**0.50**	**mg/L**	1	03-Feb-2022 09:30
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.22**	J	**0.610**	**2.00**	**mg/L**	1	31-Jan-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	U		0.150	1.00	mg/L	5	01-Feb-2022 20:55
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 01-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.227**		**0.0200**	**0.0500**	**mg/L**	1	01-Feb-2022 16:20
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**914**	H	**5.00**	**10.0**	**mg/L**	1	19-Jan-2022 11:36
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**390**	H	**5.00**	**10.0**	**mg/L**	1	31-Jan-2022 18:43
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**888**	H	**2.50**	**2.50**	**mg/L**	1	03-Feb-2022 20:25
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 25-Jan-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.29**	J	**0.10**	**0.50**	**mg/L**	1	26-Jan-2022 12:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.1**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	01-Feb-2022 16:30
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**6.49**	H	**0.100**	**0.100**	**pH Units**	1	19-Jan-2022 10:36
Temp Deg C @pH	**22.6**	H	**0**	**0**	**DEG C**	1	19-Jan-2022 10:36

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
Sample ID: R2
Collection Date: 11-Jan-2022 11:34

ANALYTICAL REPORT
WorkOrder:HS22010747
Lab ID:HS22010747-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 20-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	**0.020**	H	**0.010**	**0.010**	**ug/L**	1	25-Jan-2022 20:33
2-Methylnaphthalene	**0.011**	H	**0.010**	**0.010**	**ug/L**	1	25-Jan-2022 20:33
Acenaphthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Acenaphthylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Chrysene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Dibenzofuran	**0.042**	H	**0.010**	**0.010**	**ug/L**	1	25-Jan-2022 20:33
Fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Fluorene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Naphthalene	**0.047**	H	**0.010**	**0.010**	**ug/L**	1	25-Jan-2022 20:33
Phenanthrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 20:33
Surr: 2-Fluorobiphenyl	*60.5*			*40-140*	*%REC*	*1*	*25-Jan-2022 20:33*
Surr: 4-Terphenyl-d14	*109*			*40-140*	*%REC*	*1*	*25-Jan-2022 20:33*
Surr: Nitrobenzene-d5	*65.5*			*40-140*	*%REC*	*1*	*25-Jan-2022 20:33*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 27-Jan-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	28-Jan-2022 23:35
Arsenic	**0.00111**	J	**0.000400**	**0.00200**	**mg/L**	1	28-Jan-2022 23:35
Beryllium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:35
Cadmium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:35
Chromium	**0.00237**	J	**0.000400**	**0.00400**	**mg/L**	1	28-Jan-2022 23:35
Cobalt	**0.00116**	J	**0.000200**	**0.00500**	**mg/L**	1	28-Jan-2022 23:35
Copper	**0.00129**	J	**0.00100**	**0.00200**	**mg/L**	1	28-Jan-2022 23:35
Lead	**0.00147**	J	**0.000600**	**0.00200**	**mg/L**	1	28-Jan-2022 23:35
Molybdenum	U		0.000600	0.00500	mg/L	1	28-Jan-2022 23:35
Nickel	**0.00179**	J	**0.000600**	**0.00200**	**mg/L**	1	28-Jan-2022 23:35
Selenium	U		0.00110	0.00200	mg/L	1	28-Jan-2022 23:35
Silver	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:35
Thallium	U		0.000200	0.00200	mg/L	1	28-Jan-2022 23:35
Vanadium	**0.00301**	J	**0.000600**	**0.00500**	**mg/L**	1	28-Jan-2022 23:35
Zinc	**0.0190**		**0.00200**	**0.00400**	**mg/L**	1	28-Jan-2022 23:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
Sample ID: R2
Collection Date: 11-Jan-2022 11:34

ANALYTICAL REPORT
WorkOrder:HS22010747
Lab ID:HS22010747-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Jan-2022 13:16
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**0.29**	J	**0.10**	**0.50**	**mg/L**	1	03-Feb-2022 09:30
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	31-Jan-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	U		0.150	1.00	mg/L	5	01-Feb-2022 21:03
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 01-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0360**	J	**0.0200**	**0.0500**	**mg/L**	1	01-Feb-2022 16:20
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**76.0**	H	**5.00**	**10.0**	**mg/L**	1	19-Jan-2022 11:36
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**60.0**	H	**5.00**	**10.0**	**mg/L**	1	31-Jan-2022 18:43
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**44.0**	H	**2.50**	**2.50**	**mg/L**	1	03-Feb-2022 20:25
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 25-Jan-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.29**	J	**0.10**	**0.50**	**mg/L**	1	26-Jan-2022 12:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.4**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	01-Feb-2022 16:30
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**4.94**	H	**0.100**	**0.100**	**pH Units**	1	19-Jan-2022 10:36
Temp Deg C @pH	**22.8**	H	**0**	**0**	**DEG C**	1	19-Jan-2022 10:36

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

Batch ID: 174584 **Start Date:** 20 Jan 2022 09:30 **End Date:** 20 Jan 2022 14:00
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010747-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22010747-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 174628 **Start Date:** 21 Jan 2022 08:30 **End Date:** 21 Jan 2022 11:30
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010747-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22010747-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174778 **Start Date:** 25 Jan 2022 12:00 **End Date:** 25 Jan 2022 15:30
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010747-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22010747-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 174798 **Start Date:** 27 Jan 2022 12:00 **End Date:** 28 Jan 2022 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010747-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22010747-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174956 **Start Date:** 01 Feb 2022 12:30 **End Date:** 01 Feb 2022 14:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010747-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22010747-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174584 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02		20 Jan 2022 08:25	25 Jan 2022 20:13	1
HS22010747-02	R2	11 Jan 2022 11:34		20 Jan 2022 08:25	25 Jan 2022 20:33	1
Batch ID: 174628 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02		21 Jan 2022 08:30	21 Jan 2022 13:15	1
HS22010747-02	R2	11 Jan 2022 11:34		21 Jan 2022 08:30	21 Jan 2022 13:16	1
Batch ID: 174778 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02		25 Jan 2022 12:00	26 Jan 2022 12:30	1
HS22010747-02	R2	11 Jan 2022 11:34		25 Jan 2022 12:00	26 Jan 2022 12:30	1
Batch ID: 174798 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02		27 Jan 2022 16:00	28 Jan 2022 23:32	1
HS22010747-02	R2	11 Jan 2022 11:34		27 Jan 2022 16:00	28 Jan 2022 23:35	1
Batch ID: 174956 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02		01 Feb 2022 12:30	01 Feb 2022 16:20	1
HS22010747-02	R2	11 Jan 2022 11:34		01 Feb 2022 12:30	01 Feb 2022 16:20	1
Batch ID: R400595 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02			19 Jan 2022 10:36	1
HS22010747-02	R2	11 Jan 2022 11:34			19 Jan 2022 10:36	1
Batch ID: R400673 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02			19 Jan 2022 11:36	1
HS22010747-02	R2	11 Jan 2022 11:34			19 Jan 2022 11:36	1
Batch ID: R400864 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02			24 Jan 2022 14:46	1
HS22010747-02	R2	11 Jan 2022 11:34			24 Jan 2022 14:46	1
Batch ID: R401287 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02			31 Jan 2022 13:00	1
HS22010747-02	R2	11 Jan 2022 11:34			31 Jan 2022 13:00	1
Batch ID: R401403 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02			01 Feb 2022 16:30	1
HS22010747-02	R2	11 Jan 2022 11:34			01 Feb 2022 16:30	1
Batch ID: R401417 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02			31 Jan 2022 18:43	1
HS22010747-02	R2	11 Jan 2022 11:34			31 Jan 2022 18:43	1
Batch ID: R401440 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02			01 Feb 2022 20:55	5
HS22010747-02	R2	11 Jan 2022 11:34			01 Feb 2022 21:03	5

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R401497 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02			03 Feb 2022 09:30	1
HS22010747-02	R2	11 Jan 2022 11:34			03 Feb 2022 09:30	1
Batch ID: R401564 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22010747-01	R1	11 Jan 2022 11:02			03 Feb 2022 20:25	1
HS22010747-02	R2	11 Jan 2022 11:34			03 Feb 2022 20:25	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174628 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-174628** Units: **mg/L** Analysis Date: **21-Jan-2022 12:52**
Client ID: Run ID: **HG03_400757** SeqNo: **6472201** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U		0.000200								

LCS Sample ID: **LCS-174628** Units: **mg/L** Analysis Date: **21-Jan-2022 12:54**
Client ID: Run ID: **HG03_400757** SeqNo: **6472202** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00522		0.000200	0.005	0	104	80 - 120				

MS Sample ID: **HS22010729-03MS** Units: **mg/L** Analysis Date: **21-Jan-2022 13:03**
Client ID: Run ID: **HG03_400757** SeqNo: **6472188** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00529		0.000200	0.005	0.000056	105	75 - 125				

MSD Sample ID: **HS22010729-03MSD** Units: **mg/L** Analysis Date: **21-Jan-2022 13:04**
Client ID: Run ID: **HG03_400757** SeqNo: **6472189** PrepDate: **21-Jan-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00537		0.000200	0.005	0.000056	106	75 - 125	0.00529	1.5	20	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-174798** Units: **mg/L** Analysis Date: **28-Jan-2022 20:13**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481556** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-174798** Units: **mg/L** Analysis Date: **28-Jan-2022 20:15**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481557** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05114	0.00200	0.05	0	102	80 - 120				
Arsenic	0.05388	0.00200	0.05	0	108	80 - 120				
Beryllium	0.04712	0.00200	0.05	0	94.2	80 - 120				
Cadmium	0.05529	0.00200	0.05	0	111	80 - 120				
Chromium	0.05463	0.00400	0.05	0	109	80 - 120				
Cobalt	0.05431	0.00500	0.05	0	109	80 - 120				
Copper	0.05672	0.00200	0.05	0	113	80 - 120				
Lead	0.05165	0.00200	0.05	0	103	80 - 120				
Molybdenum	0.05216	0.00500	0.05	0	104	80 - 120				
Nickel	0.05635	0.00200	0.05	0	113	80 - 120				
Selenium	0.05214	0.00200	0.05	0	104	80 - 120				
Silver	0.05297	0.00200	0.05	0	106	80 - 120				
Thallium	0.0522	0.00200	0.05	0	104	80 - 120				
Vanadium	0.05405	0.00500	0.05	0	108	80 - 120				
Zinc	0.05936	0.00400	0.05	0	119	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22011087-01MS** Units: **mg/L** Analysis Date: **28-Jan-2022 20:21**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481560** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05187	0.00200	0.05	0.0002	103	80 - 120				
Arsenic	0.065	0.00200	0.05	0.009776	110	80 - 120				
Beryllium	0.04962	0.00200	0.05	0.000025	99.2	80 - 120				
Cadmium	0.05543	0.00200	0.05	0.000044	111	80 - 120				
Chromium	0.05582	0.00400	0.05	0.00065	110	80 - 120				
Cobalt	0.05972	0.00500	0.05	0.005619	108	80 - 120				
Copper	0.05468	0.00200	0.05	-0.000006	109	80 - 120				
Lead	0.05556	0.00200	0.05	0.000342	110	80 - 120				
Molybdenum	0.06888	0.00500	0.05	0.01375	110	80 - 120				
Nickel	0.05822	0.00200	0.05	0.003775	109	80 - 120				
Selenium	0.05268	0.00200	0.05	-0.000078	106	80 - 120				
Silver	0.05269	0.00200	0.05	0.000004	105	80 - 120				
Thallium	0.0558	0.00200	0.05	0.000097	111	80 - 120				
Vanadium	0.05751	0.00500	0.05	0.001194	113	80 - 120				
Zinc	0.08396	0.00400	0.05	0.02619	116	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22011087-01MSD** Units: **mg/L** Analysis Date: **28-Jan-2022 20:23**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481561** PrepDate: **27-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Antimony	0.0527	0.00200	0.05	0.0002	105	80 - 120	0.05187	1.59	20	
Arsenic	0.06515	0.00200	0.05	0.009776	111	80 - 120	0.065	0.232	20	
Beryllium	0.04851	0.00200	0.05	0.000025	97.0	80 - 120	0.04962	2.26	20	
Cadmium	0.05528	0.00200	0.05	0.000044	110	80 - 120	0.05543	0.284	20	
Chromium	0.05676	0.00400	0.05	0.00065	112	80 - 120	0.05582	1.67	20	
Cobalt	0.05944	0.00500	0.05	0.005619	108	80 - 120	0.05972	0.457	20	
Copper	0.05495	0.00200	0.05	-0.000006	110	80 - 120	0.05468	0.509	20	
Lead	0.05639	0.00200	0.05	0.000342	112	80 - 120	0.05556	1.49	20	
Molybdenum	0.0692	0.00500	0.05	0.01375	111	80 - 120	0.06888	0.475	20	
Nickel	0.05869	0.00200	0.05	0.003775	110	80 - 120	0.05822	0.792	20	
Selenium	0.05383	0.00200	0.05	-0.000078	108	80 - 120	0.05268	2.17	20	
Silver	0.05248	0.00200	0.05	0.000004	105	80 - 120	0.05269	0.39	20	
Thallium	0.05757	0.00200	0.05	0.000097	115	80 - 120	0.0558	3.12	20	
Vanadium	0.05777	0.00500	0.05	0.001194	113	80 - 120	0.05751	0.442	20	
Zinc	0.08476	0.00400	0.05	0.02619	117	80 - 120	0.08396	0.944	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174798 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22011087-01SD** Units: **mg/L** Analysis Date: **28-Jan-2022 20:19**
Client ID: Run ID: **ICPMS06_401190** SeqNo: **6481559** PrepDate: **27-Jan-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.0002	0	10	
Arsenic	0.009605	0.0100					0.009776	0	10	J
Beryllium	U	0.0100					0.000025	0	10	
Cadmium	U	0.0100					0.000044	0	10	
Chromium	U	0.0200					0.00065	0	10	
Cobalt	0.005448	0.0250					0.005619	0	10	J
Copper	U	0.0100					-0.000006	0	10	
Lead	U	0.0100					0.000342	0	10	
Molybdenum	0.01389	0.0250					0.01375	0	10	J
Nickel	0.003989	0.0100					0.003775	0	10	J
Selenium	U	0.0100					-0.000078	0	10	
Silver	U	0.0100					0.000004	0	10	
Thallium	U	0.0100					0.000097	0	10	
Vanadium	U	0.0250					0.001194	0	10	
Zinc	0.02685	0.0200					0.02619	2.52	10	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174584 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-174584** Units: **ug/L** Analysis Date: **25-Jan-2022 16:11**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477629** PrepDate: **20-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
1-Methylnaphthalene	U	0.010							
2-Methylnaphthalene	U	0.010							
Acenaphthene	U	0.010							
Acenaphthylene	U	0.010							
Anthracene	U	0.010							
Benz(a)anthracene	U	0.010							
Benzo(a)pyrene	U	0.010							
Benzo(b)fluoranthene	U	0.010							
Benzo(g,h,i)perylene	U	0.010							
Benzo(k)fluoranthene	U	0.010							
Chrysene	U	0.010							
Dibenz(a,h)anthracene	U	0.010							
Dibenzofuran	U	0.010							
Fluoranthene	U	0.010							
Fluorene	U	0.010							
Indeno(1,2,3-cd)pyrene	U	0.010							
Naphthalene	U	0.010							
Phenanthrene	U	0.010							
Pyrene	U	0.010							
Surr: 2-Fluorobiphenyl	*0.05029*	*0*	*0.08*	*0*	*62.9*	*40 - 140*			
Surr: 4-Terphenyl-d14	*0.08202*	*0*	*0.08*	*0*	*103*	*40 - 140*			
Surr: Nitrobenzene-d5	*0.05288*	*0*	*0.08*	*0*	*66.1*	*40 - 140*			

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174584 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-174584** Units: **ug/L** Analysis Date: **25-Jan-2022 16:31**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477630** PrepDate: **20-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.08529	0.010	0.08	0	107	40 - 140				
2-Methylnaphthalene	0.0526	0.010	0.08	0	65.8	40 - 140				
Acenaphthene	0.041	0.010	0.08	0	51.3	40 - 140				
Acenaphthylene	0.0746	0.010	0.08	0	93.2	40 - 140				
Anthracene	0.071	0.010	0.08	0	88.7	40 - 140				
Benz(a)anthracene	0.05025	0.010	0.08	0	62.8	40 - 140				
Benzo(a)pyrene	0.08057	0.010	0.08	0	101	40 - 140				
Benzo(b)fluoranthene	0.06742	0.010	0.08	0	84.3	40 - 140				
Benzo(g,h,i)perylene	0.09255	0.010	0.08	0	116	40 - 140				
Benzo(k)fluoranthene	0.08739	0.010	0.08	0	109	40 - 140				
Chrysene	0.08363	0.010	0.08	0	105	40 - 140				
Dibenz(a,h)anthracene	0.07165	0.010	0.08	0	89.6	40 - 140				
Dibenzofuran	0.06795	0.010	0.08	0	84.9	40 - 140				
Fluoranthene	0.08095	0.010	0.08	0	101	40 - 140				
Fluorene	0.07447	0.010	0.08	0	93.1	40 - 140				
Indeno(1,2,3-cd)pyrene	0.07094	0.010	0.08	0	88.7	40 - 140				
Naphthalene	0.08158	0.010	0.08	0	102	40 - 140				
Phenanthrene	0.05782	0.010	0.08	0	72.3	40 - 140				
Pyrene	0.07876	0.010	0.08	0	98.5	40 - 140				
Surr: 2-Fluorobiphenyl	*0.06388*	*0*	*0.08*	*0*	*79.9*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.08377*	*0*	*0.08*	*0*	*105*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.07492*	*0*	*0.08*	*0*	*93.6*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174584 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-174584** Units: **ug/L** Analysis Date: **25-Jan-2022 16:52**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477631** PrepDate: **20-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.09306	0.010	0.08	0	116	40 - 140	0.08529	8.71	20	
2-Methylnaphthalene	0.05915	0.010	0.08	0	73.9	40 - 140	0.0526	11.7	20	
Acenaphthene	0.0483	0.010	0.08	0	60.4	40 - 140	0.041	16.3	20	
Acenaphthylene	0.08932	0.010	0.08	0	112	40 - 140	0.0746	18	20	
Anthracene	0.06798	0.010	0.08	0	85.0	40 - 140	0.071	4.34	20	
Benz(a)anthracene	0.05203	0.010	0.08	0	65.0	40 - 140	0.05025	3.47	20	
Benzo(a)pyrene	0.0851	0.010	0.08	0	106	40 - 140	0.08057	5.47	20	
Benzo(b)fluoranthene	0.07022	0.010	0.08	0	87.8	40 - 140	0.06742	4.06	20	
Benzo(g,h,i)perylene	0.09764	0.010	0.08	0	122	40 - 140	0.09255	5.35	20	
Benzo(k)fluoranthene	0.0945	0.010	0.08	0	118	40 - 140	0.08739	7.82	20	
Chrysene	0.08922	0.010	0.08	0	112	40 - 140	0.08363	6.46	20	
Dibenz(a,h)anthracene	0.07392	0.010	0.08	0	92.4	40 - 140	0.07165	3.12	20	
Dibenzofuran	0.078	0.010	0.08	0	97.5	40 - 140	0.06795	13.8	20	
Fluoranthene	0.07488	0.010	0.08	0	93.6	40 - 140	0.08095	7.8	20	
Fluorene	0.08011	0.010	0.08	0	100	40 - 140	0.07447	7.3	20	
Indeno(1,2,3-cd)pyrene	0.07357	0.010	0.08	0	92.0	40 - 140	0.07094	3.64	20	
Naphthalene	0.08413	0.010	0.08	0	105	40 - 140	0.08158	3.08	20	
Phenanthrene	0.06321	0.010	0.08	0	79.0	40 - 140	0.05782	8.91	20	
Pyrene	0.08252	0.010	0.08	0	103	40 - 140	0.07876	4.67	20	
Surr: 2-Fluorobiphenyl	*0.08649*	*0*	*0.08*	*0*	*108*	*40 - 140*	*0.06388*	*30.1*	*20*	R
Surr: 4-Terphenyl-d14	*0.07991*	*0*	*0.08*	*0*	*99.9*	*40 - 140*	*0.08377*	*4.72*	*20*	
Surr: Nitrobenzene-d5	*0.06413*	*0*	*0.08*	*0*	*80.2*	*40 - 140*	*0.07492*	*15.5*	*20*	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174778 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-174778** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: Run ID: **WetChem_HS_401034** SeqNo: **6477726** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-174778** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: Run ID: **WetChem_HS_401034** SeqNo: **6477725** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.97	0.50	20	0	99.8	85 - 115				

MS Sample ID: **HS22010747-01MS** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: **R1** Run ID: **WetChem_HS_401034** SeqNo: **6477723** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.02	0.50	20	0.294	98.6	75 - 125				

MSD Sample ID: **HS22010747-01MSD** Units: **mg/L** Analysis Date: **26-Jan-2022 12:30**
Client ID: **R1** Run ID: **WetChem_HS_401034** SeqNo: **6477724** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.04	0.50	20	0.294	98.7	75 - 125	20.02	0.0899	20	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: 174956 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-174956** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485144** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-174956** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485143** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.272	0.0500	0.25	0	109	80 - 120				

MS Sample ID: **HS22010956-01MS** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485141** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.383	0.0500	0.25	0.167	86.4	80 - 120				

MSD Sample ID: **HS22010956-01MSD** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485142** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.376	0.0500	0.25	0.167	83.6	80 - 120	0.383	1.84	20	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: **R400595 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS22010733-01DUP** Units: **pH Units** Analysis Date: **19-Jan-2022 10:36**
Client ID: Run ID: **WetChem_HS_400595** SeqNo: **6468510** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	5.44	0.100					5.42	0.368	10	
Temp Deg C @pH	21.2	0					21.1	0.473	10	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: R400673 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R400673** Units: **mg/L** Analysis Date: **19-Jan-2022 11:36**
Client ID: Run ID: **Balance1_400673** SeqNo: **6470256** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R400673** Units: **mg/L** Analysis Date: **19-Jan-2022 11:36**
Client ID: Run ID: **Balance1_400673** SeqNo: **6470255** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	1090	10.0	1000	0	109	85 - 115				

DUP Sample ID: **HS22010744-01DUP** Units: **mg/L** Analysis Date: **19-Jan-2022 11:36**
Client ID: Run ID: **Balance1_400673** SeqNo: **6470257** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	48	10.0					48	0	20	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: **R400864 (0)** **Instrument:** **ManTech01** **Method:** **DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS22010827-01DUP** Units: **mg/L** Analysis Date: **24-Jan-2022 14:46**
Client ID: Run ID: **ManTech01_400864** SeqNo: **6473925** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.75	1.00					11.72	0.256	20	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: R401287 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482817** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482819** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	34.4	2.00	40	0	86.0	78 - 114				

LCSD Sample ID: **WLCSDW-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482818** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	34.3	2.00	40	0	85.8	78 - 114	34.4	0.291	18	

MS Sample ID: **HS22010744-01MS** Units: **mg/L** Analysis Date: **31-Jan-2022 13:00**
Client ID: Run ID: **Balance1_401287** SeqNo: **6482797** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	46.1	2.00	40	7.755	95.9	78 - 114				

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: **R401403 (0)** **Instrument:** **WetChem_HS** **Method:** **SALINITY**

DUP Sample ID: **HS22010744-01DUP** Units: **ppt** Analysis Date: **01-Feb-2022 16:30**
Client ID: Run ID: **WetChem_HS_401403** SeqNo: **6485199** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: R401417 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485527** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-013122** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485528** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1096	10.0	1000	0	110	85 - 115				

DUP Sample ID: **HS22011101-06DUP** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: Run ID: **Balance1_401417** SeqNo: **6485521** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	794	10.0					796	0.252	5	

DUP Sample ID: **HS22010747-01DUP** Units: **mg/L** Analysis Date: **31-Jan-2022 18:43**
Client ID: **R1** Run ID: **Balance1_401417** SeqNo: **6485509** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	394	10.0					390	1.02	5	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: R401440 (0) **Instrument: ICS2100** **Method: NITRATE/NITRITE BY E300.0, REV 2.1, 1993**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **01-Feb-2022 17:33**
Client ID: Run ID: **ICS2100_401440** SeqNo: **6486000** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	0.3858	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **01-Feb-2022 17:41**
Client ID: Run ID: **ICS2100_401440** SeqNo: **6486001** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	8.118	0.200	8	0	101	90 - 110				

MS Sample ID: **HS22010744-01MS** Units: **mg/L** Analysis Date: **01-Feb-2022 20:24**
Client ID: Run ID: **ICS2100_401440** SeqNo: **6486007** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.98	1.00	20	0.367	98.1	80 - 120				

MSD Sample ID: **HS22010744-01MSD** Units: **mg/L** Analysis Date: **01-Feb-2022 20:32**
Client ID: Run ID: **ICS2100_401440** SeqNo: **6486008** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	20.6	1.00	20	0.367	101	80 - 120	19.98	3.06	20	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: HS22010747

QC BATCH REPORT

Batch ID: R401564 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488730** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488731** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	88	2.50	100	0	88.0	85 - 115				

DUP Sample ID: **HS22011194-03DUP** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488722** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	144	2.50					146	1.38	5	

DUP Sample ID: **HS22011193-01DUP** Units: **mg/L** Analysis Date: **03-Feb-2022 20:25**
Client ID: Run ID: **Balance1_401564** SeqNo: **6488720** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	20.25	2.50					19.75	2.5	5	

The following samples were analyzed in this batch: HS22010747-01 HS22010747-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
WorkOrder: **HS22010747**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

RIGHT SOLUTIONS | RIGHT PARTNER

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: R1 & R2
Work Order: HS22010747

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22010747-01	R1	Login	1/18/2022 6:20:02 PM	PJM	MET073
HS22010747-01	R1	Login	1/18/2022 6:20:02 PM	PJM	EXT070
HS22010747-01	R1	Login	1/18/2022 6:20:02 PM	PJM	WET032
HS22010747-01	R1	Login	1/18/2022 6:20:02 PM	PJM	WET032
HS22010747-01	R1	Login	1/18/2022 6:20:02 PM	PJM	WET048
HS22010747-01	R1	Login	1/18/2022 6:20:02 PM	PJM	WET048
HS22010747-01	R1	Login	1/18/2022 6:20:02 PM	PJM	WET032
HS22010747-02	R2	Login	1/18/2022 6:20:02 PM	PJM	MET073
HS22010747-02	R2	Login	1/18/2022 6:20:02 PM	PJM	EXT070
HS22010747-02	R2	Login	1/18/2022 6:20:02 PM	PJM	WET032
HS22010747-02	R2	Login	1/18/2022 6:20:02 PM	PJM	WET032
HS22010747-02	R2	Login	1/18/2022 6:20:02 PM	PJM	WET048
HS22010747-02	R2	Login	1/18/2022 6:20:02 PM	PJM	WET048
HS22010747-02	R2	Login	1/18/2022 6:20:02 PM	PJM	WET032

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS22010747 **Date/Time Received:** **18-Jan-2022 16:20**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By:	/S/ Pablo Marinez	18-Jan-2022 18:10	**Reviewed by:**	/S/ Corey Grandits	20-Jan-2022 09:12
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **WATER** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:252585
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	15.2°C UC/C	IR 01	
Cooler(s)/Kit(s):	48076		
Date/Time sample(s) sent to storage:	1/18/22 18:30		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: CoC missing ID & Collection Date/Time, logged per Sample Label
(R1 11/1/22 11:02) (R4 11/1/22 11:34)

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

RIGHT SOLUTIONS | RIGHT PARTNER

Cincinnati, OH
+1 513 733 5336

Everett, WA
+1 425 356 2600

Fort Collins, CO
+1 970 490 1511

Holland, MI
+1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 252585

HS22010747

ERM, Inc
R1 & R2

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name		
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte I NC I 28203	City/State/Zip	Charlotte I NC I 28203	
Phone		Phone		
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	

A 8270SIM_Water (PAHs)
B DISS_O 4500-O G (Dissolved Oxygen)
C ICP_TWater (6020/7470 Metals (16))
D Nitrogen, Total_Water
E O&G_1664_Water_HS (Oil & Grease)
F P_TWater (Phosphorous)
G pH_Water_9040C
H Salinity
I TSS 2540D, TDS 2540C, & TS 2540G
J

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
0																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by: Date: Time:

Relinquished by: Date: Time:

Logged by (Laboratory): Date: Time:

Received by:

Received by (Laboratory): PCT 01/13/22 1620

Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
48076	15.2

QC Package: (Check One Box Below)
[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SVAM/CLP
[ ] Other
[ ] TRRP Checklist
[ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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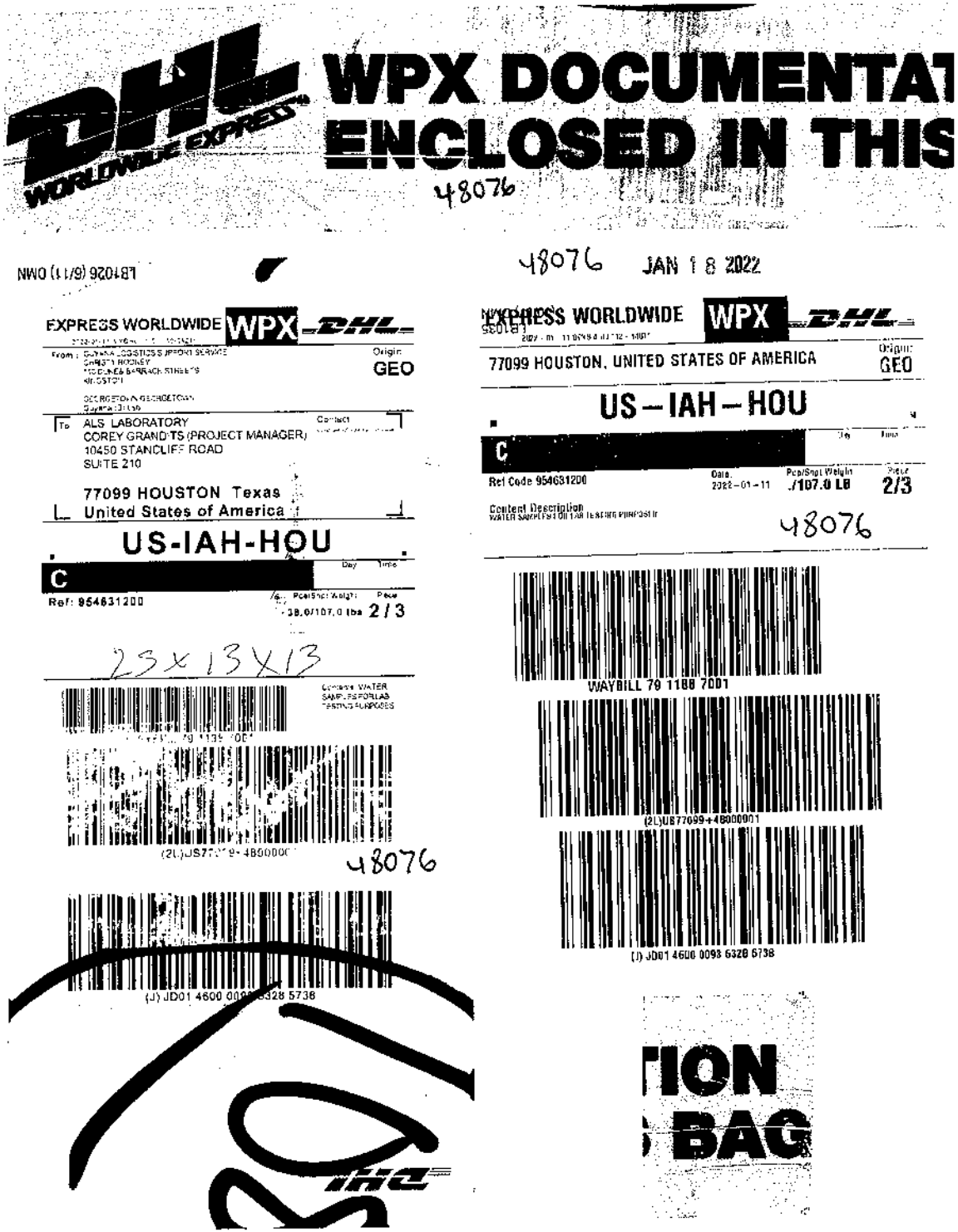

RIGHT SOLUTIONS | RIGHT PARTNER

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February 07, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22010956**

Laboratory Results for: **SW11**

Dear Selina Pradhan,

ALS Environmental received 1 sample(s) on Jan 21, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: SW11
Work Order: HS22010956

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22010956-01	SW-11	Water		13-Jan-2022 07:20	21-Jan-2022 13:57	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW11
Work Order: HS22010956

Work Order Comments

- Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

  The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

  Sample received outside method holding time for Dissolved Oxygen. DO is an immediate test. Sample results are flagged with an "H" qualifier.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 174694

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW6020A

Batch ID: 175022

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 174706

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2520

Batch ID: R401604

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540B

Batch ID: R401215

Sample ID: SW-11 (HS22010956-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method M2540C

Batch ID: R401727

Sample ID: SW-11 (HS22010956-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method E300

Batch ID: R401613

Sample ID: SW-11 (HS22010956-01)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW11
Work Order: HS22010956

WetChemistry by Method M2540D

Batch ID: R400965

Sample ID: SW-11 (HS22010956-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method Calculation

Batch ID: R401618

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E1664A

Batch ID: R401545

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R400864

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R400870

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 175001

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 174956

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
Sample ID: SW-11
Collection Date: 13-Jan-2022 07:20

ANALYTICAL REPORT
WorkOrder:HS22010956
Lab ID:HS22010956-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 24-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Acenaphthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Acenaphthylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Chrysene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Dibenzofuran	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Fluoranthene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Fluorene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Naphthalene	**0.074**	H	**0.010**	**0.010**	**ug/L**	1	25-Jan-2022 18:12
Phenanthrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Pyrene	U	H	0.010	0.010	ug/L	1	25-Jan-2022 18:12
Surr: 2-Fluorobiphenyl	*86.9*			*40-140*	*%REC*	*1*	*25-Jan-2022 18:12*
Surr: 4-Terphenyl-d14	*119*			*40-140*	*%REC*	*1*	*25-Jan-2022 18:12*
Surr: Nitrobenzene-d5	*66.7*			*40-140*	*%REC*	*1*	*25-Jan-2022 18:12*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 03-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	03-Feb-2022 16:44
Arsenic	**0.00272**		**0.000400**	**0.00200**	**mg/L**	1	03-Feb-2022 16:44
Beryllium	U		0.000200	0.00200	mg/L	1	03-Feb-2022 16:44
Cadmium	U		0.000200	0.00200	mg/L	1	03-Feb-2022 16:44
Chromium	**0.00159**	J	**0.000400**	**0.00400**	**mg/L**	1	03-Feb-2022 16:44
Cobalt	**0.00130**	J	**0.000200**	**0.00500**	**mg/L**	1	03-Feb-2022 16:44
Copper	**0.00124**	J	**0.00100**	**0.00200**	**mg/L**	1	03-Feb-2022 16:44
Lead	**0.00152**	J	**0.000600**	**0.00200**	**mg/L**	1	03-Feb-2022 16:44
Molybdenum	U		0.000600	0.00500	mg/L	1	03-Feb-2022 16:44
Nickel	**0.00266**		**0.000600**	**0.00200**	**mg/L**	1	03-Feb-2022 16:44
Selenium	U		0.00110	0.00200	mg/L	1	03-Feb-2022 16:44
Silver	U		0.000200	0.00200	mg/L	1	03-Feb-2022 16:44
Thallium	U		0.000200	0.00200	mg/L	1	03-Feb-2022 16:44
Vanadium	**0.00304**	J	**0.000600**	**0.00500**	**mg/L**	1	03-Feb-2022 16:44
Zinc	**0.00691**		**0.00200**	**0.00400**	**mg/L**	1	03-Feb-2022 16:44

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
Sample ID: SW-11
Collection Date: 13-Jan-2022 07:20

ANALYTICAL REPORT
WorkOrder:HS22010956
Lab ID:HS22010956-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A			**Method:SW7470A**		Prep:SW7470A / 25-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	25-Jan-2022 12:46
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)			**Method:Calculation**				Analyst: RPM
Nitrogen, Total	**0.50**		**0.10**	**0.50**	**mg/L**	1	04-Feb-2022 15:40
OIL & GREASE (HEM) BY E1664A			**Method:E1664A**				Analyst: KAH
Oil and Grease	**3.70**		**0.610**	**2.00**	**mg/L**	1	03-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993			**Method:E300**				Analyst: TH
Nitrate/Nitrite (as N)	**0.284**	J	**0.150**	**1.00**	**mg/L**	5	04-Feb-2022 11:01
PHOSPHORUS BY E365.3-1978			**Method:E365.3**		Prep:E365.3 / 01-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.167**		**0.0200**	**0.0500**	**mg/L**	1	01-Feb-2022 16:20
TOTAL SOLIDS BY SM2540B-2011			**Method:M2540B**				Analyst: KAH
Residue, Total	**208**	H	**5.00**	**10.0**	**mg/L**	1	27-Jan-2022 16:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011			**Method:M2540C**				Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**88.0**	H	**5.00**	**10.0**	**mg/L**	1	04-Feb-2022 13:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011			**Method:M2540D**				Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**138**	H	**2.50**	**2.50**	**mg/L**	1	24-Jan-2022 16:47
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011			**Method:M4500 NH3 D**		Prep:M4500-N C / 01-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.22**	J	**0.10**	**0.50**	**mg/L**	1	02-Feb-2022 14:30
DISSOLVED OXYGEN BY SM4500-O G			**Method:M4500-O G**				Analyst: TH
Oxygen, Dissolved	**6.72**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY			**Method:SM2520**				Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C			**Method:SW9040C**				Analyst: CWG
pH	**5.93**	H	**0.100**	**0.100**	**pH Units**	1	24-Jan-2022 15:33
Temp Deg C @pH	**20.7**	H	**0**	**0**	**DEG C**	1	24-Jan-2022 15:33

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

Batch ID: 174694 **Start Date:** 24 Jan 2022 09:30 **End Date:** 24 Jan 2022 14:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010956-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 174706 **Start Date:** 25 Jan 2022 08:00 **End Date:** 25 Jan 2022 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010956-01		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174956 **Start Date:** 01 Feb 2022 12:30 **End Date:** 01 Feb 2022 14:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010956-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

Batch ID: 175001 **Start Date:** 01 Feb 2022 11:00 **End Date:** 01 Feb 2022 13:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010956-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 175022 **Start Date:** 03 Feb 2022 09:00 **End Date:** 03 Feb 2022 13:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010956-01		10 (mL)	10 (mL)	1	120 plastic HNO3

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174694 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20		24 Jan 2022 12:53	25 Jan 2022 18:12	1
Batch ID: 174706 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20		25 Jan 2022 08:00	25 Jan 2022 12:46	1
Batch ID: 174956 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20		01 Feb 2022 12:30	01 Feb 2022 16:20	1
Batch ID: 175001 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20		01 Feb 2022 11:00	02 Feb 2022 14:30	1
Batch ID: 175022 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20		03 Feb 2022 13:00	03 Feb 2022 16:44	1
Batch ID: R400864 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20			24 Jan 2022 14:46	1
Batch ID: R400870 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20			24 Jan 2022 15:33	1
Batch ID: R400965 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20			24 Jan 2022 16:47	1
Batch ID: R401215 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20			27 Jan 2022 16:00	1
Batch ID: R401545 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20			03 Feb 2022 14:25	1
Batch ID: R401604 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20			04 Feb 2022 13:06	1
Batch ID: R401613 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20			04 Feb 2022 11:01	5
Batch ID: R401618 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20			04 Feb 2022 15:40	1
Batch ID: R401727 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22010956-01	SW-11	13 Jan 2022 07:20			04 Feb 2022 13:13	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 174706 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-174706** Units: **mg/L** Analysis Date: **25-Jan-2022 12:36**
Client ID: Run ID: **HG03_400927** SeqNo: **6475374** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U		0.000200								

LCS Sample ID: **LCS-174706** Units: **mg/L** Analysis Date: **25-Jan-2022 12:38**
Client ID: Run ID: **HG03_400927** SeqNo: **6475375** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00508		0.000200	0.005	0	102	80 - 120				

MS Sample ID: **HS22010926-01MS** Units: **mg/L** Analysis Date: **25-Jan-2022 12:41**
Client ID: Run ID: **HG03_400927** SeqNo: **6475377** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00538		0.000200	0.005	0.000011	107	75 - 125				

MSD Sample ID: **HS22010926-01MSD** Units: **mg/L** Analysis Date: **25-Jan-2022 12:43**
Client ID: Run ID: **HG03_400927** SeqNo: **6475378** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00518		0.000200	0.005	0.000011	103	75 - 125	0.00538	3.79	20	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 175022 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-175022** Units: **mg/L** Analysis Date: **03-Feb-2022 15:25**
Client ID: Run ID: **ICPMS06_401517** SeqNo: **6488451** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	0.000628	0.00500								J
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 175022 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-175022** Units: **mg/L** Analysis Date: **03-Feb-2022 15:23**
Client ID: Run ID: **ICPMS06_401517** SeqNo: **6488450** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05027	0.00200	0.05	0	101	80 - 120				
Arsenic	0.05185	0.00200	0.05	0	104	80 - 120				
Beryllium	0.04683	0.00200	0.05	0	93.7	80 - 120				
Cadmium	0.05161	0.00200	0.05	0	103	80 - 120				
Chromium	0.05134	0.00400	0.05	0	103	80 - 120				
Cobalt	0.05142	0.00500	0.05	0	103	80 - 120				
Copper	0.05364	0.00200	0.05	0	107	80 - 120				
Lead	0.05008	0.00200	0.05	0	100	80 - 120				
Molybdenum	0.04968	0.00500	0.05	0	99.4	80 - 120				
Nickel	0.05312	0.00200	0.05	0	106	80 - 120				
Selenium	0.05026	0.00200	0.05	0	101	80 - 120				
Silver	0.04946	0.00200	0.05	0	98.9	80 - 120				
Thallium	0.04866	0.00200	0.05	0	97.3	80 - 120				
Vanadium	0.05274	0.00500	0.05	0	105	80 - 120				
Zinc	0.05539	0.00400	0.05	0	111	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 175022 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22011015-01MS** Units: **mg/L** Analysis Date: **03-Feb-2022 15:42**
Client ID: Run ID: **ICPMS06_401517** SeqNo: **6488460** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05137	0.00200	0.05	0.000056	103	80 - 120				
Arsenic	0.05171	0.00200	0.05	0.000189	103	80 - 120				
Beryllium	0.049	0.00200	0.05	-0.000021	98.0	80 - 120				
Cadmium	0.05037	0.00200	0.05	0.000009	101	80 - 120				
Chromium	0.05177	0.00400	0.05	0.001764	100	80 - 120				
Cobalt	0.05018	0.00500	0.05	0.000551	99.3	80 - 120				
Copper	0.05156	0.00200	0.05	0.000397	102	80 - 120				
Lead	0.05117	0.00200	0.05	-0.000004	102	80 - 120				
Molybdenum	0.05107	0.00500	0.05	0.000276	102	80 - 120				
Nickel	0.05096	0.00200	0.05	0.001741	98.4	80 - 120				
Selenium	0.05071	0.00200	0.05	0.000069	101	80 - 120				
Silver	0.04741	0.00200	0.05	-0.000014	94.9	80 - 120				
Thallium	0.04978	0.00200	0.05	0	99.6	80 - 120				
Vanadium	0.05421	0.00500	0.05	0.000627	107	80 - 120				
Zinc	0.05423	0.00400	0.05	0.001723	105	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 175022 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22011015-01MSD** Units: **mg/L** Analysis Date: **03-Feb-2022 15:44**
Client ID: Run ID: **ICPMS06_401517** SeqNo: **6488461** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05117	0.00200	0.05	0.000056	102	80 - 120	0.05137	0.398	20	
Arsenic	0.05112	0.00200	0.05	0.000189	102	80 - 120	0.05171	1.14	20	
Beryllium	0.04923	0.00200	0.05	-0.000021	98.5	80 - 120	0.049	0.478	20	
Cadmium	0.05107	0.00200	0.05	0.000009	102	80 - 120	0.05037	1.38	20	
Chromium	0.05235	0.00400	0.05	0.001764	101	80 - 120	0.05177	1.13	20	
Cobalt	0.05129	0.00500	0.05	0.000551	101	80 - 120	0.05018	2.2	20	
Copper	0.05167	0.00200	0.05	0.000397	103	80 - 120	0.05156	0.211	20	
Lead	0.05152	0.00200	0.05	-0.000004	103	80 - 120	0.05117	0.678	20	
Molybdenum	0.05179	0.00500	0.05	0.000276	103	80 - 120	0.05107	1.38	20	
Nickel	0.05173	0.00200	0.05	0.001741	100.0	80 - 120	0.05096	1.5	20	
Selenium	0.05005	0.00200	0.05	0.000069	100.0	80 - 120	0.05071	1.3	20	
Silver	0.04769	0.00200	0.05	-0.000014	95.4	80 - 120	0.04741	0.585	20	
Thallium	0.05042	0.00200	0.05	0	101	80 - 120	0.04978	1.28	20	
Vanadium	0.05447	0.00500	0.05	0.000627	108	80 - 120	0.05421	0.48	20	
Zinc	0.0543	0.00400	0.05	0.001723	105	80 - 120	0.05423	0.122	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 175022 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22011015-01SD** Units: **mg/L** Analysis Date: **03-Feb-2022 15:40**
Client ID: Run ID: **ICPMS06_401517** SeqNo: **6488459** PrepDate: **03-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000056	0	10	
Arsenic	U	0.0100					0.000189	0	10	
Beryllium	U	0.0100					-0.000021	0	10	
Cadmium	U	0.0100					0.000009	0	10	
Chromium	U	0.0200					0.001764	0	10	
Cobalt	U	0.0250					0.000551	0	10	
Copper	U	0.0100					0.000397	0	10	
Lead	U	0.0100					-0.000004	0	10	
Molybdenum	U	0.0250					0.000276	0	10	
Nickel	U	0.0100					0.001741	0	10	
Selenium	U	0.0100					0.000069	0	10	
Silver	U	0.0100					-0.000014	0	10	
Thallium	U	0.0100					0	0	10	
Vanadium	0.004045	0.0250					0.000627	0	10	J
Zinc	U	0.0200					0.001723	0	10	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 174694 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-174694** Units: **ug/L** Analysis Date: **25-Jan-2022 17:12**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477632** PrepDate: **24-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.08118*	*0*	*0.08*	*0*	*101*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.06944*	*0*	*0.08*	*0*	*86.8*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.05416*	*0*	*0.08*	*0*	*67.7*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 174694 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-174694** Units: **ug/L** Analysis Date: **25-Jan-2022 17:32**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477633** PrepDate: **24-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.08611	0.010	0.08	0	108	40 - 140				
2-Methylnaphthalene	0.05074	0.010	0.08	0	63.4	40 - 140				
Acenaphthene	0.06272	0.010	0.08	0	78.4	40 - 140				
Acenaphthylene	0.07495	0.010	0.08	0	93.7	40 - 140				
Anthracene	0.05899	0.010	0.08	0	73.7	40 - 140				
Benz(a)anthracene	0.04031	0.010	0.08	0	50.4	40 - 140				
Benzo(a)pyrene	0.07359	0.010	0.08	0	92.0	40 - 140				
Benzo(b)fluoranthene	0.08156	0.010	0.08	0	102	40 - 140				
Benzo(g,h,i)perylene	0.08082	0.010	0.08	0	101	40 - 140				
Benzo(k)fluoranthene	0.08426	0.010	0.08	0	105	40 - 140				
Chrysene	0.07622	0.010	0.08	0	95.3	40 - 140				
Dibenz(a,h)anthracene	0.06944	0.010	0.08	0	86.8	40 - 140				
Dibenzofuran	0.08718	0.010	0.08	0	109	40 - 140				
Fluoranthene	0.05397	0.010	0.08	0	67.5	40 - 140				
Fluorene	0.08012	0.010	0.08	0	100	40 - 140				
Indeno(1,2,3-cd)pyrene	0.07385	0.010	0.08	0	92.3	40 - 140				
Naphthalene	0.07998	0.010	0.08	0	100.0	40 - 140				
Phenanthrene	0.04351	0.010	0.08	0	54.4	40 - 140				
Pyrene	0.08252	0.010	0.08	0	103	40 - 140				
Surr: 2-Fluorobiphenyl	*0.04551*	*0*	*0.08*	*0*	*56.9*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.0801*	*0*	*0.08*	*0*	*100*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.06918*	*0*	*0.08*	*0*	*86.5*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 174694 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-174694** Units: **ug/L** Analysis Date: **25-Jan-2022 17:52**
Client ID: Run ID: **SV-6_400933** SeqNo: **6477634** PrepDate: **24-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.08077	0.010	0.08	0	101	40 - 140	0.08611	6.41	20	
2-Methylnaphthalene	0.0491	0.010	0.08	0	61.4	40 - 140	0.05074	3.28	20	
Acenaphthene	0.06741	0.010	0.08	0	84.3	40 - 140	0.06272	7.2	20	
Acenaphthylene	0.08228	0.010	0.08	0	103	40 - 140	0.07495	9.31	20	
Anthracene	0.05659	0.010	0.08	0	70.7	40 - 140	0.05899	4.14	20	
Benz(a)anthracene	0.04271	0.010	0.08	0	53.4	40 - 140	0.04031	5.78	20	
Benzo(a)pyrene	0.07146	0.010	0.08	0	89.3	40 - 140	0.07359	2.93	20	
Benzo(b)fluoranthene	0.0837	0.010	0.08	0	105	40 - 140	0.08156	2.58	20	
Benzo(g,h,i)perylene	0.07878	0.010	0.08	0	98.5	40 - 140	0.08082	2.55	20	
Benzo(k)fluoranthene	0.08305	0.010	0.08	0	104	40 - 140	0.08426	1.45	20	
Chrysene	0.07455	0.010	0.08	0	93.2	40 - 140	0.07622	2.22	20	
Dibenz(a,h)anthracene	0.06721	0.010	0.08	0	84.0	40 - 140	0.06944	3.26	20	
Dibenzofuran	0.07658	0.010	0.08	0	95.7	40 - 140	0.08718	12.9	20	
Fluoranthene	0.06292	0.010	0.08	0	78.7	40 - 140	0.05397	15.3	20	
Fluorene	0.08044	0.010	0.08	0	101	40 - 140	0.08012	0.397	20	
Indeno(1,2,3-cd)pyrene	0.07637	0.010	0.08	0	95.5	40 - 140	0.07385	3.35	20	
Naphthalene	0.07578	0.010	0.08	0	94.7	40 - 140	0.07998	5.39	20	
Phenanthrene	0.04054	0.010	0.08	0	50.7	40 - 140	0.04351	7.08	20	
Pyrene	0.08564	0.010	0.08	0	107	40 - 140	0.08252	3.7	20	
Surr: 2-Fluorobiphenyl	*0.04832*	*0*	*0.08*	*0*	*60.4*	*40 - 140*	*0.04551*	*5.99*	*20*	
Surr: 4-Terphenyl-d14	*0.0788*	*0*	*0.08*	*0*	*98.5*	*40 - 140*	*0.0801*	*1.63*	*20*	
Surr: Nitrobenzene-d5	*0.06518*	*0*	*0.08*	*0*	*81.5*	*40 - 140*	*0.06918*	*5.95*	*20*	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 174956 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-174956** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485144** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-174956** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: Run ID: **UV-2450_401400** SeqNo: **6485143** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.272	0.0500	0.25	0	109	80 - 120				

MS Sample ID: **HS22010956-01MS** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: **SW-11** Run ID: **UV-2450_401400** SeqNo: **6485141** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.383	0.0500	0.25	0.167	86.4	80 - 120				

MSD Sample ID: **HS22010956-01MSD** Units: **mg/L** Analysis Date: **01-Feb-2022 16:20**
Client ID: **SW-11** Run ID: **UV-2450_401400** SeqNo: **6485142** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.376	0.0500	0.25	0.167	83.6	80 - 120	0.383	1.84	20	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: 175001 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-175001** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486367** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-175001** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486366** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.31	0.50	20	0	102	85 - 115				

MS Sample ID: **HS22010929-02MS** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486364** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.17	0.50	20	2.484	103	75 - 125				

MSD Sample ID: **HS22010929-02MSD** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486365** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.14	0.50	20	2.484	103	75 - 125	23.17	0.138	20	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: **R400864 (0)** **Instrument:** **ManTech01** **Method:** **DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS22010827-01DUP** Units: **mg/L** Analysis Date: **24-Jan-2022 14:46**
Client ID: Run ID: **ManTech01_400864** SeqNo: **6473925** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.75	1.00					11.72	0.256	20	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: **R400870 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS22010956-01DUP** Units: **pH Units** Analysis Date: **24-Jan-2022 15:33**
Client ID: **SW-11** Run ID: **WetChem_HS_400870** SeqNo: **6474059** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	5.9	0.100					5.93	0.507	10	
Temp Deg C @pH	20.8	0					20.7	0.482	10	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: R400965 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-012422** Units: **mg/L** Analysis Date: **24-Jan-2022 16:47**
Client ID: Run ID: **Balance1_400965** SeqNo: **6476128** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-012422** Units: **mg/L** Analysis Date: **24-Jan-2022 16:47**
Client ID: Run ID: **Balance1_400965** SeqNo: **6476129** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	89	2.50	100	0	89.0	85 - 115				

DUP Sample ID: **HS22010880-01DUP** Units: **mg/L** Analysis Date: **24-Jan-2022 16:47**
Client ID: Run ID: **Balance1_400965** SeqNo: **6476122** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	37.6	2.50					38	1.06	5	

DUP Sample ID: **HS22010709-02DUP** Units: **mg/L** Analysis Date: **24-Jan-2022 16:47**
Client ID: Run ID: **Balance1_400965** SeqNo: **6476114** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	16	2.50					15.4	3.82	5	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: R401215 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R401215** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481445** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R401215** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481444** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	980	10.0	1000	0	98.0	85 - 115				

DUP Sample ID: **HS22011043-01DUP** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481446** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0					2	0	20	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: R401545 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK	Sample ID:	**WBLKW-020322**			Units: **mg/L**		Analysis Date: **03-Feb-2022 14:25**				
Client ID:			Run ID:	**Balance1_401545**	SeqNo: **6488420**		PrepDate:		DF: **1**		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease		U	2.00								

LCS	Sample ID:	**WLCSW-020322**			Units: **mg/L**		Analysis Date: **03-Feb-2022 14:25**				
Client ID:			Run ID:	**Balance1_401545**	SeqNo: **6488422**		PrepDate:		DF: **1**		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease		36.1	2.00	40	0	90.2	78 - 114				

LCSD	Sample ID:	**WLCSDW-020322**			Units: **mg/L**		Analysis Date: **03-Feb-2022 14:25**				
Client ID:			Run ID:	**Balance1_401545**	SeqNo: **6488421**		PrepDate:		DF: **1**		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease		39.6	2.00	40	0	99.0	78 - 114	36.1	9.25	18	

MS	Sample ID:	**HS22011217-01MS**			Units: **mg/L**		Analysis Date: **03-Feb-2022 14:25**				
Client ID:			Run ID:	**Balance1_401545**	SeqNo: **6488414**		PrepDate:		DF: **1**		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease		38.9	2.00	40	2.066	92.1	78 - 114				

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: **R401604 (0)** **Instrument:** **WetChem_HS** **Method:** **SALINITY**

DUP Sample ID: **HS22010956-01DUP** Units: **ppt** Analysis Date: **04-Feb-2022 13:06**
Client ID: **SW-11** Run ID: **WetChem_HS_401604** SeqNo: **6489541** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: R401613 (0) **Instrument:** ICS-Integrion **Method:** NITRATE/NITRITE BY E300.0, REV 2.1, 1993

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **04-Feb-2022 10:29**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489640** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **04-Feb-2022 10:35**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489641** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	7.818	0.200	8	0	97.7	90 - 110				

MS Sample ID: **HS22010956-01MS** Units: **mg/L** Analysis Date: **04-Feb-2022 11:06**
Client ID: **SW-11** Run ID: **ICS-Integrion_401613** SeqNo: **6489643** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	16.89	1.00	20	0.2845	83.0	80 - 120				

MSD Sample ID: **HS22010956-01MSD** Units: **mg/L** Analysis Date: **04-Feb-2022 11:11**
Client ID: **SW-11** Run ID: **ICS-Integrion_401613** SeqNo: **6489644** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	17.91	1.00	20	0.2845	88.1	80 - 120	16.89	5.86	20	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: HS22010956

QC BATCH REPORT

Batch ID: R401727 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-020422** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491825** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-020422** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491826** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1080	10.0	1000	0	108	85 - 115				

DUP Sample ID: **HS22011355-01DUP** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491823** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	638	10.0					640	0.313	5	

DUP Sample ID: **HS22011267-02DUP** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491813** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1974	10.0					1960	0.712	5	

The following samples were analyzed in this batch: HS22010956-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW11
WorkOrder: **HS22010956**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

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Client: ERM, Inc
Project: SW11
Work Order: HS22010956

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22010956-01	SW-11	Login	1/21/2022 5:20:42 PM	NDR	MET073
HS22010956-01	SW-11	Login	1/21/2022 5:20:42 PM	NDR	EXT070
HS22010956-01	SW-11	Login	1/21/2022 5:20:42 PM	NDR	WET032
HS22010956-01	SW-11	Login	1/21/2022 5:20:42 PM	NDR	WET048
HS22010956-01	SW-11	Login	1/21/2022 5:20:42 PM	NDR	WET048
HS22010956-01	SW-11	Login	1/21/2022 5:20:42 PM	NDR	WET048
HS22010956-01	SW-11	Login	1/21/2022 5:20:42 PM	NDR	WET032

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Sample Receipt Checklist

Work Order ID: HS22010956 **Date/Time Received:** **21-Jan-2022 13:57**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By:	/S/ Nilesh D. Ranchod	21-Jan-2022 17:24	**Reviewed by:**	/S/ Corey Grandits	25-Jan-2022 10:26
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **WATER** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:252586
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	12.2°C /12.7C UC/C	IR 31	
Cooler(s)/Kit(s):	48077		
Date/Time sample(s) sent to storage:	01/21/2022 18:00		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: CoC missing ID & Collection Date/Time, logged per Sample Label
SW11 Date : 13/01/2022 Time : 07:20

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 252586

HS22010956

WV

ERM, Inc
SW11

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	
Work Order		Project Number	
Company Name	ERM	Bill To Company	ERM
Send Report To	Selina Pradhan	Invoice Attn	AP
Address	300 West Summit Avenue	Address	300 West Summit Avenue
City/State/Zip	Charlotte I NC I 28203	City/State/Zip	Charlotte I NC I 28203
Phone		Phone	
Fax		Fax	
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by: Date: Time: Received by:

Relinquished by: Date: Time: Received by (Laboratory): P.V.A. 1/21/2022 13:57

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
48077	12.2°

QC Package: (Check One Box Below)

☒ Level II Std QC
☐ Level III Std QC/Raw Data
☐ Level IV SW846/CLP
☐ Other
☐ TRRP Checklist
☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

Copyright 2011 by ALS Environmental.

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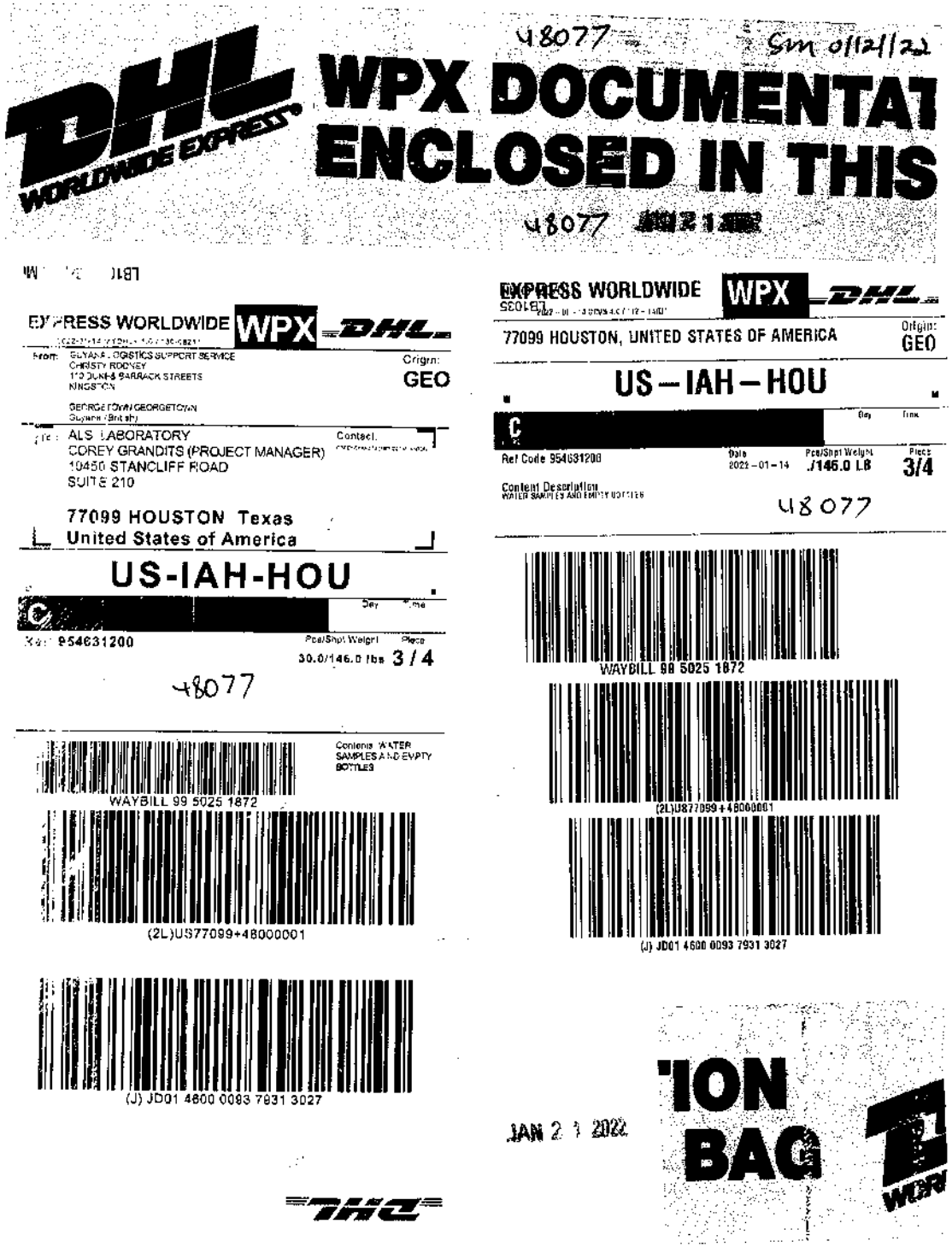

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 07, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22010993**

Laboratory Results for: **SW7 & SW8**

Dear Selina Pradhan,

ALS Environmental received 2 sample(s) on Jan 24, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: SW7 & SW8
Work Order: HS22010993

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22010993-01	SW7	Water		14-Jan-2022 11:00	24-Jan-2022 10:40	☐
HS22010993-02	SW8	Water		14-Jan-2022 10:40	24-Jan-2022 10:40	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW7 & SW8
Work Order: HS22010993

Work Order Comments

- Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

  The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 174755

Sample ID: LCSD-174755

- The RPD between the LCS and LCSD was outside of the control limit.

Sample ID: SW7 (HS22010993-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Metals by Method SW6020A

Batch ID: 175082

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 174706

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2520

Batch ID: R401604

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R401727

Sample ID: SW7 (HS22010993-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW8 (HS22010993-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW7 & SW8
Work Order: HS22010993

WetChemistry by Method M2540D

Batch ID: R401748

Sample ID: SW7 (HS22010993-01)

- Limited Sample used 500Ml
- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW8 (HS22010993-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method Calculation

Batch ID: R401747

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E300

Batch ID: R401613

Sample ID: SW7 (HS22010993-01)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Sample ID: SW8 (HS22010993-02)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

WetChemistry by Method E1664A

Batch ID: R401545

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R400864

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540B

Batch ID: R401215

Sample ID: SW7 (HS22010993-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW8 (HS22010993-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
Work Order: HS22010993

CASE NARRATIVE

WetChemistry by Method SW9040C

Batch ID: R400934

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 175097

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 175001

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
Sample ID: SW7
Collection Date: 14-Jan-2022 11:00

ANALYTICAL REPORT
WorkOrder:HS22010993
Lab ID:HS22010993-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 26-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Acenaphthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Dibenzofuran	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Fluorene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Naphthalene	**0.041**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 17:50
Phenanthrene	**0.010**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 17:50
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 17:50
Surr: 2-Fluorobiphenyl	*71.6*			*40-140*	*%REC*	*1*	*04-Feb-2022 17:50*
Surr: 4-Terphenyl-d14	*89.3*			*40-140*	*%REC*	*1*	*04-Feb-2022 17:50*
Surr: Nitrobenzene-d5	*73.6*			*40-140*	*%REC*	*1*	*04-Feb-2022 17:50*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 04-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	04-Feb-2022 21:51
Arsenic	**0.000476**	J	**0.000400**	**0.00200**	**mg/L**	1	04-Feb-2022 21:51
Beryllium	**0.000561**	J	**0.000200**	**0.00200**	**mg/L**	1	04-Feb-2022 21:51
Cadmium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:51
Chromium	**0.000856**	J	**0.000400**	**0.00400**	**mg/L**	1	04-Feb-2022 21:51
Cobalt	**0.00248**	J	**0.000200**	**0.00500**	**mg/L**	1	04-Feb-2022 21:51
Copper	U		0.00100	0.00200	mg/L	1	04-Feb-2022 21:51
Lead	U		0.000600	0.00200	mg/L	1	04-Feb-2022 21:51
Molybdenum	U		0.000600	0.00500	mg/L	1	04-Feb-2022 21:51
Nickel	**0.00543**		**0.000600**	**0.00200**	**mg/L**	1	04-Feb-2022 21:51
Selenium	U		0.00110	0.00200	mg/L	1	04-Feb-2022 21:51
Silver	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:51
Thallium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:51
Vanadium	**0.00151**	J	**0.000600**	**0.00500**	**mg/L**	1	04-Feb-2022 21:51
Zinc	**0.0367**		**0.00200**	**0.00400**	**mg/L**	1	04-Feb-2022 21:51

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
Sample ID: SW7
Collection Date: 14-Jan-2022 11:00

ANALYTICAL REPORT
WorkOrder:HS22010993
Lab ID:HS22010993-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 25-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	25-Jan-2022 12:58
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.41**	J	**0.10**	**0.50**	**mg/L**	1	07-Feb-2022 16:49
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**5.96**		**0.610**	**2.00**	**mg/L**	1	03-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: TH
Nitrate/Nitrite (as N)	**0.200**	J	**0.150**	**1.00**	**mg/L**	5	04-Feb-2022 11:38
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 04-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.171**		**0.0200**	**0.0500**	**mg/L**	1	07-Feb-2022 16:00
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**82.0**	H	**5.00**	**10.0**	**mg/L**	1	27-Jan-2022 16:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**126**	H	**5.00**	**10.0**	**mg/L**	1	04-Feb-2022 13:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**4.00**	H	**2.50**	**2.50**	**mg/L**	1	07-Feb-2022 12:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 01-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.21**	J	**0.10**	**0.50**	**mg/L**	1	02-Feb-2022 14:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**8.87**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**3.12**	H	**0.100**	**0.100**	**pH Units**	1	25-Jan-2022 14:28
Temp Deg C @pH	**22.9**	H	**0**	**0**	**DEG C**	1	25-Jan-2022 14:28

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
Sample ID: SW8
Collection Date: 14-Jan-2022 10:40

ANALYTICAL REPORT
WorkOrder:HS22010993
Lab ID:HS22010993-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 26-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Acenaphthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Dibenzofuran	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Fluorene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Naphthalene	**0.035**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 18:09
Phenanthrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:09
Surr: 2-Fluorobiphenyl	*98.6*			*40-140*	*%REC*	*1*	*04-Feb-2022 18:09*
Surr: 4-Terphenyl-d14	*98.5*			*40-140*	*%REC*	*1*	*04-Feb-2022 18:09*
Surr: Nitrobenzene-d5	*89.8*			*40-140*	*%REC*	*1*	*04-Feb-2022 18:09*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 04-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	04-Feb-2022 21:53
Arsenic	**0.00194**	J	**0.000400**	**0.00200**	**mg/L**	1	04-Feb-2022 21:53
Beryllium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:53
Cadmium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:53
Chromium	**0.000993**	J	**0.000400**	**0.00400**	**mg/L**	1	04-Feb-2022 21:53
Cobalt	**0.00100**	J	**0.000200**	**0.00500**	**mg/L**	1	04-Feb-2022 21:53
Copper	U		0.00100	0.00200	mg/L	1	04-Feb-2022 21:53
Lead	U		0.000600	0.00200	mg/L	1	04-Feb-2022 21:53
Molybdenum	U		0.000600	0.00500	mg/L	1	04-Feb-2022 21:53
Nickel	**0.00172**	J	**0.000600**	**0.00200**	**mg/L**	1	04-Feb-2022 21:53
Selenium	U		0.00110	0.00200	mg/L	1	04-Feb-2022 21:53
Silver	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:53
Thallium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:53
Vanadium	U		0.000600	0.00500	mg/L	1	04-Feb-2022 21:53
Zinc	**0.00472**		**0.00200**	**0.00400**	**mg/L**	1	04-Feb-2022 21:53

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
Sample ID: SW8
Collection Date: 14-Jan-2022 10:40

ANALYTICAL REPORT
WorkOrder:HS22010993
Lab ID:HS22010993-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A			**Method:SW7470A**		Prep:SW7470A / 25-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	25-Jan-2022 13:00
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)			**Method:Calculation**				Analyst: YP
Nitrogen, Total	**2.1**		**0.10**	**0.50**	**mg/L**	1	07-Feb-2022 16:49
OIL & GREASE (HEM) BY E1664A			**Method:E1664A**				Analyst: KAH
Oil and Grease	**3.43**		**0.610**	**2.00**	**mg/L**	1	03-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993			**Method:E300**				Analyst: TH
Nitrate/Nitrite (as N)	**0.178**	J	**0.150**	**1.00**	**mg/L**	5	04-Feb-2022 11:43
PHOSPHORUS BY E365.3-1978			**Method:E365.3**		Prep:E365.3 / 04-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0960**		**0.0200**	**0.0500**	**mg/L**	1	07-Feb-2022 16:00
TOTAL SOLIDS BY SM2540B-2011			**Method:M2540B**				Analyst: KAH
Residue, Total	**124**	H	**5.00**	**10.0**	**mg/L**	1	27-Jan-2022 16:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011			**Method:M2540C**				Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**112**	H	**5.00**	**10.0**	**mg/L**	1	04-Feb-2022 13:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011			**Method:M2540D**				Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**74.0**	H	**2.50**	**2.50**	**mg/L**	1	07-Feb-2022 12:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011			**Method:M4500 NH3 D**		Prep:M4500-N C / 01-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**1.9**		**0.10**	**0.50**	**mg/L**	1	02-Feb-2022 14:30
DISSOLVED OXYGEN BY SM4500-O G			**Method:M4500-O G**				Analyst: TH
Oxygen, Dissolved	**4.91**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY			**Method:SM2520**				Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C			**Method:SW9040C**				Analyst: CWG
pH	**5.79**	H	**0.100**	**0.100**	**pH Units**	1	25-Jan-2022 14:28
Temp Deg C @pH	**22.6**	H	**0**	**0**	**DEG C**	1	25-Jan-2022 14:28

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

Batch ID: 174706 **Start Date:** 25 Jan 2022 08:00 **End Date:** 25 Jan 2022 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010993-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22010993-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174755 **Start Date:** 26 Jan 2022 09:52 **End Date:** 26 Jan 2022 13:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010993-01		1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22010993-02		1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 175001 **Start Date:** 01 Feb 2022 11:00 **End Date:** 01 Feb 2022 13:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010993-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22010993-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 175082 **Start Date:** 04 Feb 2022 12:00 **End Date:** 04 Feb 2022 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010993-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22010993-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 175097 **Start Date:** 04 Feb 2022 10:30 **End Date:** 04 Feb 2022 12:30
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010993-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22010993-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174706 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00		25 Jan 2022 08:00	25 Jan 2022 12:58	1
HS22010993-02	SW8	14 Jan 2022 10:40		25 Jan 2022 08:00	25 Jan 2022 13:00	1
Batch ID: 174755 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00		26 Jan 2022 09:52	04 Feb 2022 17:50	1
HS22010993-02	SW8	14 Jan 2022 10:40		26 Jan 2022 09:52	04 Feb 2022 18:09	1
Batch ID: 175001 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00		01 Feb 2022 11:00	02 Feb 2022 14:30	1
HS22010993-02	SW8	14 Jan 2022 10:40		01 Feb 2022 11:00	02 Feb 2022 14:30	1
Batch ID: 175082 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00		04 Feb 2022 16:00	04 Feb 2022 21:51	1
HS22010993-02	SW8	14 Jan 2022 10:40		04 Feb 2022 16:00	04 Feb 2022 21:53	1
Batch ID: 175097 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00		04 Feb 2022 10:30	07 Feb 2022 16:00	1
HS22010993-02	SW8	14 Jan 2022 10:40		04 Feb 2022 10:30	07 Feb 2022 16:00	1
Batch ID: R400864 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00			24 Jan 2022 14:46	1
HS22010993-02	SW8	14 Jan 2022 10:40			24 Jan 2022 14:46	1
Batch ID: R400934 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00			25 Jan 2022 14:28	1
HS22010993-02	SW8	14 Jan 2022 10:40			25 Jan 2022 14:28	1
Batch ID: R401215 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00			27 Jan 2022 16:00	1
HS22010993-02	SW8	14 Jan 2022 10:40			27 Jan 2022 16:00	1
Batch ID: R401545 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00			03 Feb 2022 14:25	1
HS22010993-02	SW8	14 Jan 2022 10:40			03 Feb 2022 14:25	1
Batch ID: R401604 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00			04 Feb 2022 13:06	1
HS22010993-02	SW8	14 Jan 2022 10:40			04 Feb 2022 13:06	1
Batch ID: R401613 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00			04 Feb 2022 11:38	5
HS22010993-02	SW8	14 Jan 2022 10:40			04 Feb 2022 11:43	5
Batch ID: R401727 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00			04 Feb 2022 13:13	1
HS22010993-02	SW8	14 Jan 2022 10:40			04 Feb 2022 13:13	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R401747 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00			07 Feb 2022 16:49	1
HS22010993-02	SW8	14 Jan 2022 10:40			07 Feb 2022 16:49	1
Batch ID: R401748 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22010993-01	SW7	14 Jan 2022 11:00			07 Feb 2022 12:00	1
HS22010993-02	SW8	14 Jan 2022 10:40			07 Feb 2022 12:00	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 174706 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-174706** Units: **mg/L** Analysis Date: **25-Jan-2022 12:36**
Client ID: Run ID: **HG03_400927** SeqNo: **6475374** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-174706** Units: **mg/L** Analysis Date: **25-Jan-2022 12:38**
Client ID: Run ID: **HG03_400927** SeqNo: **6475375** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00508	0.000200	0.005	0	102	80 - 120				

MS Sample ID: **HS22010926-01MS** Units: **mg/L** Analysis Date: **25-Jan-2022 12:41**
Client ID: Run ID: **HG03_400927** SeqNo: **6475377** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00538	0.000200	0.005	0.000011	107	75 - 125				

MSD Sample ID: **HS22010926-01MSD** Units: **mg/L** Analysis Date: **25-Jan-2022 12:43**
Client ID: Run ID: **HG03_400927** SeqNo: **6475378** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00518	0.000200	0.005	0.000011	103	75 - 125	0.00538	3.79	20	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-175082** Units: **mg/L** Analysis Date: **04-Feb-2022 21:33**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490508** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-175082** Units: **mg/L** Analysis Date: **04-Feb-2022 21:35**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490509** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04686	0.00200	0.05	0	93.7	80 - 120				
Arsenic	0.04885	0.00200	0.05	0	97.7	80 - 120				
Beryllium	0.04966	0.00200	0.05	0	99.3	80 - 120				
Cadmium	0.05093	0.00200	0.05	0	102	80 - 120				
Chromium	0.04928	0.00400	0.05	0	98.6	80 - 120				
Cobalt	0.04825	0.00500	0.05	0	96.5	80 - 120				
Copper	0.05108	0.00200	0.05	0	102	80 - 120				
Lead	0.04845	0.00200	0.05	0	96.9	80 - 120				
Molybdenum	0.04887	0.00500	0.05	0	97.7	80 - 120				
Nickel	0.05023	0.00200	0.05	0	100	80 - 120				
Selenium	0.05133	0.00200	0.05	0	103	80 - 120				
Silver	0.04882	0.00200	0.05	0	97.6	80 - 120				
Thallium	0.04983	0.00200	0.05	0	99.7	80 - 120				
Vanadium	0.04786	0.00500	0.05	0	95.7	80 - 120				
Zinc	0.05234	0.00400	0.05	0	105	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22010974-12MS** Units: **mg/L** Analysis Date: **04-Feb-2022 21:41**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490512** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04777	0.00200	0.05	0.000183	95.2	80 - 120				
Arsenic	0.05158	0.00200	0.05	0.000758	102	80 - 120				
Beryllium	0.05164	0.00200	0.05	0.000023	103	80 - 120				
Cadmium	0.05164	0.00200	0.05	0.000507	102	80 - 120				
Chromium	0.04989	0.00400	0.05	0.000254	99.3	80 - 120				
Cobalt	0.04844	0.00500	0.05	0.000033	96.8	80 - 120				
Copper	0.0524	0.00200	0.05	0.000826	103	80 - 120				
Lead	0.04888	0.00200	0.05	0.000305	97.1	80 - 120				
Molybdenum	0.05161	0.00500	0.05	0.001882	99.5	80 - 120				
Nickel	0.05118	0.00200	0.05	0.001152	100	80 - 120				
Selenium	0.04918	0.00200	0.05	0.00011	98.1	80 - 120				
Silver	0.0485	0.00200	0.05	0.000015	97.0	80 - 120				
Thallium	0.04957	0.00200	0.05	0.000093	99.0	80 - 120				
Vanadium	0.0491	0.00500	0.05	-0.000113	98.4	80 - 120				
Zinc	0.05888	0.00400	0.05	0.007264	103	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22010974-12MSD** Units: **mg/L** Analysis Date: **04-Feb-2022 21:43**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490513** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Antimony	0.04655	0.00200	0.05	0.000183	92.7	80 - 120	0.04777	2.59	20	
Arsenic	0.04968	0.00200	0.05	0.000758	97.8	80 - 120	0.05158	3.76	20	
Beryllium	0.05117	0.00200	0.05	0.000023	102	80 - 120	0.05164	0.914	20	
Cadmium	0.0494	0.00200	0.05	0.000507	97.8	80 - 120	0.05164	4.44	20	
Chromium	0.04909	0.00400	0.05	0.000254	97.7	80 - 120	0.04989	1.63	20	
Cobalt	0.04766	0.00500	0.05	0.000033	95.3	80 - 120	0.04844	1.62	20	
Copper	0.05076	0.00200	0.05	0.000826	99.9	80 - 120	0.0524	3.18	20	
Lead	0.04799	0.00200	0.05	0.000305	95.4	80 - 120	0.04888	1.83	20	
Molybdenum	0.04994	0.00500	0.05	0.001882	96.1	80 - 120	0.05161	3.29	20	
Nickel	0.04991	0.00200	0.05	0.001152	97.5	80 - 120	0.05118	2.53	20	
Selenium	0.04616	0.00200	0.05	0.00011	92.1	80 - 120	0.04918	6.33	20	
Silver	0.04706	0.00200	0.05	0.000015	94.1	80 - 120	0.0485	3.01	20	
Thallium	0.04963	0.00200	0.05	0.000093	99.1	80 - 120	0.04957	0.117	20	
Vanadium	0.04777	0.00500	0.05	-0.000113	95.8	80 - 120	0.0491	2.74	20	
Zinc	0.05698	0.00400	0.05	0.007264	99.4	80 - 120	0.05888	3.27	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22010974-12SD** Units: **mg/L** Analysis Date: **04-Feb-2022 21:39**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490511** PrepDate: **04-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000183	0	10	
Arsenic	U	0.0100					0.000758	0	10	
Beryllium	U	0.0100					0.000023	0	10	
Cadmium	U	0.0100					0.000507	0	10	
Chromium	U	0.0200					0.000254	0	10	
Cobalt	U	0.0250					0.000033	0	10	
Copper	U	0.0100					0.000826	0	10	
Lead	U	0.0100					0.000305	0	10	
Molybdenum	U	0.0250					0.001882	0	10	
Nickel	U	0.0100					0.001152	0	10	
Selenium	U	0.0100					0.00011	0	10	
Silver	U	0.0100					0.000015	0	10	
Thallium	U	0.0100					0.000093	0	10	
Vanadium	U	0.0250					-0.000113	0	10	
Zinc	U	0.0200					0.007264	0	10	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 174755 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-174755** Units: **ug/L** Analysis Date: **04-Feb-2022 14:50**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491331** PrepDate: **26-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.08627*	*0*	*0.08*	*0*	*108*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.109*	*0*	*0.08*	*0*	*136*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.08013*	*0*	*0.08*	*0*	*100*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 174755 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-174755** Units: **ug/L** Analysis Date: **04-Feb-2022 15:10**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491332** PrepDate: **26-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.05456	0.010	0.08	0	68.2	40 - 140				
2-Methylnaphthalene	0.04749	0.010	0.08	0	59.4	40 - 140				
Acenaphthene	0.04864	0.010	0.08	0	60.8	40 - 140				
Acenaphthylene	0.04471	0.010	0.08	0	55.9	40 - 140				
Anthracene	0.04738	0.010	0.08	0	59.2	40 - 140				
Benz(a)anthracene	0.04539	0.010	0.08	0	56.7	40 - 140				
Benzo(a)pyrene	0.04513	0.010	0.08	0	56.4	40 - 140				
Benzo(b)fluoranthene	0.04982	0.010	0.08	0	62.3	40 - 140				
Benzo(g,h,i)perylene	0.04609	0.010	0.08	0	57.6	40 - 140				
Benzo(k)fluoranthene	0.05155	0.010	0.08	0	64.4	40 - 140				
Chrysene	0.05296	0.010	0.08	0	66.2	40 - 140				
Dibenz(a,h)anthracene	0.04781	0.010	0.08	0	59.8	40 - 140				
Dibenzofuran	0.04803	0.010	0.08	0	60.0	40 - 140				
Fluoranthene	0.04858	0.010	0.08	0	60.7	40 - 140				
Fluorene	0.04504	0.010	0.08	0	56.3	40 - 140				
Indeno(1,2,3-cd)pyrene	0.04575	0.010	0.08	0	57.2	40 - 140				
Naphthalene	0.06511	0.010	0.08	0	81.4	40 - 140				
Phenanthrene	0.04969	0.010	0.08	0	62.1	40 - 140				
Pyrene	0.04657	0.010	0.08	0	58.2	40 - 140				
Surr: 2-Fluorobiphenyl	*0.06569*	*0*	*0.08*	*0*	*82.1*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.05169*	*0*	*0.08*	*0*	*64.6*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.06396*	*0*	*0.08*	*0*	*80.0*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 174755 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-174755** Units: **ug/L** Analysis Date: **04-Feb-2022 15:30**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491333** PrepDate: **26-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.05365	0.010	0.08	0	67.1	40 - 140	0.05456	1.68	20	
2-Methylnaphthalene	0.04793	0.010	0.08	0	59.9	40 - 140	0.04749	0.916	20	
Acenaphthene	0.04789	0.010	0.08	0	59.9	40 - 140	0.04864	1.54	20	
Acenaphthylene	0.04391	0.010	0.08	0	54.9	40 - 140	0.04471	1.83	20	
Anthracene	0.0458	0.010	0.08	0	57.2	40 - 140	0.04738	3.39	20	
Benz(a)anthracene	0.04407	0.010	0.08	0	55.1	40 - 140	0.04539	2.95	20	
Benzo(a)pyrene	0.05739	0.010	0.08	0	71.7	40 - 140	0.04513	23.9	20	R
Benzo(b)fluoranthene	0.05392	0.010	0.08	0	67.4	40 - 140	0.04982	7.89	20	
Benzo(g,h,i)perylene	0.04888	0.010	0.08	0	61.1	40 - 140	0.04609	5.89	20	
Benzo(k)fluoranthene	0.05129	0.010	0.08	0	64.1	40 - 140	0.05155	0.513	20	
Chrysene	0.04549	0.010	0.08	0	56.9	40 - 140	0.05296	15.2	20	
Dibenz(a,h)anthracene	0.04932	0.010	0.08	0	61.7	40 - 140	0.04781	3.12	20	
Dibenzofuran	0.05072	0.010	0.08	0	63.4	40 - 140	0.04803	5.45	20	
Fluoranthene	0.04629	0.010	0.08	0	57.9	40 - 140	0.04858	4.83	20	
Fluorene	0.04674	0.010	0.08	0	58.4	40 - 140	0.04504	3.69	20	
Indeno(1,2,3-cd)pyrene	0.04858	0.010	0.08	0	60.7	40 - 140	0.04575	6.01	20	
Naphthalene	0.06453	0.010	0.08	0	80.7	40 - 140	0.06511	0.898	20	
Phenanthrene	0.04626	0.010	0.08	0	57.8	40 - 140	0.04969	7.14	20	
Pyrene	0.04493	0.010	0.08	0	56.2	40 - 140	0.04657	3.59	20	
Surr: 2-Fluorobiphenyl	*0.06372*	*0*	*0.08*	*0*	*79.7*	*40 - 140*	*0.06569*	*3.04*	*20*	
Surr: 4-Terphenyl-d14	*0.05112*	*0*	*0.08*	*0*	*63.9*	*40 - 140*	*0.05169*	*1.1*	*20*	
Surr: Nitrobenzene-d5	*0.06037*	*0*	*0.08*	*0*	*75.5*	*40 - 140*	*0.06396*	*5.78*	*20*	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 175001 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-175001** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486367** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-175001** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486366** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.31	0.50	20	0	102	85 - 115				

MS Sample ID: **HS22010929-02MS** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486364** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.17	0.50	20	2.484	103	75 - 125				

MSD Sample ID: **HS22010929-02MSD** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486365** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.14	0.50	20	2.484	103	75 - 125	23.17	0.138	20	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: 175097 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-175097** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491261** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-175097** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491260** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.231	0.0500	0.25	0	92.4	80 - 120				

MS Sample ID: **HS22010929-02MS** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491258** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.228	0.0500	0.25	0.013	86.0	80 - 120				

MSD Sample ID: **HS22010929-02MSD** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491259** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.222	0.0500	0.25	0.013	83.6	80 - 120	0.228	2.67	20	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: **R400864 (0)** **Instrument:** **ManTech01** **Method:** **DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS22010827-01DUP** Units: **mg/L** Analysis Date: **24-Jan-2022 14:46**
Client ID: Run ID: **ManTech01_400864** SeqNo: **6473925** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.75	1.00					11.72	0.256	20	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: **R400934 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS22010993-02DUP** Units: **pH Units** Analysis Date: **25-Jan-2022 14:28**
Client ID: **SW8** Run ID: **WetChem_HS_400934** SeqNo: **6475514** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	5.78	0.100					5.79	0.173	10	
Temp Deg C @pH	22.8	0					22.6	0.881	10	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: R401215 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R401215** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481445** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R401215** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481444** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	980	10.0	1000	0	98.0	85 - 115				

DUP Sample ID: **HS22011043-01DUP** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481446** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0					2	0	20	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: R401545 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488420** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488422** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.1	2.00	40	0	90.2	78 - 114				

LCSD Sample ID: **WLCSDW-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488421** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39.6	2.00	40	0	99.0	78 - 114	36.1	9.25	18	

MS Sample ID: **HS22011217-01MS** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488414** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.9	2.00	40	2.066	92.1	78 - 114				

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: **R401604 (0)** **Instrument:** **WetChem_HS** **Method:** **SALINITY**

DUP Sample ID: **HS22010956-01DUP** Units: **ppt** Analysis Date: **04-Feb-2022 13:06**
Client ID: Run ID: **WetChem_HS_401604** SeqNo: **6489541** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: R401613 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY E300.0, REV 2.1, 1993**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **04-Feb-2022 10:29**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489640** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **04-Feb-2022 10:35**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489641** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	7.818	0.200	8	0	97.7	90 - 110				

MS Sample ID: **HS22010956-01MS** Units: **mg/L** Analysis Date: **04-Feb-2022 11:06**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489643** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	16.89	1.00	20	0.2845	83.0	80 - 120				

MSD Sample ID: **HS22010956-01MSD** Units: **mg/L** Analysis Date: **04-Feb-2022 11:11**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489644** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	17.91	1.00	20	0.2845	88.1	80 - 120	16.89	5.86	20	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: R401727 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-020422** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491825** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-020422** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491826** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1080	10.0	1000	0	108	85 - 115				

DUP Sample ID: **HS22011355-01DUP** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491823** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	638	10.0					640	0.313	5	

DUP Sample ID: **HS22011267-02DUP** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491813** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1974	10.0					1960	0.712	5	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: HS22010993

QC BATCH REPORT

Batch ID: R401748 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-020722** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492379** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-020722** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492380** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	97	2.50	100	0	97.0	85 - 115				

DUP Sample ID: **HS22020063-05DUP** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492376** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	1980	2.50					1990	0.504	5	

DUP Sample ID: **HS22010994-01DUP** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492360** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	78	2.50					76.67	1.72	5	

The following samples were analyzed in this batch: HS22010993-01 HS22010993-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW7 & SW8
WorkOrder: **HS22010993**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

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Client: ERM, Inc
Project: SW7 & SW8
Work Order: HS22010993

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22010993-01	SW7	Login	1/24/2022 11:57:49 AM	NDR	MET073
HS22010993-01	SW7	Login	1/24/2022 11:57:49 AM	NDR	EXT070
HS22010993-01	SW7	Login	1/24/2022 11:57:49 AM	NDR	WET032
HS22010993-01	SW7	Login	1/24/2022 11:57:49 AM	NDR	WET048
HS22010993-01	SW7	Login	1/24/2022 11:57:49 AM	NDR	WET048
HS22010993-01	SW7	Login	1/24/2022 11:57:49 AM	NDR	WET048
HS22010993-01	SW7	Login	1/24/2022 11:57:49 AM	NDR	WET032
HS22010993-02	SW8	Login	1/24/2022 11:57:49 AM	NDR	MET073
HS22010993-02	SW8	Login	1/24/2022 11:57:49 AM	NDR	EXT070
HS22010993-02	SW8	Login	1/24/2022 11:57:49 AM	NDR	WET048
HS22010993-02	SW8	Login	1/24/2022 11:57:49 AM	NDR	WET048
HS22010993-02	SW8	Login	1/24/2022 11:57:49 AM	NDR	WET048
HS22010993-02	SW8	Login	1/24/2022 11:57:49 AM	NDR	WET048
HS22010993-02	SW8	Login	1/24/2022 11:57:49 AM	NDR	WET048

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Sample Receipt Checklist

Work Order ID: HS22010993 **Date/Time Received:** **24-Jan-2022 10:40**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By:	/S/ Nilesh D. Ranchod	24-Jan-2022 12:03	**Reviewed by:**	/S/ Corey Grandits	25-Jan-2022 10:28
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **WATER** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:259245
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s):	15.5°C/15.0c UC/C	IR 31
Cooler(s)/Kit(s):	25220	
Date/Time sample(s) sent to storage:	01/24/2022 13:00	

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: CoC missing ID & Collection Date/Time, logged per Sample Label
SW7 1/14/22 11:00, SW8 1/14/22 10:40

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 259245

HS22010993

ERM, Inc
SW7 & SW8

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name		
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte, NC 28203	City/State/Zip	Charlotte, NC 28203	
Phone	(507) 304-2187	Phone	(507) 304-2187	
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	selina.pradhan@erm.com	

A 8270SIM_Water (PAHs)
B DISS_O 4500-O G (Dissolved Oxygen)
C ICP_TWater (6020/7470 Metals (16))
D Nitrogen, Total_Water
E O&G_1664_Water_HS (Oil & Grease)
F P_TWater (Phosphorous)
G pH_Water_9040C
H Salinity
I TSS 2540D, TDS 2540C, & TS 2540G
J

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
0																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] 5-10 Work Days [ ] 5 Work Days [ ] 2 Day [ ] 24 Hour [ ] Other ____

Results Due Date:

Relinquished by: Date: Time: Received by:

Relinquished by: Date: Time: Received by (Laboratory): PG 011224 22 1040

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
25220	14.5

QC Package: (Check One Box Below)
[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SW846 QC/Raw Data
[ ] TRRP Checklist
[ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

Copyright 2011 by ALS Environmental

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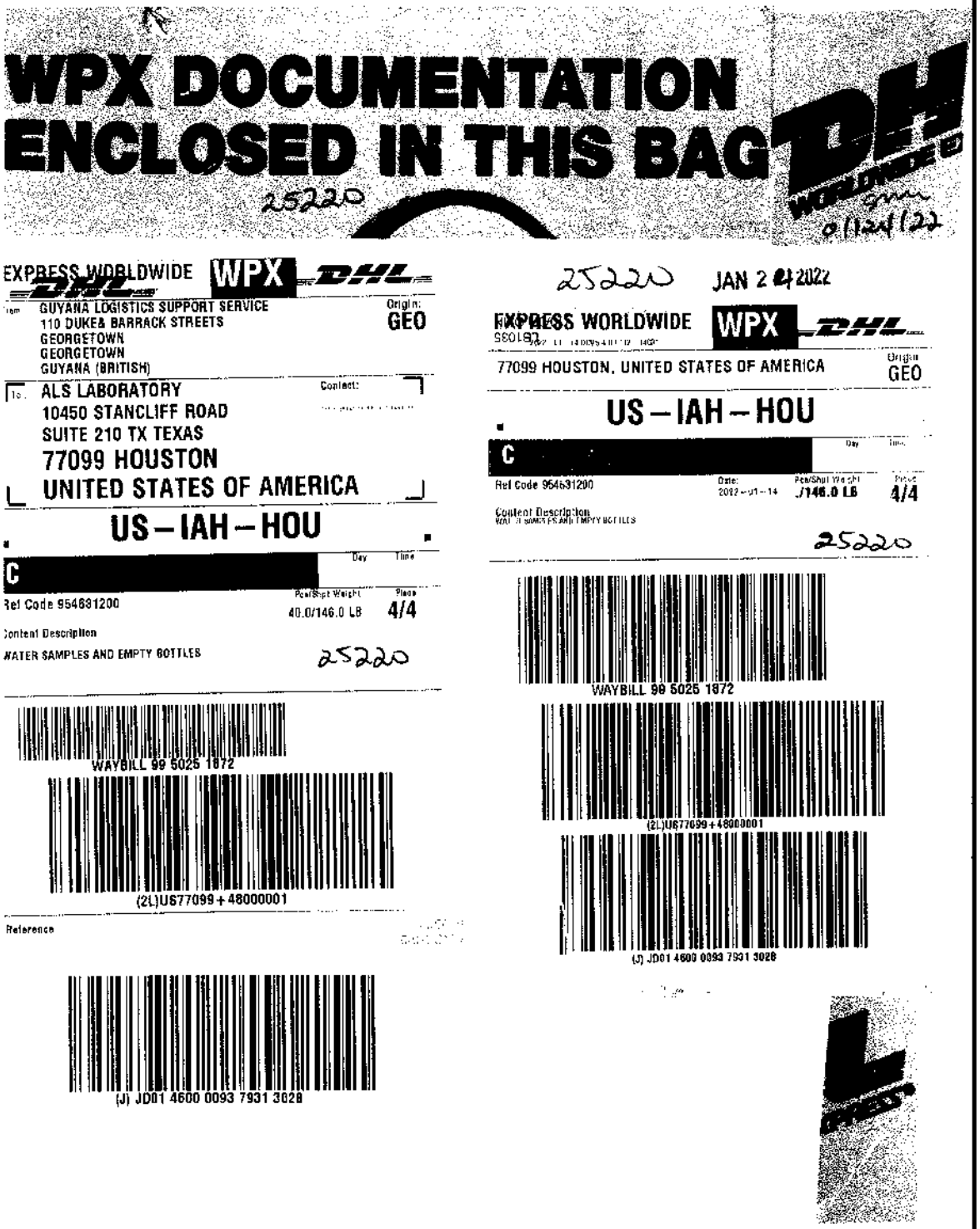

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 07, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22010994**

Laboratory Results for: **SW2 & SW14**

Dear Selina Pradhan,

ALS Environmental received 2 sample(s) on Jan 24, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: SW2 & SW14
Work Order: HS22010994

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22010994-01	SW2	Water		14-Jan-2022 11:53	24-Jan-2022 10:40	☐
HS22010994-02	SW14	Water		14-Jan-2022 10:48	24-Jan-2022 10:40	☐

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Client: ERM, Inc **CASE NARRATIVE**
Project: SW2 & SW14
Work Order: HS22010994

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 174755

Sample ID: LCSD-174755

• The RPD between the LCS and LCSD was outside of the control limit.

Sample ID: SW2 (HS22010994-01)

• Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Metals by Method SW6020A

Batch ID: 175082

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 174706

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2520

Batch ID: R401604

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R401727

Sample ID: SW14 (HS22010994-02)

• Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW2 (HS22010994-01)

• Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW2 & SW14
Work Order: HS22010994

WetChemistry by Method M2540D

Batch ID: R401748

Sample ID: SW14 (HS22010994-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW2 (HS22010994-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method Calculation

Batch ID: R401747

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E300

Batch ID: R401613

Sample ID: SW14 (HS22010994-02)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Sample ID: SW2 (HS22010994-01)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

WetChemistry by Method E1664A

Batch ID: R401545

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R400864

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540B

Batch ID: R401215

Sample ID: SW14 (HS22010994-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW2 (HS22010994-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW2 & SW14
Work Order: HS22010994

WetChemistry by Method SW9040C

Batch ID: R400934

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 175097

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 175001

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
Sample ID: SW2
Collection Date: 14-Jan-2022 11:53

ANALYTICAL REPORT
WorkOrder:HS22010994
Lab ID:HS22010994-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 26-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Acenaphthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Dibenzofuran	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Fluorene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Naphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Phenanthrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:29
Surr: 2-Fluorobiphenyl	*75.0*			*40-140*	*%REC*	*1*	*04-Feb-2022 18:29*
Surr: 4-Terphenyl-d14	*95.3*			*40-140*	*%REC*	*1*	*04-Feb-2022 18:29*
Surr: Nitrobenzene-d5	*79.6*			*40-140*	*%REC*	*1*	*04-Feb-2022 18:29*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 04-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	04-Feb-2022 21:55
Arsenic	**0.00320**		**0.000400**	**0.00200**	**mg/L**	1	04-Feb-2022 21:55
Beryllium	**0.000208**	J	**0.000200**	**0.00200**	**mg/L**	1	04-Feb-2022 21:55
Cadmium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:55
Chromium	**0.00317**	J	**0.000400**	**0.00400**	**mg/L**	1	04-Feb-2022 21:55
Cobalt	**0.00139**	J	**0.000200**	**0.00500**	**mg/L**	1	04-Feb-2022 21:55
Copper	**0.00239**		**0.00100**	**0.00200**	**mg/L**	1	04-Feb-2022 21:55
Lead	**0.00315**		**0.000600**	**0.00200**	**mg/L**	1	04-Feb-2022 21:55
Molybdenum	U		0.000600	0.00500	mg/L	1	04-Feb-2022 21:55
Nickel	**0.00309**		**0.000600**	**0.00200**	**mg/L**	1	04-Feb-2022 21:55
Selenium	U		0.00110	0.00200	mg/L	1	04-Feb-2022 21:55
Silver	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:55
Thallium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:55
Vanadium	**0.00535**		**0.000600**	**0.00500**	**mg/L**	1	04-Feb-2022 21:55
Zinc	**0.0119**		**0.00200**	**0.00400**	**mg/L**	1	04-Feb-2022 21:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM, Inc
Project: SW2 & SW14
Sample ID: SW2
Collection Date: 14-Jan-2022 11:53

ANALYTICAL REPORT
WorkOrder:HS22010994
Lab ID:HS22010994-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A			**Method:SW7470A**		Prep:SW7470A / 25-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	25-Jan-2022 13:01
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)			**Method:Calculation**				Analyst: YP
Nitrogen, Total	**0.77**		**0.10**	**0.50**	**mg/L**	1	07-Feb-2022 16:49
OIL & GREASE (HEM) BY E1664A			**Method:E1664A**				Analyst: KAH
Oil and Grease	**13.0**		**0.610**	**2.00**	**mg/L**	1	03-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993			**Method:E300**				Analyst: TH
Nitrate/Nitrite (as N)	**0.312**	J	**0.150**	**1.00**	**mg/L**	5	04-Feb-2022 11:48
PHOSPHORUS BY E365.3-1978			**Method:E365.3**		Prep:E365.3 / 04-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.119**		**0.0200**	**0.0500**	**mg/L**	1	07-Feb-2022 16:00
TOTAL SOLIDS BY SM2540B-2011			**Method:M2540B**				Analyst: KAH
Residue, Total	**192**	H	**5.00**	**10.0**	**mg/L**	1	27-Jan-2022 16:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011			**Method:M2540C**				Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**112**	H	**5.00**	**10.0**	**mg/L**	1	04-Feb-2022 13:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011			**Method:M2540D**				Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**76.7**	H	**2.50**	**2.50**	**mg/L**	1	07-Feb-2022 12:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011			**Method:M4500 NH3 D**		Prep:M4500-N C / 01-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.46**	J	**0.10**	**0.50**	**mg/L**	1	02-Feb-2022 14:30
DISSOLVED OXYGEN BY SM4500-O G			**Method:M4500-O G**				Analyst: TH
Oxygen, Dissolved	**6.23**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY			**Method:SM2520**				Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C			**Method:SW9040C**				Analyst: CWG
pH	**6.62**	H	**0.100**	**0.100**	**pH Units**	1	25-Jan-2022 14:28
Temp Deg C @pH	**22.8**	H	**0**	**0**	**DEG C**	1	25-Jan-2022 14:28

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
Sample ID: SW14
Collection Date: 14-Jan-2022 10:48

ANALYTICAL REPORT
WorkOrder:HS22010994
Lab ID:HS22010994-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 26-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Acenaphthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Dibenzofuran	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Fluorene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Naphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Phenanthrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 18:49
Surr: 2-Fluorobiphenyl	*78.7*			*40-140*	*%REC*	*1*	*04-Feb-2022 18:49*
Surr: 4-Terphenyl-d14	*101*			*40-140*	*%REC*	*1*	*04-Feb-2022 18:49*
Surr: Nitrobenzene-d5	*95.5*			*40-140*	*%REC*	*1*	*04-Feb-2022 18:49*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 04-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	04-Feb-2022 21:57
Arsenic	**0.000898**	J	**0.000400**	**0.00200**	**mg/L**	1	04-Feb-2022 21:57
Beryllium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:57
Cadmium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:57
Chromium	**0.00159**	J	**0.000400**	**0.00400**	**mg/L**	1	04-Feb-2022 21:57
Cobalt	**0.000879**	J	**0.000200**	**0.00500**	**mg/L**	1	04-Feb-2022 21:57
Copper	**0.00102**	J	**0.00100**	**0.00200**	**mg/L**	1	04-Feb-2022 21:57
Lead	**0.000894**	J	**0.000600**	**0.00200**	**mg/L**	1	04-Feb-2022 21:57
Molybdenum	U		0.000600	0.00500	mg/L	1	04-Feb-2022 21:57
Nickel	**0.00106**	J	**0.000600**	**0.00200**	**mg/L**	1	04-Feb-2022 21:57
Selenium	U		0.00110	0.00200	mg/L	1	04-Feb-2022 21:57
Silver	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:57
Thallium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:57
Vanadium	**0.00250**	J	**0.000600**	**0.00500**	**mg/L**	1	04-Feb-2022 21:57
Zinc	**0.0144**		**0.00200**	**0.00400**	**mg/L**	1	04-Feb-2022 21:57

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
Sample ID: SW14
Collection Date: 14-Jan-2022 10:48

ANALYTICAL REPORT
WorkOrder:HS22010994
Lab ID:HS22010994-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 25-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	25-Jan-2022 13:03
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.49**	J	**0.10**	**0.50**	**mg/L**	1	07-Feb-2022 16:49
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	03-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: TH
Nitrate/Nitrite (as N)	**0.264**	J	**0.150**	**1.00**	**mg/L**	5	04-Feb-2022 11:54
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 04-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0200**	J	**0.0200**	**0.0500**	**mg/L**	1	07-Feb-2022 16:00
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**50.0**	H	**5.00**	**10.0**	**mg/L**	1	27-Jan-2022 16:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**86.0**	H	**5.00**	**10.0**	**mg/L**	1	04-Feb-2022 13:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**28.0**	H	**2.50**	**2.50**	**mg/L**	1	07-Feb-2022 12:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 01-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.23**	J	**0.10**	**0.50**	**mg/L**	1	02-Feb-2022 14:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**8.16**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**5.00**	H	**0.100**	**0.100**	**pH Units**	1	25-Jan-2022 14:28
Temp Deg C @pH	**23.0**	H	**0**	**0**	**DEG C**	1	25-Jan-2022 14:28

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

Batch ID: 174706 **Start Date:** 25 Jan 2022 08:00 **End Date:** 25 Jan 2022 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010994-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22010994-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174755 **Start Date:** 26 Jan 2022 09:52 **End Date:** 26 Jan 2022 13:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010994-01		1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22010994-02		1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 175001 **Start Date:** 01 Feb 2022 11:00 **End Date:** 01 Feb 2022 13:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010994-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22010994-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 175082 **Start Date:** 04 Feb 2022 12:00 **End Date:** 04 Feb 2022 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010994-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22010994-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 175097 **Start Date:** 04 Feb 2022 10:30 **End Date:** 04 Feb 2022 12:30
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010994-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22010994-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174706 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53		25 Jan 2022 08:00	25 Jan 2022 13:01	1
HS22010994-02	SW14	14 Jan 2022 10:48		25 Jan 2022 08:00	25 Jan 2022 13:03	1
Batch ID: 174755 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53		26 Jan 2022 09:52	04 Feb 2022 18:29	1
HS22010994-02	SW14	14 Jan 2022 10:48		26 Jan 2022 09:52	04 Feb 2022 18:49	1
Batch ID: 175001 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53		01 Feb 2022 11:00	02 Feb 2022 14:30	1
HS22010994-02	SW14	14 Jan 2022 10:48		01 Feb 2022 11:00	02 Feb 2022 14:30	1
Batch ID: 175082 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53		04 Feb 2022 16:00	04 Feb 2022 21:55	1
HS22010994-02	SW14	14 Jan 2022 10:48		04 Feb 2022 16:00	04 Feb 2022 21:57	1
Batch ID: 175097 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53		04 Feb 2022 10:30	07 Feb 2022 16:00	1
HS22010994-02	SW14	14 Jan 2022 10:48		04 Feb 2022 10:30	07 Feb 2022 16:00	1
Batch ID: R400864 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53			24 Jan 2022 14:46	1
HS22010994-02	SW14	14 Jan 2022 10:48			24 Jan 2022 14:46	1
Batch ID: R400934 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53			25 Jan 2022 14:28	1
HS22010994-02	SW14	14 Jan 2022 10:48			25 Jan 2022 14:28	1
Batch ID: R401215 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53			27 Jan 2022 16:00	1
HS22010994-02	SW14	14 Jan 2022 10:48			27 Jan 2022 16:00	1
Batch ID: R401545 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53			03 Feb 2022 14:25	1
HS22010994-02	SW14	14 Jan 2022 10:48			03 Feb 2022 14:25	1
Batch ID: R401604 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53			04 Feb 2022 13:06	1
HS22010994-02	SW14	14 Jan 2022 10:48			04 Feb 2022 13:06	1
Batch ID: R401613 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53			04 Feb 2022 11:48	5
HS22010994-02	SW14	14 Jan 2022 10:48			04 Feb 2022 11:54	5
Batch ID: R401727 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53			04 Feb 2022 13:13	1
HS22010994-02	SW14	14 Jan 2022 10:48			04 Feb 2022 13:13	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R401747 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53			07 Feb 2022 16:49	1
HS22010994-02	SW14	14 Jan 2022 10:48			07 Feb 2022 16:49	1
Batch ID: R401748 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22010994-01	SW2	14 Jan 2022 11:53			07 Feb 2022 12:00	1
HS22010994-02	SW14	14 Jan 2022 10:48			07 Feb 2022 12:00	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 174706 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-174706** Units: **mg/L** Analysis Date: **25-Jan-2022 12:36**
Client ID: Run ID: **HG03_400927** SeqNo: **6475374** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-174706** Units: **mg/L** Analysis Date: **25-Jan-2022 12:38**
Client ID: Run ID: **HG03_400927** SeqNo: **6475375** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00508	0.000200	0.005	0	102	80 - 120				

MS Sample ID: **HS22010926-01MS** Units: **mg/L** Analysis Date: **25-Jan-2022 12:41**
Client ID: Run ID: **HG03_400927** SeqNo: **6475377** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00538	0.000200	0.005	0.000011	107	75 - 125				

MSD Sample ID: **HS22010926-01MSD** Units: **mg/L** Analysis Date: **25-Jan-2022 12:43**
Client ID: Run ID: **HG03_400927** SeqNo: **6475378** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00518	0.000200	0.005	0.000011	103	75 - 125	0.00538	3.79	20	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-175082** Units: **mg/L** Analysis Date: **04-Feb-2022 21:33**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490508** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-175082** Units: **mg/L** Analysis Date: **04-Feb-2022 21:35**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490509** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04686	0.00200	0.05	0	93.7	80 - 120				
Arsenic	0.04885	0.00200	0.05	0	97.7	80 - 120				
Beryllium	0.04966	0.00200	0.05	0	99.3	80 - 120				
Cadmium	0.05093	0.00200	0.05	0	102	80 - 120				
Chromium	0.04928	0.00400	0.05	0	98.6	80 - 120				
Cobalt	0.04825	0.00500	0.05	0	96.5	80 - 120				
Copper	0.05108	0.00200	0.05	0	102	80 - 120				
Lead	0.04845	0.00200	0.05	0	96.9	80 - 120				
Molybdenum	0.04887	0.00500	0.05	0	97.7	80 - 120				
Nickel	0.05023	0.00200	0.05	0	100	80 - 120				
Selenium	0.05133	0.00200	0.05	0	103	80 - 120				
Silver	0.04882	0.00200	0.05	0	97.6	80 - 120				
Thallium	0.04983	0.00200	0.05	0	99.7	80 - 120				
Vanadium	0.04786	0.00500	0.05	0	95.7	80 - 120				
Zinc	0.05234	0.00400	0.05	0	105	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22010974-12MS** Units: **mg/L** Analysis Date: **04-Feb-2022 21:41**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490512** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04777	0.00200	0.05	0.000183	95.2	80 - 120				
Arsenic	0.05158	0.00200	0.05	0.000758	102	80 - 120				
Beryllium	0.05164	0.00200	0.05	0.000023	103	80 - 120				
Cadmium	0.05164	0.00200	0.05	0.000507	102	80 - 120				
Chromium	0.04989	0.00400	0.05	0.000254	99.3	80 - 120				
Cobalt	0.04844	0.00500	0.05	0.000033	96.8	80 - 120				
Copper	0.0524	0.00200	0.05	0.000826	103	80 - 120				
Lead	0.04888	0.00200	0.05	0.000305	97.1	80 - 120				
Molybdenum	0.05161	0.00500	0.05	0.001882	99.5	80 - 120				
Nickel	0.05118	0.00200	0.05	0.001152	100	80 - 120				
Selenium	0.04918	0.00200	0.05	0.00011	98.1	80 - 120				
Silver	0.0485	0.00200	0.05	0.000015	97.0	80 - 120				
Thallium	0.04957	0.00200	0.05	0.000093	99.0	80 - 120				
Vanadium	0.0491	0.00500	0.05	-0.000113	98.4	80 - 120				
Zinc	0.05888	0.00400	0.05	0.007264	103	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22010974-12MSD** Units: **mg/L** Analysis Date: **04-Feb-2022 21:43**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490513** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Antimony	0.04655	0.00200	0.05	0.000183	92.7	80 - 120	0.04777	2.59	20	
Arsenic	0.04968	0.00200	0.05	0.000758	97.8	80 - 120	0.05158	3.76	20	
Beryllium	0.05117	0.00200	0.05	0.000023	102	80 - 120	0.05164	0.914	20	
Cadmium	0.0494	0.00200	0.05	0.000507	97.8	80 - 120	0.05164	4.44	20	
Chromium	0.04909	0.00400	0.05	0.000254	97.7	80 - 120	0.04989	1.63	20	
Cobalt	0.04766	0.00500	0.05	0.000033	95.3	80 - 120	0.04844	1.62	20	
Copper	0.05076	0.00200	0.05	0.000826	99.9	80 - 120	0.0524	3.18	20	
Lead	0.04799	0.00200	0.05	0.000305	95.4	80 - 120	0.04888	1.83	20	
Molybdenum	0.04994	0.00500	0.05	0.001882	96.1	80 - 120	0.05161	3.29	20	
Nickel	0.04991	0.00200	0.05	0.001152	97.5	80 - 120	0.05118	2.53	20	
Selenium	0.04616	0.00200	0.05	0.00011	92.1	80 - 120	0.04918	6.33	20	
Silver	0.04706	0.00200	0.05	0.000015	94.1	80 - 120	0.0485	3.01	20	
Thallium	0.04963	0.00200	0.05	0.000093	99.1	80 - 120	0.04957	0.117	20	
Vanadium	0.04777	0.00500	0.05	-0.000113	95.8	80 - 120	0.0491	2.74	20	
Zinc	0.05698	0.00400	0.05	0.007264	99.4	80 - 120	0.05888	3.27	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22010974-12SD** Units: **mg/L** Analysis Date: **04-Feb-2022 21:39**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490511** PrepDate: **04-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000183	0	10	
Arsenic	U	0.0100					0.000758	0	10	
Beryllium	U	0.0100					0.000023	0	10	
Cadmium	U	0.0100					0.000507	0	10	
Chromium	U	0.0200					0.000254	0	10	
Cobalt	U	0.0250					0.000033	0	10	
Copper	U	0.0100					0.000826	0	10	
Lead	U	0.0100					0.000305	0	10	
Molybdenum	U	0.0250					0.001882	0	10	
Nickel	U	0.0100					0.001152	0	10	
Selenium	U	0.0100					0.00011	0	10	
Silver	U	0.0100					0.000015	0	10	
Thallium	U	0.0100					0.000093	0	10	
Vanadium	U	0.0250					-0.000113	0	10	
Zinc	U	0.0200					0.007264	0	10	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 174755 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-174755** Units: **ug/L** Analysis Date: **04-Feb-2022 14:50**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491331** PrepDate: **26-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.08627*	*0*	*0.08*	*0*	*108*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.109*	*0*	*0.08*	*0*	*136*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.08013*	*0*	*0.08*	*0*	*100*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 174755 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-174755** Units: **ug/L** Analysis Date: **04-Feb-2022 15:10**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491332** PrepDate: **26-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.05456	0.010	0.08	0	68.2	40 - 140				
2-Methylnaphthalene	0.04749	0.010	0.08	0	59.4	40 - 140				
Acenaphthene	0.04864	0.010	0.08	0	60.8	40 - 140				
Acenaphthylene	0.04471	0.010	0.08	0	55.9	40 - 140				
Anthracene	0.04738	0.010	0.08	0	59.2	40 - 140				
Benz(a)anthracene	0.04539	0.010	0.08	0	56.7	40 - 140				
Benzo(a)pyrene	0.04513	0.010	0.08	0	56.4	40 - 140				
Benzo(b)fluoranthene	0.04982	0.010	0.08	0	62.3	40 - 140				
Benzo(g,h,i)perylene	0.04609	0.010	0.08	0	57.6	40 - 140				
Benzo(k)fluoranthene	0.05155	0.010	0.08	0	64.4	40 - 140				
Chrysene	0.05296	0.010	0.08	0	66.2	40 - 140				
Dibenz(a,h)anthracene	0.04781	0.010	0.08	0	59.8	40 - 140				
Dibenzofuran	0.04803	0.010	0.08	0	60.0	40 - 140				
Fluoranthene	0.04858	0.010	0.08	0	60.7	40 - 140				
Fluorene	0.04504	0.010	0.08	0	56.3	40 - 140				
Indeno(1,2,3-cd)pyrene	0.04575	0.010	0.08	0	57.2	40 - 140				
Naphthalene	0.06511	0.010	0.08	0	81.4	40 - 140				
Phenanthrene	0.04969	0.010	0.08	0	62.1	40 - 140				
Pyrene	0.04657	0.010	0.08	0	58.2	40 - 140				
Surr: 2-Fluorobiphenyl	*0.06569*	*0*	*0.08*	*0*	*82.1*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.05169*	*0*	*0.08*	*0*	*64.6*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.06396*	*0*	*0.08*	*0*	*80.0*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 174755 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-174755** Units: **ug/L** Analysis Date: **04-Feb-2022 15:30**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491333** PrepDate: **26-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.05365	0.010	0.08	0	67.1	40 - 140	0.05456	1.68	20	
2-Methylnaphthalene	0.04793	0.010	0.08	0	59.9	40 - 140	0.04749	0.916	20	
Acenaphthene	0.04789	0.010	0.08	0	59.9	40 - 140	0.04864	1.54	20	
Acenaphthylene	0.04391	0.010	0.08	0	54.9	40 - 140	0.04471	1.83	20	
Anthracene	0.0458	0.010	0.08	0	57.2	40 - 140	0.04738	3.39	20	
Benz(a)anthracene	0.04407	0.010	0.08	0	55.1	40 - 140	0.04539	2.95	20	
Benzo(a)pyrene	0.05739	0.010	0.08	0	71.7	40 - 140	0.04513	23.9	20	R
Benzo(b)fluoranthene	0.05392	0.010	0.08	0	67.4	40 - 140	0.04982	7.89	20	
Benzo(g,h,i)perylene	0.04888	0.010	0.08	0	61.1	40 - 140	0.04609	5.89	20	
Benzo(k)fluoranthene	0.05129	0.010	0.08	0	64.1	40 - 140	0.05155	0.513	20	
Chrysene	0.04549	0.010	0.08	0	56.9	40 - 140	0.05296	15.2	20	
Dibenz(a,h)anthracene	0.04932	0.010	0.08	0	61.7	40 - 140	0.04781	3.12	20	
Dibenzofuran	0.05072	0.010	0.08	0	63.4	40 - 140	0.04803	5.45	20	
Fluoranthene	0.04629	0.010	0.08	0	57.9	40 - 140	0.04858	4.83	20	
Fluorene	0.04674	0.010	0.08	0	58.4	40 - 140	0.04504	3.69	20	
Indeno(1,2,3-cd)pyrene	0.04858	0.010	0.08	0	60.7	40 - 140	0.04575	6.01	20	
Naphthalene	0.06453	0.010	0.08	0	80.7	40 - 140	0.06511	0.898	20	
Phenanthrene	0.04626	0.010	0.08	0	57.8	40 - 140	0.04969	7.14	20	
Pyrene	0.04493	0.010	0.08	0	56.2	40 - 140	0.04657	3.59	20	
Surr: 2-Fluorobiphenyl	*0.06372*	*0*	*0.08*	*0*	*79.7*	*40 - 140*	*0.06569*	*3.04*	*20*	
Surr: 4-Terphenyl-d14	*0.05112*	*0*	*0.08*	*0*	*63.9*	*40 - 140*	*0.05169*	*1.1*	*20*	
Surr: Nitrobenzene-d5	*0.06037*	*0*	*0.08*	*0*	*75.5*	*40 - 140*	*0.06396*	*5.78*	*20*	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 175001 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-175001** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486367** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-175001** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486366** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.31	0.50	20	0	102	85 - 115				

MS Sample ID: **HS22010929-02MS** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486364** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.17	0.50	20	2.484	103	75 - 125				

MSD Sample ID: **HS22010929-02MSD** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486365** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.14	0.50	20	2.484	103	75 - 125	23.17	0.138	20	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: 175097 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-175097** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491261** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-175097** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491260** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.231	0.0500	0.25	0	92.4	80 - 120				

MS Sample ID: **HS22010929-02MS** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491258** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.228	0.0500	0.25	0.013	86.0	80 - 120				

MSD Sample ID: **HS22010929-02MSD** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491259** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.222	0.0500	0.25	0.013	83.6	80 - 120	0.228	2.67	20	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: R400864 (0) **Instrument:** ManTech01 **Method:** DISSOLVED OXYGEN BY SM4500-O G

DUP Sample ID: **HS22010827-01DUP** Units: **mg/L** Analysis Date: **24-Jan-2022 14:46**
Client ID: Run ID: **ManTech01_400864** SeqNo: **6473925** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.75	1.00					11.72	0.256	20	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: **R400934 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS22010993-02DUP** Units: **pH Units** Analysis Date: **25-Jan-2022 14:28**
Client ID: Run ID: **WetChem_HS_400934** SeqNo: **6475514** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	5.78	0.100					5.79	0.173	10	
Temp Deg C @pH	22.8	0					22.6	0.881	10	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: R401215 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R401215** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481445** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R401215** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481444** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	980	10.0	1000	0	98.0	85 - 115				

DUP Sample ID: **HS22011043-01DUP** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481446** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0					2	0	20	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: R401545 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488420** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488422** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.1	2.00	40	0	90.2	78 - 114				

LCSD Sample ID: **WLCSDW-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488421** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39.6	2.00	40	0	99.0	78 - 114	36.1	9.25	18	

MS Sample ID: **HS22011217-01MS** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488414** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.9	2.00	40	2.066	92.1	78 - 114				

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: **R401604 (0)** **Instrument:** **WetChem_HS** **Method:** **SALINITY**

DUP Sample ID: **HS22010956-01DUP** Units: **ppt** Analysis Date: **04-Feb-2022 13:06**
Client ID: Run ID: **WetChem_HS_401604** SeqNo: **6489541** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: R401613 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY E300.0, REV 2.1, 1993**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **04-Feb-2022 10:29**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489640** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **04-Feb-2022 10:35**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489641** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	7.818	0.200	8	0	97.7	90 - 110				

MS Sample ID: **HS22010956-01MS** Units: **mg/L** Analysis Date: **04-Feb-2022 11:06**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489643** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	16.89	1.00	20	0.2845	83.0	80 - 120				

MSD Sample ID: **HS22010956-01MSD** Units: **mg/L** Analysis Date: **04-Feb-2022 11:11**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489644** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	17.91	1.00	20	0.2845	88.1	80 - 120	16.89	5.86	20	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: R401727 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-020422** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491825** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-020422** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491826** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1080	10.0	1000	0	108	85 - 115				

DUP Sample ID: **HS22011355-01DUP** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491823** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	638	10.0					640	0.313	5	

DUP Sample ID: **HS22011267-02DUP** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491813** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1974	10.0					1960	0.712	5	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: HS22010994

QC BATCH REPORT

Batch ID: R401748 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-020722** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492379** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-020722** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492380** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	97	2.50	100	0	97.0	85 - 115				

DUP Sample ID: **HS22020063-05DUP** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492376** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	1980	2.50					1990	0.504	5	

DUP Sample ID: **HS22010994-01DUP** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: **SW2** Run ID: **Balance1_401748** SeqNo: **6492360** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	78	2.50					76.67	1.72	5	

The following samples were analyzed in this batch: HS22010994-01 HS22010994-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW2 & SW14
WorkOrder: **HS22010994**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

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Client: ERM, Inc
Project: SW2 & SW14
Work Order: HS22010994

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22010994-01	SW2	Login	1/24/2022 12:09:29 PM	NDR	MET015
HS22010994-01	SW2	Login	1/24/2022 12:09:29 PM	NDR	EXT091
HS22010994-01	SW2	Login	1/24/2022 12:09:29 PM	NDR	WET213
HS22010994-01	SW2	Login	1/24/2022 12:09:29 PM	NDR	WET213
HS22010994-01	SW2	Login	1/24/2022 12:09:29 PM	NDR	WET213
HS22010994-01	SW2	Login	1/24/2022 12:09:29 PM	NDR	WET213
HS22010994-01	SW2	Login	1/24/2022 12:09:29 PM	NDR	WET213
HS22010994-02	SW14	Login	1/24/2022 12:09:29 PM	NDR	MET015
HS22010994-02	SW14	Login	1/24/2022 12:09:29 PM	NDR	EXT091
HS22010994-02	SW14	Login	1/24/2022 12:09:29 PM	NDR	WET213
HS22010994-02	SW14	Login	1/24/2022 12:09:29 PM	NDR	WET213
HS22010994-02	SW14	Login	1/24/2022 12:09:29 PM	NDR	WET213
HS22010994-02	SW14	Login	1/24/2022 12:09:29 PM	NDR	WET213
HS22010994-02	SW14	Login	1/24/2022 12:09:29 PM	NDR	WET213

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Sample Receipt Checklist

Work Order ID: HS22010994 **Date/Time Received:** **24-Jan-2022 10:40**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By:	/S/ Nilesh D. Ranchod	24-Jan-2022 12:03	**Reviewed by:**	/S/ Corey Grandits	25-Jan-2022 10:28
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **WATER** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:259254
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	13.3°C/13.8c UC/C	IR 31	
Cooler(s)/Kit(s):	48147		
Date/Time sample(s) sent to storage:	01/24/2022 13:00		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: CoC missing ID & Collection Date/Time, logged per Sample Label
SW2 1/14/22 11:53, SW14 1/14/22 10:48

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 259254

HS22010994

ERM, Inc
SW2 & SW14

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name		
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte, NC 28203	City/State/Zip	Charlotte, NC 28203	
Phone	(507) 304-2187	Phone	(507) 304-2187	
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	selina.pradhan@erm.com	

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
0																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] 5-7 Work Days [ ] 3 Work Days [ ] 2 Wk Days [ ] Other

Results Due Date:

Relinquished by:	Date:	Time:	Received by:	
Relinquished by:	Date:	Time:	Received by (Laboratory): PGT 01/24/22	10:54
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
48147	13.3

QC Package: (Check One Box Below)

[X] Level II Std QC
[ ] Level III Std QC/LCS Raw Data
[ ] Level IV (Full QC/Cal)
[ ] Other
[ ] Table Checklist
[ ] Other Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

2R431 CLF 0.5

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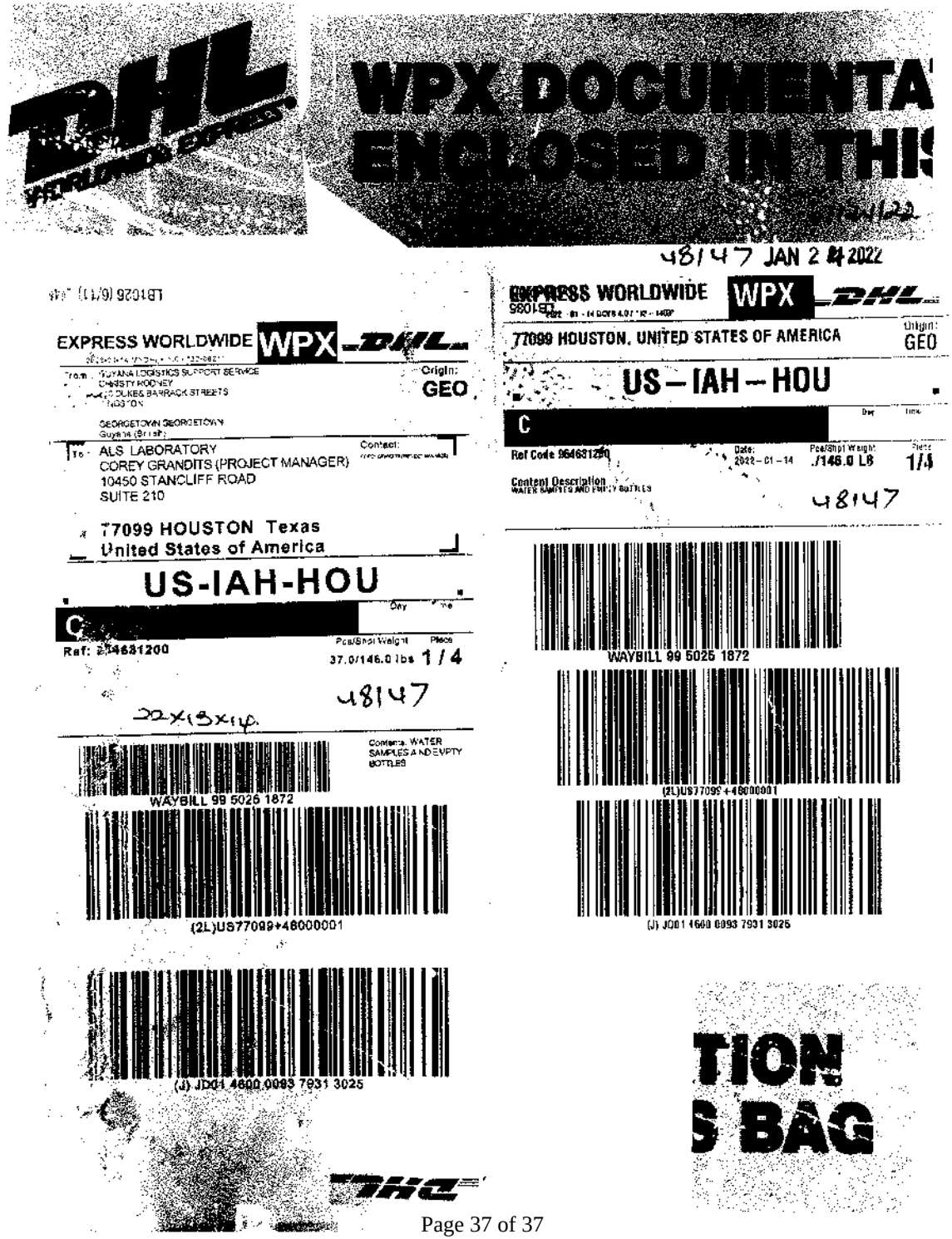

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 07, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22010996**

Laboratory Results for: **SW9 & SW13**

Dear Selina Pradhan,

ALS Environmental received 2 sample(s) on Jan 24, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: SW9 & SW13
Work Order: HS22010996

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22010996-01	SW9	Water		14-Jan-2022 09:20	24-Jan-2022 10:40	☐
HS22010996-02	SW13	Water		14-Jan-2022 10:35	24-Jan-2022 10:40	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW9 & SW13
Work Order: HS22010996

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 174755

Sample ID: LCSD-174755

• The RPD between the LCS and LCSD was outside of the control limit.

Sample ID: SW9 (HS22010996-01)

• Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Metals by Method SW6020A

Batch ID: 175082

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 174706

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2520

Batch ID: R401604

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R401727

Sample ID: SW13 (HS22010996-02)

• Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW9 (HS22010996-01)

• Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW9 & SW13
Work Order: HS22010996

WetChemistry by Method M2540D

Batch ID: R401748

Sample ID: SW13 (HS22010996-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW9 (HS22010996-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method Calculation

Batch ID: R401747

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E300

Batch ID: R401613

Sample ID: SW13 (HS22010996-02)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

Sample ID: SW9 (HS22010996-01)

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes.

WetChemistry by Method E1664A

Batch ID: R401545

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R400864

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540B

Batch ID: R401215

Sample ID: SW13 (HS22010996-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW9 (HS22010996-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW9 & SW13
Work Order: HS22010996

WetChemistry by Method SW9040C

Batch ID: R400934

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 175097

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 175001

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
Sample ID: SW9
Collection Date: 14-Jan-2022 09:20

ANALYTICAL REPORT
WorkOrder:HS22010996
Lab ID:HS22010996-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 26-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Acenaphthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Dibenzofuran	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Fluorene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Naphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Phenanthrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:09
Surr: 2-Fluorobiphenyl	*82.6*			*40-140*	*%REC*	*1*	*04-Feb-2022 19:09*
Surr: 4-Terphenyl-d14	*105*			*40-140*	*%REC*	*1*	*04-Feb-2022 19:09*
Surr: Nitrobenzene-d5	*88.7*			*40-140*	*%REC*	*1*	*04-Feb-2022 19:09*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 04-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	04-Feb-2022 21:59
Arsenic	**0.000888**	J	**0.000400**	**0.00200**	**mg/L**	1	04-Feb-2022 21:59
Beryllium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:59
Cadmium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:59
Chromium	**0.000905**	J	**0.000400**	**0.00400**	**mg/L**	1	04-Feb-2022 21:59
Cobalt	**0.000339**	J	**0.000200**	**0.00500**	**mg/L**	1	04-Feb-2022 21:59
Copper	U		0.00100	0.00200	mg/L	1	04-Feb-2022 21:59
Lead	U		0.000600	0.00200	mg/L	1	04-Feb-2022 21:59
Molybdenum	U		0.000600	0.00500	mg/L	1	04-Feb-2022 21:59
Nickel	**0.000652**	J	**0.000600**	**0.00200**	**mg/L**	1	04-Feb-2022 21:59
Selenium	U		0.00110	0.00200	mg/L	1	04-Feb-2022 21:59
Silver	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:59
Thallium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 21:59
Vanadium	U		0.000600	0.00500	mg/L	1	04-Feb-2022 21:59
Zinc	**0.00481**		**0.00200**	**0.00400**	**mg/L**	1	04-Feb-2022 21:59

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
Sample ID: SW9
Collection Date: 14-Jan-2022 09:20

ANALYTICAL REPORT
WorkOrder:HS22010996
Lab ID:HS22010996-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 25-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	25-Jan-2022 13:05
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.33**	J	**0.10**	**0.50**	**mg/L**	1	07-Feb-2022 16:49
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**7.60**		**0.610**	**2.00**	**mg/L**	1	03-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: TH
Nitrate/Nitrite (as N)	**0.167**	J	**0.150**	**1.00**	**mg/L**	5	04-Feb-2022 11:59
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 04-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0960**		**0.0200**	**0.0500**	**mg/L**	1	07-Feb-2022 16:00
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**6.00**	JH	**5.00**	**10.0**	**mg/L**	1	27-Jan-2022 16:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**70.0**	H	**5.00**	**10.0**	**mg/L**	1	04-Feb-2022 13:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**10.00**	H	**2.50**	**2.50**	**mg/L**	1	07-Feb-2022 12:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 01-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.16**	J	**0.10**	**0.50**	**mg/L**	1	02-Feb-2022 14:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**7.19**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**5.54**	H	**0.100**	**0.100**	**pH Units**	1	25-Jan-2022 14:28
Temp Deg C @pH	**22.7**	H	**0**	**0**	**DEG C**	1	25-Jan-2022 14:28

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
Sample ID: SW13
Collection Date: 14-Jan-2022 10:35

ANALYTICAL REPORT
WorkOrder:HS22010996
Lab ID:HS22010996-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 26-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	**0.016**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 19:29
2-Methylnaphthalene	**0.019**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 19:29
Acenaphthene	**0.016**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 19:29
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Dibenzofuran	**0.014**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 19:29
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Fluorene	**0.011**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 19:29
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Naphthalene	**0.13**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 19:29
Phenanthrene	**0.014**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 19:29
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:29
Surr: 2-Fluorobiphenyl	*83.9*			*40-140*	*%REC*	*1*	*04-Feb-2022 19:29*
Surr: 4-Terphenyl-d14	*93.0*			*40-140*	*%REC*	*1*	*04-Feb-2022 19:29*
Surr: Nitrobenzene-d5	*90.4*			*40-140*	*%REC*	*1*	*04-Feb-2022 19:29*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 04-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	04-Feb-2022 22:01
Arsenic	**0.000637**	J	**0.000400**	**0.00200**	**mg/L**	1	04-Feb-2022 22:01
Beryllium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 22:01
Cadmium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 22:01
Chromium	**0.00194**	J	**0.000400**	**0.00400**	**mg/L**	1	04-Feb-2022 22:01
Cobalt	**0.000777**	J	**0.000200**	**0.00500**	**mg/L**	1	04-Feb-2022 22:01
Copper	**0.00100**	J	**0.00100**	**0.00200**	**mg/L**	1	04-Feb-2022 22:01
Lead	**0.000865**	J	**0.000600**	**0.00200**	**mg/L**	1	04-Feb-2022 22:01
Molybdenum	U		0.000600	0.00500	mg/L	1	04-Feb-2022 22:01
Nickel	**0.00114**	J	**0.000600**	**0.00200**	**mg/L**	1	04-Feb-2022 22:01
Selenium	U		0.00110	0.00200	mg/L	1	04-Feb-2022 22:01
Silver	U		0.000200	0.00200	mg/L	1	04-Feb-2022 22:01
Thallium	U		0.000200	0.00200	mg/L	1	04-Feb-2022 22:01
Vanadium	**0.00228**	J	**0.000600**	**0.00500**	**mg/L**	1	04-Feb-2022 22:01
Zinc	**0.0405**		**0.00200**	**0.00400**	**mg/L**	1	04-Feb-2022 22:01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
Sample ID: SW13
Collection Date: 14-Jan-2022 10:35

ANALYTICAL REPORT
WorkOrder:HS22010996
Lab ID:HS22010996-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 25-Jan-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	25-Jan-2022 13:07
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.44**	J	**0.10**	**0.50**	**mg/L**	1	07-Feb-2022 16:49
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**8.09**		**0.610**	**2.00**	**mg/L**	1	03-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: TH
Nitrate/Nitrite (as N)	**0.246**	J	**0.150**	**1.00**	**mg/L**	5	04-Feb-2022 12:04
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 04-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0330**	J	**0.0200**	**0.0500**	**mg/L**	1	07-Feb-2022 16:00
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**88.0**	H	**5.00**	**10.0**	**mg/L**	1	27-Jan-2022 16:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**58.0**	H	**5.00**	**10.0**	**mg/L**	1	04-Feb-2022 13:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: KAH
Suspended Solids (Residue, Non -Filterable)	**23.0**	H	**2.50**	**2.50**	**mg/L**	1	07-Feb-2022 12:00
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 01-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.19**	J	**0.10**	**0.50**	**mg/L**	1	02-Feb-2022 14:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**7.93**	H	**1.00**	**1.00**	**mg/L**	1	24-Jan-2022 14:46
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**4.79**	H	**0.100**	**0.100**	**pH Units**	1	25-Jan-2022 14:28
Temp Deg C @pH	**22.9**	H	**0**	**0**	**DEG C**	1	25-Jan-2022 14:28

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

Batch ID: 174706 **Start Date:** 25 Jan 2022 08:00 **End Date:** 25 Jan 2022 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010996-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22010996-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 174755 **Start Date:** 26 Jan 2022 09:52 **End Date:** 26 Jan 2022 13:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010996-01		1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22010996-02		1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 175001 **Start Date:** 01 Feb 2022 11:00 **End Date:** 01 Feb 2022 13:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010996-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22010996-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 175082 **Start Date:** 04 Feb 2022 12:00 **End Date:** 04 Feb 2022 16:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010996-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22010996-02		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 175097 **Start Date:** 04 Feb 2022 10:30 **End Date:** 04 Feb 2022 12:30
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22010996-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22010996-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174706 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20		25 Jan 2022 08:00	25 Jan 2022 13:05	1
HS22010996-02	SW13	14 Jan 2022 10:35		25 Jan 2022 08:00	25 Jan 2022 13:07	1
Batch ID: 174755 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20		26 Jan 2022 09:52	04 Feb 2022 19:09	1
HS22010996-02	SW13	14 Jan 2022 10:35		26 Jan 2022 09:52	04 Feb 2022 19:29	1
Batch ID: 175001 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20		01 Feb 2022 11:00	02 Feb 2022 14:30	1
HS22010996-02	SW13	14 Jan 2022 10:35		01 Feb 2022 11:00	02 Feb 2022 14:30	1
Batch ID: 175082 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20		04 Feb 2022 16:00	04 Feb 2022 21:59	1
HS22010996-02	SW13	14 Jan 2022 10:35		04 Feb 2022 16:00	04 Feb 2022 22:01	1
Batch ID: 175097 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20		04 Feb 2022 10:30	07 Feb 2022 16:00	1
HS22010996-02	SW13	14 Jan 2022 10:35		04 Feb 2022 10:30	07 Feb 2022 16:00	1
Batch ID: R400864 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20			24 Jan 2022 14:46	1
HS22010996-02	SW13	14 Jan 2022 10:35			24 Jan 2022 14:46	1
Batch ID: R400934 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20			25 Jan 2022 14:28	1
HS22010996-02	SW13	14 Jan 2022 10:35			25 Jan 2022 14:28	1
Batch ID: R401215 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20			27 Jan 2022 16:00	1
HS22010996-02	SW13	14 Jan 2022 10:35			27 Jan 2022 16:00	1
Batch ID: R401545 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20			03 Feb 2022 14:25	1
HS22010996-02	SW13	14 Jan 2022 10:35			03 Feb 2022 14:25	1
Batch ID: R401604 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20			04 Feb 2022 13:06	1
HS22010996-02	SW13	14 Jan 2022 10:35			04 Feb 2022 13:06	1
Batch ID: R401613 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20			04 Feb 2022 11:59	5
HS22010996-02	SW13	14 Jan 2022 10:35			04 Feb 2022 12:04	5
Batch ID: R401727 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20			04 Feb 2022 13:13	1
HS22010996-02	SW13	14 Jan 2022 10:35			04 Feb 2022 13:13	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R401747 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20			07 Feb 2022 16:49	1
HS22010996-02	SW13	14 Jan 2022 10:35			07 Feb 2022 16:49	1
Batch ID: R401748 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22010996-01	SW9	14 Jan 2022 09:20			07 Feb 2022 12:00	1
HS22010996-02	SW13	14 Jan 2022 10:35			07 Feb 2022 12:00	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 174706 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-174706** Units: **mg/L** Analysis Date: **25-Jan-2022 12:36**
Client ID: Run ID: **HG03_400927** SeqNo: **6475374** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS Sample ID: **LCS-174706** Units: **mg/L** Analysis Date: **25-Jan-2022 12:38**
Client ID: Run ID: **HG03_400927** SeqNo: **6475375** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00508	0.000200	0.005	0	102	80 - 120				

MS Sample ID: **HS22010926-01MS** Units: **mg/L** Analysis Date: **25-Jan-2022 12:41**
Client ID: Run ID: **HG03_400927** SeqNo: **6475377** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00538	0.000200	0.005	0.000011	107	75 - 125				

MSD Sample ID: **HS22010926-01MSD** Units: **mg/L** Analysis Date: **25-Jan-2022 12:43**
Client ID: Run ID: **HG03_400927** SeqNo: **6475378** PrepDate: **25-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00518	0.000200	0.005	0.000011	103	75 - 125	0.00538	3.79	20	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-175082** Units: **mg/L** Analysis Date: **04-Feb-2022 21:33**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490508** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-175082** Units: **mg/L** Analysis Date: **04-Feb-2022 21:35**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490509** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04686	0.00200	0.05	0	93.7	80 - 120				
Arsenic	0.04885	0.00200	0.05	0	97.7	80 - 120				
Beryllium	0.04966	0.00200	0.05	0	99.3	80 - 120				
Cadmium	0.05093	0.00200	0.05	0	102	80 - 120				
Chromium	0.04928	0.00400	0.05	0	98.6	80 - 120				
Cobalt	0.04825	0.00500	0.05	0	96.5	80 - 120				
Copper	0.05108	0.00200	0.05	0	102	80 - 120				
Lead	0.04845	0.00200	0.05	0	96.9	80 - 120				
Molybdenum	0.04887	0.00500	0.05	0	97.7	80 - 120				
Nickel	0.05023	0.00200	0.05	0	100	80 - 120				
Selenium	0.05133	0.00200	0.05	0	103	80 - 120				
Silver	0.04882	0.00200	0.05	0	97.6	80 - 120				
Thallium	0.04983	0.00200	0.05	0	99.7	80 - 120				
Vanadium	0.04786	0.00500	0.05	0	95.7	80 - 120				
Zinc	0.05234	0.00400	0.05	0	105	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22010974-12MS** Units: **mg/L** Analysis Date: **04-Feb-2022 21:41**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490512** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04777	0.00200	0.05	0.000183	95.2	80 - 120				
Arsenic	0.05158	0.00200	0.05	0.000758	102	80 - 120				
Beryllium	0.05164	0.00200	0.05	0.000023	103	80 - 120				
Cadmium	0.05164	0.00200	0.05	0.000507	102	80 - 120				
Chromium	0.04989	0.00400	0.05	0.000254	99.3	80 - 120				
Cobalt	0.04844	0.00500	0.05	0.000033	96.8	80 - 120				
Copper	0.0524	0.00200	0.05	0.000826	103	80 - 120				
Lead	0.04888	0.00200	0.05	0.000305	97.1	80 - 120				
Molybdenum	0.05161	0.00500	0.05	0.001882	99.5	80 - 120				
Nickel	0.05118	0.00200	0.05	0.001152	100	80 - 120				
Selenium	0.04918	0.00200	0.05	0.00011	98.1	80 - 120				
Silver	0.0485	0.00200	0.05	0.000015	97.0	80 - 120				
Thallium	0.04957	0.00200	0.05	0.000093	99.0	80 - 120				
Vanadium	0.0491	0.00500	0.05	-0.000113	98.4	80 - 120				
Zinc	0.05888	0.00400	0.05	0.007264	103	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22010974-12MSD** Units: **mg/L** Analysis Date: **04-Feb-2022 21:43**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490513** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04655	0.00200	0.05	0.000183	92.7	80 - 120	0.04777	2.59	20	
Arsenic	0.04968	0.00200	0.05	0.000758	97.8	80 - 120	0.05158	3.76	20	
Beryllium	0.05117	0.00200	0.05	0.000023	102	80 - 120	0.05164	0.914	20	
Cadmium	0.0494	0.00200	0.05	0.000507	97.8	80 - 120	0.05164	4.44	20	
Chromium	0.04909	0.00400	0.05	0.000254	97.7	80 - 120	0.04989	1.63	20	
Cobalt	0.04766	0.00500	0.05	0.000033	95.3	80 - 120	0.04844	1.62	20	
Copper	0.05076	0.00200	0.05	0.000826	99.9	80 - 120	0.0524	3.18	20	
Lead	0.04799	0.00200	0.05	0.000305	95.4	80 - 120	0.04888	1.83	20	
Molybdenum	0.04994	0.00500	0.05	0.001882	96.1	80 - 120	0.05161	3.29	20	
Nickel	0.04991	0.00200	0.05	0.001152	97.5	80 - 120	0.05118	2.53	20	
Selenium	0.04616	0.00200	0.05	0.00011	92.1	80 - 120	0.04918	6.33	20	
Silver	0.04706	0.00200	0.05	0.000015	94.1	80 - 120	0.0485	3.01	20	
Thallium	0.04963	0.00200	0.05	0.000093	99.1	80 - 120	0.04957	0.117	20	
Vanadium	0.04777	0.00500	0.05	-0.000113	95.8	80 - 120	0.0491	2.74	20	
Zinc	0.05698	0.00400	0.05	0.007264	99.4	80 - 120	0.05888	3.27	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 175082 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22010974-12SD** Units: **mg/L** Analysis Date: **04-Feb-2022 21:39**
Client ID: Run ID: **ICPMS06_401621** SeqNo: **6490511** PrepDate: **04-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000183	0	10	
Arsenic	U	0.0100					0.000758	0	10	
Beryllium	U	0.0100					0.000023	0	10	
Cadmium	U	0.0100					0.000507	0	10	
Chromium	U	0.0200					0.000254	0	10	
Cobalt	U	0.0250					0.000033	0	10	
Copper	U	0.0100					0.000826	0	10	
Lead	U	0.0100					0.000305	0	10	
Molybdenum	U	0.0250					0.001882	0	10	
Nickel	U	0.0100					0.001152	0	10	
Selenium	U	0.0100					0.00011	0	10	
Silver	U	0.0100					0.000015	0	10	
Thallium	U	0.0100					0.000093	0	10	
Vanadium	U	0.0250					-0.000113	0	10	
Zinc	U	0.0200					0.007264	0	10	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 174755 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-174755** Units: **ug/L** Analysis Date: **04-Feb-2022 14:50**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491331** PrepDate: **26-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.08627*	*0*	*0.08*	*0*	*108*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.109*	*0*	*0.08*	*0*	*136*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.08013*	*0*	*0.08*	*0*	*100*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 174755 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-174755** Units: **ug/L** Analysis Date: **04-Feb-2022 15:10**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491332** PrepDate: **26-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.05456	0.010	0.08	0	68.2	40 - 140				
2-Methylnaphthalene	0.04749	0.010	0.08	0	59.4	40 - 140				
Acenaphthene	0.04864	0.010	0.08	0	60.8	40 - 140				
Acenaphthylene	0.04471	0.010	0.08	0	55.9	40 - 140				
Anthracene	0.04738	0.010	0.08	0	59.2	40 - 140				
Benz(a)anthracene	0.04539	0.010	0.08	0	56.7	40 - 140				
Benzo(a)pyrene	0.04513	0.010	0.08	0	56.4	40 - 140				
Benzo(b)fluoranthene	0.04982	0.010	0.08	0	62.3	40 - 140				
Benzo(g,h,i)perylene	0.04609	0.010	0.08	0	57.6	40 - 140				
Benzo(k)fluoranthene	0.05155	0.010	0.08	0	64.4	40 - 140				
Chrysene	0.05296	0.010	0.08	0	66.2	40 - 140				
Dibenz(a,h)anthracene	0.04781	0.010	0.08	0	59.8	40 - 140				
Dibenzofuran	0.04803	0.010	0.08	0	60.0	40 - 140				
Fluoranthene	0.04858	0.010	0.08	0	60.7	40 - 140				
Fluorene	0.04504	0.010	0.08	0	56.3	40 - 140				
Indeno(1,2,3-cd)pyrene	0.04575	0.010	0.08	0	57.2	40 - 140				
Naphthalene	0.06511	0.010	0.08	0	81.4	40 - 140				
Phenanthrene	0.04969	0.010	0.08	0	62.1	40 - 140				
Pyrene	0.04657	0.010	0.08	0	58.2	40 - 140				
Surr: 2-Fluorobiphenyl	*0.06569*	*0*	*0.08*	*0*	*82.1*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.05169*	*0*	*0.08*	*0*	*64.6*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.06396*	*0*	*0.08*	*0*	*80.0*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 174755 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-174755** Units: **ug/L** Analysis Date: **04-Feb-2022 15:30**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491333** PrepDate: **26-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.05365	0.010	0.08	0	67.1	40 - 140	0.05456	1.68	20	
2-Methylnaphthalene	0.04793	0.010	0.08	0	59.9	40 - 140	0.04749	0.916	20	
Acenaphthene	0.04789	0.010	0.08	0	59.9	40 - 140	0.04864	1.54	20	
Acenaphthylene	0.04391	0.010	0.08	0	54.9	40 - 140	0.04471	1.83	20	
Anthracene	0.0458	0.010	0.08	0	57.2	40 - 140	0.04738	3.39	20	
Benz(a)anthracene	0.04407	0.010	0.08	0	55.1	40 - 140	0.04539	2.95	20	
Benzo(a)pyrene	0.05739	0.010	0.08	0	71.7	40 - 140	0.04513	23.9	20	R
Benzo(b)fluoranthene	0.05392	0.010	0.08	0	67.4	40 - 140	0.04982	7.89	20	
Benzo(g,h,i)perylene	0.04888	0.010	0.08	0	61.1	40 - 140	0.04609	5.89	20	
Benzo(k)fluoranthene	0.05129	0.010	0.08	0	64.1	40 - 140	0.05155	0.513	20	
Chrysene	0.04549	0.010	0.08	0	56.9	40 - 140	0.05296	15.2	20	
Dibenz(a,h)anthracene	0.04932	0.010	0.08	0	61.7	40 - 140	0.04781	3.12	20	
Dibenzofuran	0.05072	0.010	0.08	0	63.4	40 - 140	0.04803	5.45	20	
Fluoranthene	0.04629	0.010	0.08	0	57.9	40 - 140	0.04858	4.83	20	
Fluorene	0.04674	0.010	0.08	0	58.4	40 - 140	0.04504	3.69	20	
Indeno(1,2,3-cd)pyrene	0.04858	0.010	0.08	0	60.7	40 - 140	0.04575	6.01	20	
Naphthalene	0.06453	0.010	0.08	0	80.7	40 - 140	0.06511	0.898	20	
Phenanthrene	0.04626	0.010	0.08	0	57.8	40 - 140	0.04969	7.14	20	
Pyrene	0.04493	0.010	0.08	0	56.2	40 - 140	0.04657	3.59	20	
Surr: 2-Fluorobiphenyl	*0.06372*	*0*	*0.08*	*0*	*79.7*	*40 - 140*	*0.06569*	*3.04*	*20*	
Surr: 4-Terphenyl-d14	*0.05112*	*0*	*0.08*	*0*	*63.9*	*40 - 140*	*0.05169*	*1.1*	*20*	
Surr: Nitrobenzene-d5	*0.06037*	*0*	*0.08*	*0*	*75.5*	*40 - 140*	*0.06396*	*5.78*	*20*	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 175001 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-175001** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486367** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-175001** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486366** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	20.31	0.50	20	0	102	85 - 115				

MS Sample ID: **HS22010929-02MS** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486364** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.17	0.50	20	2.484	103	75 - 125				

MSD Sample ID: **HS22010929-02MSD** Units: **mg/L** Analysis Date: **02-Feb-2022 14:30**
Client ID: Run ID: **WetChem_HS_401453** SeqNo: **6486365** PrepDate: **01-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	23.14	0.50	20	2.484	103	75 - 125	23.17	0.138	20	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: 175097 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-175097** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491261** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-175097** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491260** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.231	0.0500	0.25	0	92.4	80 - 120				

MS Sample ID: **HS22010929-02MS** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491258** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.228	0.0500	0.25	0.013	86.0	80 - 120				

MSD Sample ID: **HS22010929-02MSD** Units: **mg/L** Analysis Date: **07-Feb-2022 16:00**
Client ID: Run ID: **UV-2450_401697** SeqNo: **6491259** PrepDate: **04-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.222	0.0500	0.25	0.013	83.6	80 - 120	0.228	2.67	20	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: **R400864 (0)** **Instrument:** **ManTech01** **Method:** **DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS22010827-01DUP** Units: **mg/L** Analysis Date: **24-Jan-2022 14:46**
Client ID: Run ID: **ManTech01_400864** SeqNo: **6473925** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.75	1.00					11.72	0.256	20	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: **R400934 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS22010993-02DUP** Units: **pH Units** Analysis Date: **25-Jan-2022 14:28**
Client ID: Run ID: **WetChem_HS_400934** SeqNo: **6475514** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	5.78	0.100					5.79	0.173	10	
Temp Deg C @pH	22.8	0					22.6	0.881	10	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: R401215 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R401215** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481445** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R401215** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481444** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	980	10.0	1000	0	98.0	85 - 115				

DUP Sample ID: **HS22011043-01DUP** Units: **mg/L** Analysis Date: **27-Jan-2022 16:00**
Client ID: Run ID: **Balance1_401215** SeqNo: **6481446** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0					2	0	20	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: R401545 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488420** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488422** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.1	2.00	40	0	90.2	78 - 114				

LCSD Sample ID: **WLCSDW-020322** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488421** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39.6	2.00	40	0	99.0	78 - 114	36.1	9.25	18	

MS Sample ID: **HS22011217-01MS** Units: **mg/L** Analysis Date: **03-Feb-2022 14:25**
Client ID: Run ID: **Balance1_401545** SeqNo: **6488414** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.9	2.00	40	2.066	92.1	78 - 114				

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: R401604 (0) **Instrument: WetChem_HS** **Method: SALINITY**

DUP Sample ID: **HS22010956-01DUP** Units: **ppt** Analysis Date: **04-Feb-2022 13:06**
Client ID: Run ID: **WetChem_HS_401604** SeqNo: **6489541** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: R401613 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY E300.0, REV 2.1, 1993**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **04-Feb-2022 10:29**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489640** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **04-Feb-2022 10:35**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489641** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	7.818	0.200	8	0	97.7	90 - 110				

MS Sample ID: **HS22010956-01MS** Units: **mg/L** Analysis Date: **04-Feb-2022 11:06**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489643** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	16.89	1.00	20	0.2845	83.0	80 - 120				

MSD Sample ID: **HS22010956-01MSD** Units: **mg/L** Analysis Date: **04-Feb-2022 11:11**
Client ID: Run ID: **ICS-Integrion_401613** SeqNo: **6489644** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	17.91	1.00	20	0.2845	88.1	80 - 120	16.89	5.86	20	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: R401727 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-020422** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491825** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-020422** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491826** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1080	10.0	1000	0	108	85 - 115				

DUP Sample ID: **HS22011355-01DUP** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491823** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	638	10.0					640	0.313	5	

DUP Sample ID: **HS22011267-02DUP** Units: **mg/L** Analysis Date: **04-Feb-2022 13:13**
Client ID: Run ID: **Balance1_401727** SeqNo: **6491813** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1974	10.0					1960	0.712	5	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: HS22010996

QC BATCH REPORT

Batch ID: R401748 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-020722** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492379** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-020722** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492380** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	97	2.50	100	0	97.0	85 - 115				

DUP Sample ID: **HS22020063-05DUP** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492376** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	1980	2.50					1990	0.504	5	

DUP Sample ID: **HS22010994-01DUP** Units: **mg/L** Analysis Date: **07-Feb-2022 12:00**
Client ID: Run ID: **Balance1_401748** SeqNo: **6492360** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	78	2.50					76.67	1.72	5	

The following samples were analyzed in this batch: HS22010996-01 HS22010996-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
WorkOrder: **HS22010996**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW9 & SW13
Work Order: HS22010996

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22010996-01	SW9	Login	1/24/2022 12:24:29 PM	NDR	MET015
HS22010996-01	SW9	Login	1/24/2022 12:24:29 PM	NDR	EXT091
HS22010996-01	SW9	Login	1/24/2022 12:24:29 PM	NDR	WET213
HS22010996-01	SW9	Login	1/24/2022 12:24:29 PM	NDR	WET213
HS22010996-01	SW9	Login	1/24/2022 12:24:29 PM	NDR	WET213
HS22010996-01	SW9	Login	1/24/2022 12:24:29 PM	NDR	WET213
HS22010996-01	SW9	Login	1/24/2022 12:24:29 PM	NDR	WET213
HS22010996-02	SW13	Login	1/24/2022 12:24:29 PM	NDR	MET015
HS22010996-02	SW13	Login	1/24/2022 12:24:29 PM	NDR	EXT091
HS22010996-02	SW13	Login	1/24/2022 12:24:29 PM	NDR	WET213
HS22010996-02	SW13	Login	1/24/2022 12:24:29 PM	NDR	WET213
HS22010996-02	SW13	Login	1/24/2022 12:24:29 PM	NDR	WET213
HS22010996-02	SW13	Login	1/24/2022 12:24:29 PM	NDR	WET213
HS22010996-02	SW13	Login	1/24/2022 12:24:29 PM	NDR	WET213

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Sample Receipt Checklist

Work Order ID: HS22010996 **Date/Time Received:** **24-Jan-2022 10:40**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By:	/S/ Nilesh D. Ranchod	24-Jan-2022 12:03	**Reviewed by:**	/S/ Corey Grandits	25-Jan-2022 10:27
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **WATER** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:259245
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☐	No ☑	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☐	No ☑	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s):	15.5°C/15.0c UC/C	IR 31
Cooler(s)/Kit(s):	25220	
Date/Time sample(s) sent to storage:	01/24/2022 13:00	

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: CoC missing ID & Collection Date/Time, logged per Sample Label
SW9 1/14/22 09:20, SW13 1/14/22 10:35
SW9 1l amber bottle received broken 2 of 2

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody Forr

Page ____ of ____

COC ID: 259246

HS22010996

ERM, Inc
SW9 & SW13

, WV

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name		
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte, NC 28203	City/State/Zip	Charlotte, NC 28203	
Phone	(507) 304-2187	Phone	(507) 304-2187	
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	selina.pradhan@erm.com	

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold

mpler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] 5-10 Wk Days [ ] 5 Wk Days [ ] 3 Wk Days [ ] 24 Hour [ ] Other ____

Results Due Date:

inquished by:	Date:	Time:	Received by:
inquished by:	Date:	Time:	Received by (Laboratory): PGT 01/24/22 10:40
ged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
492963	13.5

QC Package: (Check One Box Below)

[X] Level II Std QC
[ ] Level II Std QC/Raw Data
[ ] Level III SW/CLP
[ ] Other
[ ] TRRP Checklist
[ ] TRRP Level IV

servative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

82231 CLP-S

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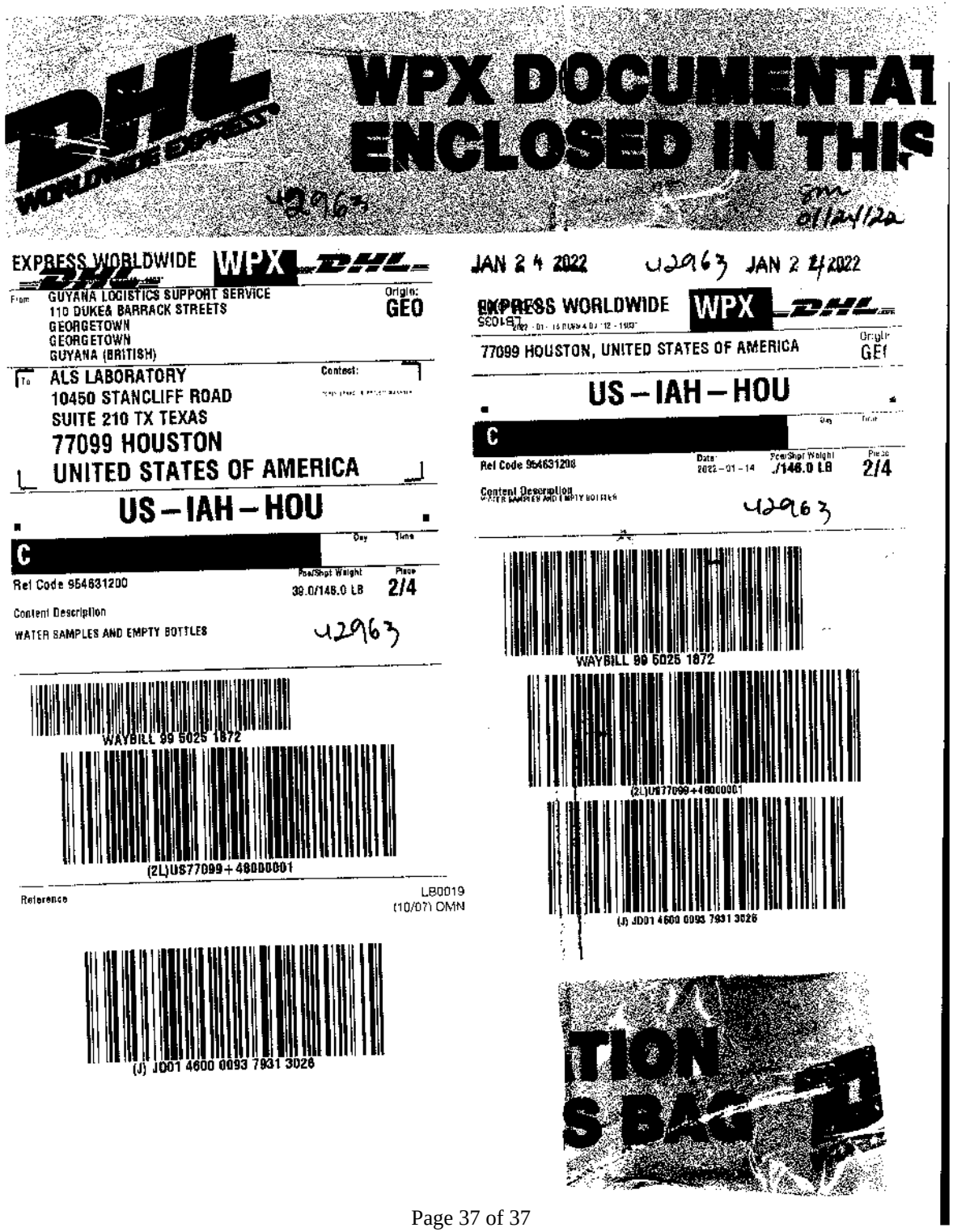

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 04, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22011236**

Laboratory Results for: **Gas to Energy - EIA Study PAHs**

Dear Selina Pradhan,

ALS Environmental received 3 sample(s) on Jan 27, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
Work Order: HS22011236

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22011236-01	D2	Soil		20-Dec-2021 11:00	27-Jan-2022 09:45	☐
HS22011236-02	D3	Soil		20-Dec-2021 11:15	27-Jan-2022 09:45	☐
HS22011236-03	D4	Soil		20-Dec-2021 11:30	27-Jan-2022 09:45	☐

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Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - EIA Study PAHs
Work Order: HS22011236

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 174864

- Samples holding time expired prior to sample receipt.Samples analyzed at the request of the client. Results should be considered estimated.

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Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
Sample ID: D2
Collection Date: 20-Dec-2021 11:00

ANALYTICAL REPORT
WorkOrder:HS22011236
Lab ID:HS22011236-01
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SW8270 SIM	**Method:SW8270SIM**				Prep:SW3541 / 28-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
2-Methylnaphthalene	**0.37**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:19
Acenaphthene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Acenaphthylene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Anthracene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Benz(a)anthracene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Benzo(a)pyrene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Benzo(b)fluoranthene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Benzo(g,h,i)perylene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Benzo(k)fluoranthene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Chrysene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Dibenz(a,h)anthracene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Dibenzofuran	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Fluoranthene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Fluorene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Indeno(1,2,3-cd)pyrene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Naphthalene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:19
Phenanthrene	**0.53**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:19
Pyrene	**0.70**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:19
Surr: 2-Fluorobiphenyl	*98.9*			*40-140*	*%REC*	*1*	*03-Feb-2022 16:19*
Surr: 4-Terphenyl-d14	*101*			*40-140*	*%REC*	*1*	*03-Feb-2022 16:19*
Surr: Nitrobenzene-d5	*103*			*40-140*	*%REC*	*1*	*03-Feb-2022 16:19*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
Sample ID: D3
Collection Date: 20-Dec-2021 11:15

ANALYTICAL REPORT
WorkOrder:HS22011236
Lab ID:HS22011236-02
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SW8270 SIM	**Method:SW8270SIM**				Prep:SW3541 / 28-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	**0.42**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
2-Methylnaphthalene	**0.62**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Acenaphthene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:59
Acenaphthylene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:59
Anthracene	**0.48**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Benz(a)anthracene	**0.79**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Benzo(a)pyrene	**0.70**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Benzo(b)fluoranthene	**1.2**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Benzo(g,h,i)perylene	**1.0**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Benzo(k)fluoranthene	**0.72**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Chrysene	**1.5**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Dibenz(a,h)anthracene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:59
Dibenzofuran	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:59
Fluoranthene	**3.4**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Fluorene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:59
Indeno(1,2,3-cd)pyrene	**0.55**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Naphthalene	**0.40**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Phenanthrene	**3.5**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Pyrene	**2.8**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:59
Surr: 2-Fluorobiphenyl	*80.6*			*40-140*	*%REC*	*1*	*03-Feb-2022 16:59*
Surr: 4-Terphenyl-d14	*96.2*			*40-140*	*%REC*	*1*	*03-Feb-2022 16:59*
Surr: Nitrobenzene-d5	*89.4*			*40-140*	*%REC*	*1*	*03-Feb-2022 16:59*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
Sample ID: D4
Collection Date: 20-Dec-2021 11:30

ANALYTICAL REPORT
WorkOrder:HS22011236
Lab ID:HS22011236-03
Matrix:Soil

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SW8270 SIM	**Method:SW8270SIM**				Prep:SW3541 / 28-Jan-2022		Analyst: JLJ
1-Methylnaphthalene	**0.63**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:39
2-Methylnaphthalene	**1.2**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:39
Acenaphthene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Acenaphthylene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Anthracene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Benz(a)anthracene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Benzo(a)pyrene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Benzo(b)fluoranthene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Benzo(g,h,i)perylene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Benzo(k)fluoranthene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Chrysene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Dibenz(a,h)anthracene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Dibenzofuran	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Fluoranthene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Fluorene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Indeno(1,2,3-cd)pyrene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Naphthalene	**0.61**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:39
Phenanthrene	**0.70**	H	**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 16:39
Pyrene	U	H	0.33	0.33	ug/Kg	1	03-Feb-2022 16:39
Surr: 2-Fluorobiphenyl	*85.0*			*40-140*	*%REC*	*1*	*03-Feb-2022 16:39*
Surr: 4-Terphenyl-d14	*90.7*			*40-140*	*%REC*	*1*	*03-Feb-2022 16:39*
Surr: Nitrobenzene-d5	*93.2*			*40-140*	*%REC*	*1*	*03-Feb-2022 16:39*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Weight / Prep Log

Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
WorkOrder: HS22011236

Batch ID: 174864 **Start Date:** 28 Jan 2022 12:00 **End Date:** 28 Jan 2022 15:30
Method: SV SOXHLET EXTRACT-LOWLEVEL-SW3541 **Prep Code:** 3541_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011236-01		30.08 (g)	1 (mL)	0.03324	8-oz glass, Neat
HS22011236-02		30.24 (g)	1 (mL)	0.03307	8-oz glass, Neat
HS22011236-03		30.05 (g)	1 (mL)	0.03328	8-oz glass, Neat

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Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
WorkOrder: HS22011236

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174864 (0)	**Test Name :** SW8270 SIM				**Matrix:** Soil	
HS22011236-01	D2	20 Dec 2021 11:00		28 Jan 2022 12:00	03 Feb 2022 16:19	1
HS22011236-02	D3	20 Dec 2021 11:15		28 Jan 2022 12:00	03 Feb 2022 16:59	1
HS22011236-03	D4	20 Dec 2021 11:30		28 Jan 2022 12:00	03 Feb 2022 16:39	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
WorkOrder: HS22011236

QC BATCH REPORT

Batch ID: 174864 (0) **Instrument: SV-6** **Method: SW8270 SIM**

MBLK Sample ID: **MBLK-174864** Units: **ug/Kg** Analysis Date: **03-Feb-2022 12:33**
Client ID: Run ID: **SV-6_401547** SeqNo: **6489347** PrepDate: **28-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.33								
2-Methylnaphthalene	U	0.33								
Acenaphthene	U	0.33								
Acenaphthylene	U	0.33								
Anthracene	U	0.33								
Benz(a)anthracene	U	0.33								
Benzo(a)pyrene	U	0.33								
Benzo(b)fluoranthene	U	0.33								
Benzo(g,h,i)perylene	U	0.33								
Benzo(k)fluoranthene	U	0.33								
Chrysene	U	0.33								
Dibenz(a,h)anthracene	U	0.33								
Dibenzofuran	U	0.33								
Fluoranthene	U	0.33								
Fluorene	U	0.33								
Indeno(1,2,3-cd)pyrene	U	0.33								
Naphthalene	U	0.33								
Phenanthrene	U	0.33								
Pyrene	U	0.33								
Surr: 2-Fluorobiphenyl	*2.983*	*0*	*2.66*	*0*	*112*	*40 - 140*				
Surr: 4-Terphenyl-d14	*2.942*	*0*	*2.66*	*0*	*111*	*40 - 140*				
Surr: Nitrobenzene-d5	*2.496*	*0*	*2.66*	*0*	*93.8*	*40 - 140*				

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Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
WorkOrder: HS22011236

QC BATCH REPORT

Batch ID: 174864 (0) **Instrument: SV-6** **Method: SW8270 SIM**

LCS Sample ID: **LCS-174864** Units: **ug/Kg** Analysis Date: **03-Feb-2022 12:53**
Client ID: Run ID: **SV-6_401547** SeqNo: **6489348** PrepDate: **28-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	2.577	0.33	2.66	0	96.9	40 - 140				
2-Methylnaphthalene	1.724	0.33	2.66	0	64.8	40 - 140				
Acenaphthene	1.424	0.33	2.66	0	53.5	40 - 140				
Acenaphthylene	1.718	0.33	2.66	0	64.6	40 - 140				
Anthracene	1.977	0.33	2.66	0	74.3	40 - 140				
Benz(a)anthracene	1.596	0.33	2.66	0	60.0	40 - 140				
Benzo(a)pyrene	2.003	0.33	2.66	0	75.3	40 - 140				
Benzo(b)fluoranthene	1.808	0.33	2.66	0	68.0	40 - 140				
Benzo(g,h,i)perylene	1.872	0.33	2.66	0	70.4	40 - 140				
Benzo(k)fluoranthene	2.945	0.33	2.66	0	111	40 - 140				
Chrysene	2.429	0.33	2.66	0	91.3	40 - 140				
Dibenz(a,h)anthracene	1.729	0.33	2.66	0	65.0	40 - 140				
Dibenzofuran	2.021	0.33	2.66	0	76.0	40 - 140				
Fluoranthene	1.884	0.33	2.66	0	70.8	40 - 140				
Fluorene	1.894	0.33	2.66	0	71.2	40 - 140				
Indeno(1,2,3-cd)pyrene	2.077	0.33	2.66	0	78.1	40 - 140				
Naphthalene	2.573	0.33	2.66	0	96.7	40 - 140				
Phenanthrene	1.98	0.33	2.66	0	74.4	40 - 140				
Pyrene	2.489	0.33	2.66	0	93.6	40 - 140				
Surr: 2-Fluorobiphenyl	*2.504*	*0*	*2.66*	*0*	*94.1*	*40 - 140*				
Surr: 4-Terphenyl-d14	*2.838*	*0*	*2.66*	*0*	*107*	*40 - 140*				
Surr: Nitrobenzene-d5	*2.251*	*0*	*2.66*	*0*	*84.6*	*40 - 140*				

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Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
WorkOrder: HS22011236

QC BATCH REPORT

Batch ID: 174864 (0) **Instrument: SV-6** **Method: SW8270 SIM**

LCSD Sample ID: **LCSD-174864** Units: **ug/Kg** Analysis Date: **03-Feb-2022 13:13**
Client ID: Run ID: **SV-6_401547** SeqNo: **6489349** PrepDate: **28-Jan-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	2.9	0.33	2.66	0	109	40 - 140	2.577	11.8	30	
2-Methylnaphthalene	1.934	0.33	2.66	0	72.7	40 - 140	1.724	11.5	30	
Acenaphthene	1.459	0.33	2.66	0	54.8	40 - 140	1.424	2.42	30	
Acenaphthylene	1.855	0.33	2.66	0	69.7	40 - 140	1.718	7.65	30	
Anthracene	2.248	0.33	2.66	0	84.5	40 - 140	1.977	12.9	30	
Benz(a)anthracene	1.559	0.33	2.66	0	58.6	40 - 140	1.596	2.37	30	
Benzo(a)pyrene	2.141	0.33	2.66	0	80.5	40 - 140	2.003	6.65	30	
Benzo(b)fluoranthene	1.94	0.33	2.66	0	72.9	40 - 140	1.808	7.05	30	
Benzo(g,h,i)perylene	2.103	0.33	2.66	0	79.0	40 - 140	1.872	11.6	30	
Benzo(k)fluoranthene	2.924	0.33	2.66	0	110	40 - 140	2.945	0.728	30	
Chrysene	2.369	0.33	2.66	0	89.1	40 - 140	2.429	2.49	30	
Dibenz(a,h)anthracene	1.841	0.33	2.66	0	69.2	40 - 140	1.729	6.26	30	
Dibenzofuran	2.157	0.33	2.66	0	81.1	40 - 140	2.021	6.5	30	
Fluoranthene	2.165	0.33	2.66	0	81.4	40 - 140	1.884	13.9	30	
Fluorene	2.089	0.33	2.66	0	78.5	40 - 140	1.894	9.78	30	
Indeno(1,2,3-cd)pyrene	2.291	0.33	2.66	0	86.1	40 - 140	2.077	9.81	30	
Naphthalene	2.919	0.33	2.66	0	110	40 - 140	2.573	12.6	30	
Phenanthrene	2.256	0.33	2.66	0	84.8	40 - 140	1.98	13	30	
Pyrene	2.43	0.33	2.66	0	91.3	40 - 140	2.489	2.42	30	
Surr: 2-Fluorobiphenyl	*2.318*	*0*	*2.66*	*0*	*87.2*	*40 - 140*	*2.504*	*7.7*	*30*	
Surr: 4-Terphenyl-d14	*2.744*	*0*	*2.66*	*0*	*103*	*40 - 140*	*2.838*	*3.37*	*30*	
Surr: Nitrobenzene-d5	*2.568*	*0*	*2.66*	*0*	*96.5*	*40 - 140*	*2.251*	*13.2*	*30*	

The following samples were analyzed in this batch: HS22011236-01 HS22011236-02 HS22011236-03

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Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
WorkOrder: **HS22011236**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
ug/Kg	Micrograms per Kilograms

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

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Client: ERM, Inc
Project: Gas to Energy - EIA Study PAHs
Work Order: HS22011236

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22011236-01	D2	Login	1/27/2022 5:13:25 PM	PMG	Sub
HS22011236-02	D3	Login	1/27/2022 5:13:25 PM	PMG	Sub
HS22011236-03	D4	Login	1/27/2022 5:13:25 PM	PMG	Sub

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Sample Receipt Checklist

Work Order ID: HS22011236 **Date/Time Received:** **27-Jan-2022 09:45**

Client Name: ERM NC **Received by:** **Nilesh D. Ranchod**

Completed By:	/S/ Paresh M. Giga	27-Jan-2022 17:15	**Reviewed by:**	/S/ Corey Grandits	28-Jan-2022 17:17
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **Soil** Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:253020
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	0.8C/1.3C U/C	IR31	
Cooler(s)/Kit(s):	Blue		
Date/Time sample(s) sent to storage:	1/27/2022 17:20		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes: RE-LOG SRC

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody For

Page ____ of ____

COC ID: 253020

HS22011236

ERM. Inc

Gas to Energy - EIA Study

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name	Gas to Energy - EIA study	
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte NC 28203	City/State/Zip	Charlotte NC 28203	
Phone	507-304-2187	Phone	(	
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	emnaaccountspayable@erm.com	

	A	8270SIM_Soil (PAHs)
	B	8081 Pesticides
	C	ICP_Soil_Low (6020/7471 Metals-16)
	D	PCB_Soil_Total (8082 PCBs)
	E	TS_S (Total Solids)
	F	TOC_Soil (Total Organic Carbon)
	G	Sub Sulfide 9030 ALS Holland MI
	H	Sub ALS Kelso ASTM D422 - 15 Day TAT
	I	
	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	D2	20/12/21	11:00AM	D		2	X	✓	✓	✓		✓	✓	X			
2	D3	20/12/21	11:15AM	D		2	X	✓	✓	✓		✓	✓	X			
3	D4	20/12/21	11:30AM	D		2	X	✓	✓	✓		✓	✓	X			
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Michael Lowe

Shipment Method:

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by: Michael Lowe Date: 21/12/21 Time: 9:15am Received by: Christy Podrey

Relinquished by: Date: 12/23/21 Time: 12:30 Received by (Laboratory): J. Hinsenn

Logged by (Laboratory): Date: Time: Checked by (Laboratory): 1/27/22 OP-N3

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
479064	24 UC
5.02	0.3 C

QC Package: (Check One Box Below)

[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SVM/HC/CLP
[ ] TRRP Checklist
[ ] TRRP Level IV
[ ] Other

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-NaHSO$_4$ 7-Other 8-4°C 9-5035

1431 CFO-3

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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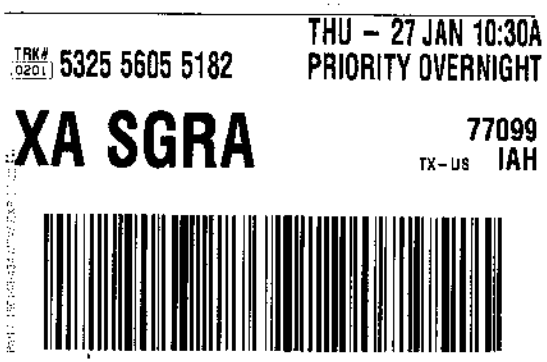
Custody Seal

Date 1/26/2022

Signature

Project 1/27/22

Container # 1 of 1



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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 15, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22011359**

Laboratory Results for: **SW-3, SW-4, SW-5, SW-6, SW-10**

Dear Selina Pradhan,

ALS Environmental received 5 sample(s) on Jan 31, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Work Order: HS22011359

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22011359-01	SW-3	Water		21-Jan-2022 08:45	31-Jan-2022 11:50	☐
HS22011359-02	SW-4	Water		21-Jan-2022 10:50	31-Jan-2022 11:50	☐
HS22011359-03	SW-5	Water		21-Jan-2022 10:50	31-Jan-2022 11:50	☐
HS22011359-04	SW-6	Water		21-Jan-2022 12:10	31-Jan-2022 11:50	☐
HS22011359-05	SW-10	Water		21-Jan-2022 06:45	31-Jan-2022 11:50	☐

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Client: ERM, Inc **CASE NARRATIVE**
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Work Order: HS22011359

Work Order Comments

- Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

  The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

  Sample received outside method holding time for Dissolved Oxygen DO is field parameters that require immediate tests. Sample results are flagged with an "H" qualifier.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 175032

Sample ID: SW-3 (HS22011359-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Metals by Method SW6020A

Batch ID: 175248

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 175024

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540B

Batch ID: R402076

Sample ID: SW-10 (HS22011359-05)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-3 (HS22011359-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-4 (HS22011359-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-5 (HS22011359-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-6 (HS22011359-04)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

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Client: ERM, Inc **CASE NARRATIVE**
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Work Order: HS22011359

WetChemistry by Method E300

Batch ID: R402158

Sample ID: MBLK

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes for samples reported in Batch ID #402158

WetChemistry by Method M2540D

Batch ID: R402221

Sample ID: SW-10 (HS22011359-05)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-3 (HS22011359-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-4 (HS22011359-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-5 (HS22011359-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-6 (HS22011359-04)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method Calculation

Batch ID: R402209

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM, Inc **CASE NARRATIVE**
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Work Order: HS22011359

WetChemistry by Method M2540C

Batch ID: R402127

Sample ID: SW-10 (HS22011359-05)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-4 (HS22011359-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-5 (HS22011359-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW-6 (HS22011359-04)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Batch ID: R402085

Sample ID: SW-3 (HS22011359-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method E1664A

Batch ID: R402033,R402198

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R401378

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2520

Batch ID: R401604

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R401405

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 175262

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM, Inc **CASE NARRATIVE**
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Work Order: HS22011359

WetChemistry by Method M4500 NH3 D

Batch ID: 175159

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Sample ID: SW-3
Collection Date: 21-Jan-2022 08:45

ANALYTICAL REPORT
WorkOrder:HS22011359
Lab ID:HS22011359-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 03-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Acenaphthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Dibenzofuran	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Fluorene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Naphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Phenanthrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 19:49
Surr: 2-Fluorobiphenyl	*56.6*			*40-140*	*%REC*	*1*	*04-Feb-2022 19:49*
Surr: 4-Terphenyl-d14	*88.8*			*40-140*	*%REC*	*1*	*04-Feb-2022 19:49*
Surr: Nitrobenzene-d5	*88.2*			*40-140*	*%REC*	*1*	*04-Feb-2022 19:49*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 11-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	11-Feb-2022 16:31
Arsenic	**0.000480**	J	**0.000400**	**0.00200**	**mg/L**	1	11-Feb-2022 16:31
Beryllium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:31
Cadmium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:31
Chromium	**0.00116**	J	**0.000400**	**0.00400**	**mg/L**	1	11-Feb-2022 16:31
Cobalt	**0.000528**	J	**0.000200**	**0.00500**	**mg/L**	1	11-Feb-2022 16:31
Copper	U		0.00100	0.00200	mg/L	1	11-Feb-2022 16:31
Lead	U		0.000600	0.00200	mg/L	1	11-Feb-2022 16:31
Molybdenum	U		0.000600	0.00500	mg/L	1	11-Feb-2022 16:31
Nickel	**0.00118**	J	**0.000600**	**0.00200**	**mg/L**	1	11-Feb-2022 16:31
Selenium	U		0.00110	0.00200	mg/L	1	11-Feb-2022 16:31
Silver	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:31
Thallium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:31
Vanadium	**0.00143**	J	**0.000600**	**0.00500**	**mg/L**	1	11-Feb-2022 16:31
Zinc	**0.0132**		**0.00200**	**0.00400**	**mg/L**	1	11-Feb-2022 16:31

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Sample ID: SW-3
Collection Date: 21-Jan-2022 08:45

ANALYTICAL REPORT
WorkOrder:HS22011359
Lab ID:HS22011359-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 03-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	03-Feb-2022 13:41
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**1.0**		**0.10**	**0.50**	**mg/L**	1	14-Feb-2022 15:39
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.63**	J	**0.610**	**2.00**	**mg/L**	1	10-Feb-2022 15:45
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.345**	J	**0.150**	**1.00**	**mg/L**	5	11-Feb-2022 11:22
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 10-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0290**	J	**0.0200**	**0.0500**	**mg/L**	1	10-Feb-2022 15:11
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**54.0**	H	**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**32.0**	H	**5.00**	**10.0**	**mg/L**	1	10-Feb-2022 14:22
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**15.0**	H	**2.50**	**2.50**	**mg/L**	1	12-Feb-2022 16:52
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 08-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.69**		**0.10**	**0.50**	**mg/L**	1	08-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**8.37**	H	**1.00**	**1.00**	**mg/L**	1	01-Feb-2022 13:03
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**4.82**	H	**0.100**	**0.100**	**pH Units**	1	01-Feb-2022 16:51
Temp Deg C @pH	**21.7**	H	**0**	**0**	**DEG C**	1	01-Feb-2022 16:51

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Sample ID: SW-4
Collection Date: 21-Jan-2022 10:50

ANALYTICAL REPORT
WorkOrder:HS22011359
Lab ID:HS22011359-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 03-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Acenaphthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Dibenzofuran	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Fluorene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Naphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Phenanthrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:09
Surr: 2-Fluorobiphenyl	*65.7*			*40-140*	*%REC*	*1*	*04-Feb-2022 20:09*
Surr: 4-Terphenyl-d14	*93.2*			*40-140*	*%REC*	*1*	*04-Feb-2022 20:09*
Surr: Nitrobenzene-d5	*68.1*			*40-140*	*%REC*	*1*	*04-Feb-2022 20:09*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 11-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	11-Feb-2022 16:33
Arsenic	**0.000411**	J	**0.000400**	**0.00200**	**mg/L**	1	11-Feb-2022 16:33
Beryllium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:33
Cadmium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:33
Chromium	**0.000965**	J	**0.000400**	**0.00400**	**mg/L**	1	11-Feb-2022 16:33
Cobalt	**0.000337**	J	**0.000200**	**0.00500**	**mg/L**	1	11-Feb-2022 16:33
Copper	U		0.00100	0.00200	mg/L	1	11-Feb-2022 16:33
Lead	U		0.000600	0.00200	mg/L	1	11-Feb-2022 16:33
Molybdenum	U		0.000600	0.00500	mg/L	1	11-Feb-2022 16:33
Nickel	**0.00100**	J	**0.000600**	**0.00200**	**mg/L**	1	11-Feb-2022 16:33
Selenium	U		0.00110	0.00200	mg/L	1	11-Feb-2022 16:33
Silver	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:33
Thallium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:33
Vanadium	**0.000622**	J	**0.000600**	**0.00500**	**mg/L**	1	11-Feb-2022 16:33
Zinc	**0.00667**		**0.00200**	**0.00400**	**mg/L**	1	11-Feb-2022 16:33

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Sample ID: SW-4
Collection Date: 21-Jan-2022 10:50

ANALYTICAL REPORT
WorkOrder:HS22011359
Lab ID:HS22011359-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 03-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	03-Feb-2022 13:46
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.50**		**0.10**	**0.50**	**mg/L**	1	14-Feb-2022 15:39
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**2.87**		**0.610**	**2.00**	**mg/L**	1	10-Feb-2022 15:45
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.224**	J	**0.150**	**1.00**	**mg/L**	5	11-Feb-2022 11:38
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 10-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	10-Feb-2022 15:11
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**6.00**	JH	**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**34.0**	H	**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:14
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**9.81**	H	**2.50**	**2.50**	**mg/L**	1	12-Feb-2022 16:52
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 08-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.28**	J	**0.10**	**0.50**	**mg/L**	1	08-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**8.56**	H	**1.00**	**1.00**	**mg/L**	1	01-Feb-2022 13:03
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**4.60**	H	**0.100**	**0.100**	**pH Units**	1	01-Feb-2022 16:51
Temp Deg C @pH	**21.8**	H	**0**	**0**	**DEG C**	1	01-Feb-2022 16:51

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Sample ID: SW-5
Collection Date: 21-Jan-2022 10:50

ANALYTICAL REPORT
WorkOrder:HS22011359
Lab ID:HS22011359-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 03-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Acenaphthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Dibenzofuran	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Fluorene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Naphthalene	**0.013**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 20:29
Phenanthrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:29
Surr: 2-Fluorobiphenyl	*75.9*			*40-140*	*%REC*	*1*	*04-Feb-2022 20:29*
Surr: 4-Terphenyl-d14	*112*			*40-140*	*%REC*	*1*	*04-Feb-2022 20:29*
Surr: Nitrobenzene-d5	*77.3*			*40-140*	*%REC*	*1*	*04-Feb-2022 20:29*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 11-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	11-Feb-2022 16:53
Arsenic	**0.000724**	J	**0.000400**	**0.00200**	**mg/L**	1	11-Feb-2022 16:53
Beryllium	**0.000407**	J	**0.000200**	**0.00200**	**mg/L**	1	11-Feb-2022 16:53
Cadmium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:53
Chromium	**0.000837**	J	**0.000400**	**0.00400**	**mg/L**	1	11-Feb-2022 16:53
Cobalt	**0.00204**	J	**0.000200**	**0.00500**	**mg/L**	1	11-Feb-2022 16:53
Copper	U		0.00100	0.00200	mg/L	1	11-Feb-2022 16:53
Lead	U		0.000600	0.00200	mg/L	1	11-Feb-2022 16:53
Molybdenum	U		0.000600	0.00500	mg/L	1	11-Feb-2022 16:53
Nickel	**0.00497**		**0.000600**	**0.00200**	**mg/L**	1	11-Feb-2022 16:53
Selenium	U		0.00110	0.00200	mg/L	1	11-Feb-2022 16:53
Silver	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:53
Thallium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:53
Vanadium	U		0.000600	0.00500	mg/L	1	11-Feb-2022 16:53
Zinc	**0.0272**		**0.00200**	**0.00400**	**mg/L**	1	11-Feb-2022 16:53

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Sample ID: SW-5
Collection Date: 21-Jan-2022 10:50

ANALYTICAL REPORT
WorkOrder:HS22011359
Lab ID:HS22011359-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 03-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	03-Feb-2022 13:48
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.44**	J	**0.10**	**0.50**	**mg/L**	1	14-Feb-2022 15:39
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**2.44**		**0.610**	**2.00**	**mg/L**	1	10-Feb-2022 15:45
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.244**	J	**0.150**	**1.00**	**mg/L**	5	11-Feb-2022 11:44
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 10-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	10-Feb-2022 15:11
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**90.0**	H	**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**40.0**	H	**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:14
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**4.33**	H	**2.50**	**2.50**	**mg/L**	1	12-Feb-2022 16:52
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 08-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.20**	J	**0.10**	**0.50**	**mg/L**	1	08-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**9.92**	H	**1.00**	**1.00**	**mg/L**	1	01-Feb-2022 13:03
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**3.66**	H	**0.100**	**0.100**	**pH Units**	1	01-Feb-2022 16:51
Temp Deg C @pH	**21.8**	H	**0**	**0**	**DEG C**	1	01-Feb-2022 16:51

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Sample ID: SW-6
Collection Date: 21-Jan-2022 12:10

ANALYTICAL REPORT
WorkOrder:HS22011359
Lab ID:HS22011359-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 03-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Acenaphthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Dibenzofuran	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Fluorene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Naphthalene	**0.010**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 20:49
Phenanthrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 20:49
Surr: 2-Fluorobiphenyl	*78.0*			*40-140*	*%REC*	*1*	*04-Feb-2022 20:49*
Surr: 4-Terphenyl-d14	*103*			*40-140*	*%REC*	*1*	*04-Feb-2022 20:49*
Surr: Nitrobenzene-d5	*75.3*			*40-140*	*%REC*	*1*	*04-Feb-2022 20:49*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 11-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	11-Feb-2022 16:55
Arsenic	**0.000501**	J	**0.000400**	**0.00200**	**mg/L**	1	11-Feb-2022 16:55
Beryllium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:55
Cadmium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:55
Chromium	**0.00105**	J	**0.000400**	**0.00400**	**mg/L**	1	11-Feb-2022 16:55
Cobalt	**0.000285**	J	**0.000200**	**0.00500**	**mg/L**	1	11-Feb-2022 16:55
Copper	U		0.00100	0.00200	mg/L	1	11-Feb-2022 16:55
Lead	U		0.000600	0.00200	mg/L	1	11-Feb-2022 16:55
Molybdenum	U		0.000600	0.00500	mg/L	1	11-Feb-2022 16:55
Nickel	**0.000881**	J	**0.000600**	**0.00200**	**mg/L**	1	11-Feb-2022 16:55
Selenium	U		0.00110	0.00200	mg/L	1	11-Feb-2022 16:55
Silver	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:55
Thallium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:55
Vanadium	**0.000720**	J	**0.000600**	**0.00500**	**mg/L**	1	11-Feb-2022 16:55
Zinc	**0.00583**		**0.00200**	**0.00400**	**mg/L**	1	11-Feb-2022 16:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Sample ID: SW-6
Collection Date: 21-Jan-2022 12:10

ANALYTICAL REPORT
WorkOrder:HS22011359
Lab ID:HS22011359-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 03-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	03-Feb-2022 13:50
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.55**		**0.10**	**0.50**	**mg/L**	1	14-Feb-2022 15:39
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**2.51**		**0.610**	**2.00**	**mg/L**	1	14-Feb-2022 13:20
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.256**	J	**0.150**	**1.00**	**mg/L**	5	11-Feb-2022 12:05
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 10-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	10-Feb-2022 15:11
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**44.0**	H	**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**26.0**	H	**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:14
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**14.5**	H	**2.50**	**2.50**	**mg/L**	1	12-Feb-2022 16:52
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 08-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.29**	J	**0.10**	**0.50**	**mg/L**	1	08-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**9.00**	H	**1.00**	**1.00**	**mg/L**	1	01-Feb-2022 13:03
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**4.23**	H	**0.100**	**0.100**	**pH Units**	1	01-Feb-2022 16:51
Temp Deg C @pH	**21.5**	H	**0**	**0**	**DEG C**	1	01-Feb-2022 16:51

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Sample ID: SW-10
Collection Date: 21-Jan-2022 06:45

ANALYTICAL REPORT
WorkOrder:HS22011359
Lab ID:HS22011359-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 03-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Acenaphthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Acenaphthylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Chrysene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Dibenzofuran	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Fluoranthene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Fluorene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Naphthalene	**0.025**	H	**0.010**	**0.010**	**ug/L**	1	04-Feb-2022 21:09
Phenanthrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Pyrene	U	H	0.010	0.010	ug/L	1	04-Feb-2022 21:09
Surr: 2-Fluorobiphenyl	*74.0*			*40-140*	*%REC*	*1*	*04-Feb-2022 21:09*
Surr: 4-Terphenyl-d14	*104*			*40-140*	*%REC*	*1*	*04-Feb-2022 21:09*
Surr: Nitrobenzene-d5	*69.1*			*40-140*	*%REC*	*1*	*04-Feb-2022 21:09*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 11-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	11-Feb-2022 16:57
Arsenic	**0.00110**	J	**0.000400**	**0.00200**	**mg/L**	1	11-Feb-2022 16:57
Beryllium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:57
Cadmium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:57
Chromium	**0.000892**	J	**0.000400**	**0.00400**	**mg/L**	1	11-Feb-2022 16:57
Cobalt	**0.000245**	J	**0.000200**	**0.00500**	**mg/L**	1	11-Feb-2022 16:57
Copper	U		0.00100	0.00200	mg/L	1	11-Feb-2022 16:57
Lead	U		0.000600	0.00200	mg/L	1	11-Feb-2022 16:57
Molybdenum	U		0.000600	0.00500	mg/L	1	11-Feb-2022 16:57
Nickel	**0.00180**	J	**0.000600**	**0.00200**	**mg/L**	1	11-Feb-2022 16:57
Selenium	U		0.00110	0.00200	mg/L	1	11-Feb-2022 16:57
Silver	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:57
Thallium	U		0.000200	0.00200	mg/L	1	11-Feb-2022 16:57
Vanadium	**0.00134**	J	**0.000600**	**0.00500**	**mg/L**	1	11-Feb-2022 16:57
Zinc	**0.00463**		**0.00200**	**0.00400**	**mg/L**	1	11-Feb-2022 16:57

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Sample ID: SW-10
Collection Date: 21-Jan-2022 06:45

ANALYTICAL REPORT
WorkOrder:HS22011359
Lab ID:HS22011359-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 03-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	03-Feb-2022 13:52
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.42**	J	**0.10**	**0.50**	**mg/L**	1	14-Feb-2022 15:39
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**4.58**		**0.610**	**2.00**	**mg/L**	1	14-Feb-2022 13:20
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.198**	J	**0.150**	**1.00**	**mg/L**	5	11-Feb-2022 12:10
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 10-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	10-Feb-2022 15:11
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**14.0**	H	**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**48.0**	H	**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:14
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**16.0**	H	**2.50**	**2.50**	**mg/L**	1	12-Feb-2022 16:52
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 08-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.22**	J	**0.10**	**0.50**	**mg/L**	1	08-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**8.64**	H	**1.00**	**1.00**	**mg/L**	1	01-Feb-2022 13:03
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	04-Feb-2022 13:06
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**4.61**	H	**0.100**	**0.100**	**pH Units**	1	01-Feb-2022 16:51
Temp Deg C @pH	**21.5**	H	**0**	**0**	**DEG C**	1	01-Feb-2022 16:51

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

Batch ID: 175024 **Start Date:** 03 Feb 2022 08:00 **End Date:** 03 Feb 2022 11:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011359-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22011359-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22011359-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22011359-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22011359-05		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 175032 **Start Date:** 03 Feb 2022 11:11 **End Date:** 03 Feb 2022 15:00
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011359-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22011359-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22011359-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22011359-04	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22011359-05	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 175159 **Start Date:** 08 Feb 2022 10:00 **End Date:** 08 Feb 2022 13:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011359-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22011359-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22011359-03		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22011359-04		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22011359-05		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 175248 **Start Date:** 11 Feb 2022 11:30 **End Date:** 11 Feb 2022 15:30
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011359-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22011359-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22011359-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22011359-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22011359-05		10 (mL)	10 (mL)	1	120 plastic HNO3

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

Batch ID: 175262 **Start Date:** 10 Feb 2022 11:00 **End Date:** 10 Feb 2022 13:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011359-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22011359-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22011359-03		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22011359-04		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22011359-05		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 175024 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45		03 Feb 2022 08:00	03 Feb 2022 13:41	1
HS22011359-02	SW-4	21 Jan 2022 10:50		03 Feb 2022 08:00	03 Feb 2022 13:46	1
HS22011359-03	SW-5	21 Jan 2022 10:50		03 Feb 2022 08:00	03 Feb 2022 13:48	1
HS22011359-04	SW-6	21 Jan 2022 12:10		03 Feb 2022 08:00	03 Feb 2022 13:50	1
HS22011359-05	SW-10	21 Jan 2022 06:45		03 Feb 2022 08:00	03 Feb 2022 13:52	1
Batch ID: 175032 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45		03 Feb 2022 11:11	04 Feb 2022 19:49	1
HS22011359-02	SW-4	21 Jan 2022 10:50		03 Feb 2022 11:11	04 Feb 2022 20:09	1
HS22011359-03	SW-5	21 Jan 2022 10:50		03 Feb 2022 11:11	04 Feb 2022 20:29	1
HS22011359-04	SW-6	21 Jan 2022 12:10		03 Feb 2022 11:11	04 Feb 2022 20:49	1
HS22011359-05	SW-10	21 Jan 2022 06:45		03 Feb 2022 11:11	04 Feb 2022 21:09	1
Batch ID: 175159 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45		08 Feb 2022 10:00	08 Feb 2022 15:30	1
HS22011359-02	SW-4	21 Jan 2022 10:50		08 Feb 2022 10:00	08 Feb 2022 15:30	1
HS22011359-03	SW-5	21 Jan 2022 10:50		08 Feb 2022 10:00	08 Feb 2022 15:30	1
HS22011359-04	SW-6	21 Jan 2022 12:10		08 Feb 2022 10:00	08 Feb 2022 15:30	1
HS22011359-05	SW-10	21 Jan 2022 06:45		08 Feb 2022 10:00	08 Feb 2022 15:30	1
Batch ID: 175248 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45		11 Feb 2022 15:30	11 Feb 2022 16:31	1
HS22011359-02	SW-4	21 Jan 2022 10:50		11 Feb 2022 15:30	11 Feb 2022 16:33	1
HS22011359-03	SW-5	21 Jan 2022 10:50		11 Feb 2022 15:30	11 Feb 2022 16:53	1
HS22011359-04	SW-6	21 Jan 2022 12:10		11 Feb 2022 15:30	11 Feb 2022 16:55	1
HS22011359-05	SW-10	21 Jan 2022 06:45		11 Feb 2022 15:30	11 Feb 2022 16:57	1
Batch ID: 175262 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45		10 Feb 2022 11:00	10 Feb 2022 15:11	1
HS22011359-02	SW-4	21 Jan 2022 10:50		10 Feb 2022 11:00	10 Feb 2022 15:11	1
HS22011359-03	SW-5	21 Jan 2022 10:50		10 Feb 2022 11:00	10 Feb 2022 15:11	1
HS22011359-04	SW-6	21 Jan 2022 12:10		10 Feb 2022 11:00	10 Feb 2022 15:11	1
HS22011359-05	SW-10	21 Jan 2022 06:45		10 Feb 2022 11:00	10 Feb 2022 15:11	1
Batch ID: R401378 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45			01 Feb 2022 13:03	1
HS22011359-02	SW-4	21 Jan 2022 10:50			01 Feb 2022 13:03	1
HS22011359-03	SW-5	21 Jan 2022 10:50			01 Feb 2022 13:03	1
HS22011359-04	SW-6	21 Jan 2022 12:10			01 Feb 2022 13:03	1
HS22011359-05	SW-10	21 Jan 2022 06:45			01 Feb 2022 13:03	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R401405 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45			01 Feb 2022 16:51	1
HS22011359-02	SW-4	21 Jan 2022 10:50			01 Feb 2022 16:51	1
HS22011359-03	SW-5	21 Jan 2022 10:50			01 Feb 2022 16:51	1
HS22011359-04	SW-6	21 Jan 2022 12:10			01 Feb 2022 16:51	1
HS22011359-05	SW-10	21 Jan 2022 06:45			01 Feb 2022 16:51	1
Batch ID: R401604 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45			04 Feb 2022 13:06	1
HS22011359-02	SW-4	21 Jan 2022 10:50			04 Feb 2022 13:06	1
HS22011359-03	SW-5	21 Jan 2022 10:50			04 Feb 2022 13:06	1
HS22011359-04	SW-6	21 Jan 2022 12:10			04 Feb 2022 13:06	1
HS22011359-05	SW-10	21 Jan 2022 06:45			04 Feb 2022 13:06	1
Batch ID: R402033 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45			10 Feb 2022 15:45	1
HS22011359-02	SW-4	21 Jan 2022 10:50			10 Feb 2022 15:45	1
HS22011359-03	SW-5	21 Jan 2022 10:50			10 Feb 2022 15:45	1
Batch ID: R402076 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45			08 Feb 2022 14:00	1
HS22011359-02	SW-4	21 Jan 2022 10:50			08 Feb 2022 14:00	1
HS22011359-03	SW-5	21 Jan 2022 10:50			08 Feb 2022 14:00	1
HS22011359-04	SW-6	21 Jan 2022 12:10			08 Feb 2022 14:00	1
HS22011359-05	SW-10	21 Jan 2022 06:45			08 Feb 2022 14:00	1
Batch ID: R402085 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45			10 Feb 2022 14:22	1
Batch ID: R402127 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22011359-02	SW-4	21 Jan 2022 10:50			11 Feb 2022 14:14	1
HS22011359-03	SW-5	21 Jan 2022 10:50			11 Feb 2022 14:14	1
HS22011359-04	SW-6	21 Jan 2022 12:10			11 Feb 2022 14:14	1
HS22011359-05	SW-10	21 Jan 2022 06:45			11 Feb 2022 14:14	1
Batch ID: R402158 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45			11 Feb 2022 11:22	5
HS22011359-02	SW-4	21 Jan 2022 10:50			11 Feb 2022 11:38	5
HS22011359-03	SW-5	21 Jan 2022 10:50			11 Feb 2022 11:44	5
HS22011359-04	SW-6	21 Jan 2022 12:10			11 Feb 2022 12:05	5
HS22011359-05	SW-10	21 Jan 2022 06:45			11 Feb 2022 12:10	5
Batch ID: R402198 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22011359-04	SW-6	21 Jan 2022 12:10			14 Feb 2022 13:20	1
HS22011359-05	SW-10	21 Jan 2022 06:45			14 Feb 2022 13:20	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R402209 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45			14 Feb 2022 15:39	1
HS22011359-02	SW-4	21 Jan 2022 10:50			14 Feb 2022 15:39	1
HS22011359-03	SW-5	21 Jan 2022 10:50			14 Feb 2022 15:39	1
HS22011359-04	SW-6	21 Jan 2022 12:10			14 Feb 2022 15:39	1
HS22011359-05	SW-10	21 Jan 2022 06:45			14 Feb 2022 15:39	1
Batch ID: R402221 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22011359-01	SW-3	21 Jan 2022 08:45			12 Feb 2022 16:52	1
HS22011359-02	SW-4	21 Jan 2022 10:50			12 Feb 2022 16:52	1
HS22011359-03	SW-5	21 Jan 2022 10:50			12 Feb 2022 16:52	1
HS22011359-04	SW-6	21 Jan 2022 12:10			12 Feb 2022 16:52	1
HS22011359-05	SW-10	21 Jan 2022 06:45			12 Feb 2022 16:52	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175024 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-175024** Units: **mg/L** Analysis Date: **03-Feb-2022 13:34**
Client ID: Run ID: **HG03_401526** SeqNo: **6488168** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U		0.000200								

LCS Sample ID: **LCS-175024** Units: **mg/L** Analysis Date: **03-Feb-2022 13:40**
Client ID: Run ID: **HG03_401526** SeqNo: **6488169** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00452	0.000200	0.005	0	90.4	80 - 120				

MS Sample ID: **HS22011359-01MS** Units: **mg/L** Analysis Date: **03-Feb-2022 13:43**
Client ID: **SW-3** Run ID: **HG03_401526** SeqNo: **6488171** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00438	0.000200	0.005	-0.000009	87.8	75 - 125				

MSD Sample ID: **HS22011359-01MSD** Units: **mg/L** Analysis Date: **03-Feb-2022 13:45**
Client ID: **SW-3** Run ID: **HG03_401526** SeqNo: **6488172** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00464	0.000200	0.005	-0.000009	93.0	75 - 125	0.00438	5.76	20	

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175248 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-175248** Units: **mg/L** Analysis Date: **11-Feb-2022 16:27**
Client ID: Run ID: **ICPMS06_402084** SeqNo: **6499905** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175248 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-175248** Units: **mg/L** Analysis Date: **11-Feb-2022 16:29**
Client ID: Run ID: **ICPMS06_402084** SeqNo: **6499906** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05041	0.00200	0.05	0	101	80 - 120				
Arsenic	0.04923	0.00200	0.05	0	98.5	80 - 120				
Beryllium	0.04874	0.00200	0.05	0	97.5	80 - 120				
Cadmium	0.05131	0.00200	0.05	0	103	80 - 120				
Chromium	0.0471	0.00400	0.05	0	94.2	80 - 120				
Cobalt	0.0485	0.00500	0.05	0	97.0	80 - 120				
Copper	0.04782	0.00200	0.05	0	95.6	80 - 120				
Lead	0.04908	0.00200	0.05	0	98.2	80 - 120				
Molybdenum	0.04991	0.00500	0.05	0	99.8	80 - 120				
Nickel	0.04934	0.00200	0.05	0	98.7	80 - 120				
Selenium	0.0511	0.00200	0.05	0	102	80 - 120				
Silver	0.05177	0.00200	0.05	0	104	80 - 120				
Thallium	0.05053	0.00200	0.05	0	101	80 - 120				
Vanadium	0.04843	0.00500	0.05	0	96.9	80 - 120				
Zinc	0.0505	0.00400	0.05	0	101	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175248 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22020401-14MS** Units: **mg/L** Analysis Date: **11-Feb-2022 16:46**
Client ID: Run ID: **ICPMS06_402084** SeqNo: **6499914** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05065	0.00200	0.05	0.000083	101	80 - 120				
Arsenic	0.0701	0.00200	0.05	0.01878	103	80 - 120				
Beryllium	0.04805	0.00200	0.05	0.000084	95.9	80 - 120				
Cadmium	0.04847	0.00200	0.05	0.000086	96.8	80 - 120				
Chromium	0.04853	0.00400	0.05	0.001689	93.7	80 - 120				
Cobalt	0.05775	0.00500	0.05	0.009961	95.6	80 - 120				
Copper	0.04577	0.00200	0.05	0.000239	91.1	80 - 120				
Lead	0.04832	0.00200	0.05	0.000546	95.5	80 - 120				
Molybdenum	0.05415	0.00500	0.05	0.005396	97.5	80 - 120				
Nickel	0.05334	0.00200	0.05	0.005753	95.2	80 - 120				
Selenium	0.05127	0.00200	0.05	0.000203	102	80 - 120				
Silver	0.04672	0.00200	0.05	0.000026	93.4	80 - 120				
Thallium	0.04941	0.00200	0.05	0.000037	98.7	80 - 120				
Vanadium	0.05189	0.00500	0.05	0.003067	97.7	80 - 120				
Zinc	0.05083	0.00400	0.05	0.002006	97.6	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175248 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22020401-14MSD** Units: **mg/L** Analysis Date: **11-Feb-2022 16:50**
Client ID: Run ID: **ICPMS06_402084** SeqNo: **6499916** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05285	0.00200	0.05	0.000083	106	80 - 120	0.05065	4.24	20	
Arsenic	0.07339	0.00200	0.05	0.01878	109	80 - 120	0.0701	4.58	20	
Beryllium	0.05069	0.00200	0.05	0.000084	101	80 - 120	0.04805	5.35	20	
Cadmium	0.05101	0.00200	0.05	0.000086	102	80 - 120	0.04847	5.11	20	
Chromium	0.05119	0.00400	0.05	0.001689	99.0	80 - 120	0.04853	5.35	20	
Cobalt	0.06045	0.00500	0.05	0.009961	101	80 - 120	0.05775	4.56	20	
Copper	0.0476	0.00200	0.05	0.000239	94.7	80 - 120	0.04577	3.92	20	
Lead	0.05092	0.00200	0.05	0.000546	101	80 - 120	0.04832	5.25	20	
Molybdenum	0.05652	0.00500	0.05	0.005396	102	80 - 120	0.05415	4.28	20	
Nickel	0.05631	0.00200	0.05	0.005753	101	80 - 120	0.05334	5.43	20	
Selenium	0.05366	0.00200	0.05	0.000203	107	80 - 120	0.05127	4.55	20	
Silver	0.04962	0.00200	0.05	0.000026	99.2	80 - 120	0.04672	6.01	20	
Thallium	0.05257	0.00200	0.05	0.000037	105	80 - 120	0.04941	6.2	20	
Vanadium	0.05444	0.00500	0.05	0.003067	103	80 - 120	0.05189	4.79	20	
Zinc	0.05258	0.00400	0.05	0.002006	101	80 - 120	0.05083	3.39	20	

PDS Sample ID: **HS22020401-14PDS** Units: **mg/L** Analysis Date: **11-Feb-2022 16:52**
Client ID: Run ID: **ICPMS06_402084** SeqNo: **6499917** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1057	0.00200	0.1	0.000083	106	75 - 125				
Arsenic	0.1249	0.00200	0.1	0.01878	106	75 - 125				
Beryllium	0.101	0.00200	0.1	0.000084	101	75 - 125				
Cadmium	0.1021	0.00200	0.1	0.000086	102	75 - 125				
Chromium	0.1002	0.00400	0.1	0.001689	98.5	75 - 125				
Cobalt	0.1119	0.00500	0.1	0.009961	102	75 - 125				
Copper	0.09256	0.00200	0.1	0.000239	92.3	75 - 125				
Lead	0.1042	0.00200	0.1	0.000546	104	75 - 125				
Nickel	0.1037	0.00200	0.1	0.005753	98.0	75 - 125				
Selenium	0.1058	0.00200	0.1	0.000203	106	75 - 125				
Silver	0.1015	0.00200	0.1	0.000026	102	75 - 125				
Thallium	0.1074	0.00200	0.1	0.000037	107	75 - 125				
Vanadium	0.1043	0.00500	0.1	0.003067	101	75 - 125				
Zinc	0.1023	0.00400	0.1	0.002006	100	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175248 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22020401-14SD** Units: **mg/L** Analysis Date: **11-Feb-2022 16:44**
Client ID: Run ID: **ICPMS06_402084** SeqNo: **6499913** PrepDate: **11-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000083	0	10	
Arsenic	0.01811	0.0100					0.01878	3.53	10	
Beryllium	U	0.0100					0.000084	0	10	
Cadmium	U	0.0100					0.000086	0	10	
Chromium	U	0.0200					0.001689	0	10	
Cobalt	0.01024	0.0250					0.009961	0	10	J
Copper	U	0.0100					0.000239	0	10	
Lead	U	0.0100					0.000546	0	10	
Molybdenum	0.005181	0.0250					0.005396	0	10	J
Nickel	0.00582	0.0100					0.005753	0	10	J
Selenium	U	0.0100					0.000203	0	10	
Silver	U	0.0100					0.000026	0	10	
Thallium	U	0.0100					0.000037	0	10	
Vanadium	U	0.0250					0.003067	0	10	
Zinc	U	0.0200					0.002006	0	10	

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175032 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-175032** Units: **ug/L** Analysis Date: **04-Feb-2022 15:50**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491334** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.0713*	*0*	*0.08*	*0*	*89.1*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.07549*	*0*	*0.08*	*0*	*94.4*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.07085*	*0*	*0.08*	*0*	*88.6*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175032 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-175032** Units: **ug/L** Analysis Date: **04-Feb-2022 16:10**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491335** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.07489	0.010	0.08	0	93.6	40 - 140				
2-Methylnaphthalene	0.06391	0.010	0.08	0	79.9	40 - 140				
Acenaphthene	0.0679	0.010	0.08	0	84.9	40 - 140				
Acenaphthylene	0.06871	0.010	0.08	0	85.9	40 - 140				
Anthracene	0.07063	0.010	0.08	0	88.3	40 - 140				
Benz(a)anthracene	0.05752	0.010	0.08	0	71.9	40 - 140				
Benzo(a)pyrene	0.07758	0.010	0.08	0	97.0	40 - 140				
Benzo(b)fluoranthene	0.07191	0.010	0.08	0	89.9	40 - 140				
Benzo(g,h,i)perylene	0.06745	0.010	0.08	0	84.3	40 - 140				
Benzo(k)fluoranthene	0.09263	0.010	0.08	0	116	40 - 140				
Chrysene	0.07484	0.010	0.08	0	93.5	40 - 140				
Dibenz(a,h)anthracene	0.06466	0.010	0.08	0	80.8	40 - 140				
Dibenzofuran	0.06316	0.010	0.08	0	78.9	40 - 140				
Fluoranthene	0.06493	0.010	0.08	0	81.2	40 - 140				
Fluorene	0.06434	0.010	0.08	0	80.4	40 - 140				
Indeno(1,2,3-cd)pyrene	0.07774	0.010	0.08	0	97.2	40 - 140				
Naphthalene	0.08109	0.010	0.08	0	101	40 - 140				
Phenanthrene	0.06941	0.010	0.08	0	86.8	40 - 140				
Pyrene	0.07644	0.010	0.08	0	95.6	40 - 140				
Surr: 2-Fluorobiphenyl	*0.08158*	*0*	*0.08*	*0*	*102*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.08272*	*0*	*0.08*	*0*	*103*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.07033*	*0*	*0.08*	*0*	*87.9*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175032 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-175032** Units: **ug/L** Analysis Date: **04-Feb-2022 16:30**
Client ID: Run ID: **SV-6_401612** SeqNo: **6491336** PrepDate: **03-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.0702	0.010	0.08	0	87.8	40 - 140	0.07489	6.47	20	
2-Methylnaphthalene	0.06196	0.010	0.08	0	77.5	40 - 140	0.06391	3.09	20	
Acenaphthene	0.06836	0.010	0.08	0	85.5	40 - 140	0.0679	0.672	20	
Acenaphthylene	0.06402	0.010	0.08	0	80.0	40 - 140	0.06871	7.06	20	
Anthracene	0.06957	0.010	0.08	0	87.0	40 - 140	0.07063	1.5	20	
Benz(a)anthracene	0.05486	0.010	0.08	0	68.6	40 - 140	0.05752	4.74	20	
Benzo(a)pyrene	0.07274	0.010	0.08	0	90.9	40 - 140	0.07758	6.45	20	
Benzo(b)fluoranthene	0.06717	0.010	0.08	0	84.0	40 - 140	0.07191	6.81	20	
Benzo(g,h,i)perylene	0.06456	0.010	0.08	0	80.7	40 - 140	0.06745	4.38	20	
Benzo(k)fluoranthene	0.08871	0.010	0.08	0	111	40 - 140	0.09263	4.32	20	
Chrysene	0.068	0.010	0.08	0	85.0	40 - 140	0.07484	9.57	20	
Dibenz(a,h)anthracene	0.06082	0.010	0.08	0	76.0	40 - 140	0.06466	6.12	20	
Dibenzofuran	0.06077	0.010	0.08	0	76.0	40 - 140	0.06316	3.85	20	
Fluoranthene	0.06437	0.010	0.08	0	80.5	40 - 140	0.06493	0.874	20	
Fluorene	0.06579	0.010	0.08	0	82.2	40 - 140	0.06434	2.22	20	
Indeno(1,2,3-cd)pyrene	0.07497	0.010	0.08	0	93.7	40 - 140	0.07774	3.62	20	
Naphthalene	0.08024	0.010	0.08	0	100	40 - 140	0.08109	1.06	20	
Phenanthrene	0.06596	0.010	0.08	0	82.5	40 - 140	0.06941	5.1	20	
Pyrene	0.07062	0.010	0.08	0	88.3	40 - 140	0.07644	7.91	20	
Surr: 2-Fluorobiphenyl	*0.072*	*0*	*0.08*	*0*	*90.0*	*40 - 140*	*0.08158*	*12.5*	*20*	
Surr: 4-Terphenyl-d14	*0.08015*	*0*	*0.08*	*0*	*100*	*40 - 140*	*0.08272*	*3.16*	*20*	
Surr: Nitrobenzene-d5	*0.06848*	*0*	*0.08*	*0*	*85.6*	*40 - 140*	*0.07033*	*2.66*	*20*	

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175159 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-175159** Units: **mg/L** Analysis Date: **08-Feb-2022 15:30**
Client ID: Run ID: **WetChem_HS_401815** SeqNo: **6493832** PrepDate: **08-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-175159** Units: **mg/L** Analysis Date: **08-Feb-2022 15:30**
Client ID: Run ID: **WetChem_HS_401815** SeqNo: **6493831** PrepDate: **08-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	22.19	0.50	20	0	111	85 - 115				

MS Sample ID: **HS22011287-02MS** Units: **mg/L** Analysis Date: **08-Feb-2022 15:30**
Client ID: Run ID: **WetChem_HS_401815** SeqNo: **6493829** PrepDate: **08-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	35.73	0.50	20	15.62	101	75 - 125				

MSD Sample ID: **HS22011287-02MSD** Units: **mg/L** Analysis Date: **08-Feb-2022 15:30**
Client ID: Run ID: **WetChem_HS_401815** SeqNo: **6493830** PrepDate: **08-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	35.82	0.50	20	15.62	101	75 - 125	35.73	0.252	20	

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: 175262 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-175262** Units: **mg/L** Analysis Date: **10-Feb-2022 15:11**
Client ID: Run ID: **UV-2450_402003** SeqNo: **6497657** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-175262** Units: **mg/L** Analysis Date: **10-Feb-2022 15:11**
Client ID: Run ID: **UV-2450_402003** SeqNo: **6497656** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.27	0.0500	0.25	0	108	80 - 120				

MS Sample ID: **HS22011359-05MS** Units: **mg/L** Analysis Date: **10-Feb-2022 15:11**
Client ID: **SW-10** Run ID: **UV-2450_402003** SeqNo: **6497654** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.24	0.0500	0.25	0.018	88.8	80 - 120				

MSD Sample ID: **HS22011359-05MSD** Units: **mg/L** Analysis Date: **10-Feb-2022 15:11**
Client ID: **SW-10** Run ID: **UV-2450_402003** SeqNo: **6497655** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.243	0.0500	0.25	0.018	90.0	80 - 120	0.24	1.24	20	

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: R401378 (0) **Instrument: ManTech01** **Method: DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS22011187-01DUP** Units: **mg/L** Analysis Date: **01-Feb-2022 13:03**
Client ID: Run ID: **ManTech01_401378** SeqNo: **6484666** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.05	1.00					11.05	0	20	

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: **R401405 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS22011359-01DUP** Units: **pH Units** Analysis Date: **01-Feb-2022 16:51**
Client ID: **SW-3** Run ID: **WetChem_HS_401405** SeqNo: **6485213** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	4.84	0.100					4.82	0.414	10	
Temp Deg C @pH	21.6	0					21.7	0.462	10	

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: R401604 (0) **Instrument: WetChem_HS** **Method: SALINITY**

DUP Sample ID: **HS22010956-01DUP** Units: **ppt** Analysis Date: **04-Feb-2022 13:06**
Client ID: Run ID: **WetChem_HS_401604** SeqNo: **6489541** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: R402033 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-021022** Units: **mg/L** Analysis Date: **10-Feb-2022 15:45**
Client ID: Run ID: **Balance1_402033** SeqNo: **6498200** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-021022** Units: **mg/L** Analysis Date: **10-Feb-2022 15:45**
Client ID: Run ID: **Balance1_402033** SeqNo: **6498202** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39.8	2.00	40	0	99.5	78 - 114				

LCSD Sample ID: **WLCSDW-021022** Units: **mg/L** Analysis Date: **10-Feb-2022 15:45**
Client ID: Run ID: **Balance1_402033** SeqNo: **6498201** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39.9	2.00	40	0	99.8	78 - 114	39.8	0.251	18	

MS Sample ID: **HS22020165-01MS** Units: **mg/L** Analysis Date: **10-Feb-2022 15:45**
Client ID: Run ID: **Balance1_402033** SeqNo: **6498191** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	40	2.00	40	4.115	89.7	78 - 114				

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: R402076 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK	Sample ID:	**MBLK-R402076**			Units: **mg/L**		Analysis Date: **08-Feb-2022 14:00**				
Client ID:			Run ID: **Balance1_402076**		SeqNo: **6499146**		PrepDate:		DF: **1**		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Residue, Total	U	10.0									

LCS	Sample ID:	**LCS-R402076**			Units: **mg/L**		Analysis Date: **08-Feb-2022 14:00**				
Client ID:			Run ID: **Balance1_402076**		SeqNo: **6499145**		PrepDate:		DF: **1**		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Residue, Total	1064	10.0	1000	0	106	85 - 115					

DUP	Sample ID:	**HS22020287-04DUP**			Units: **mg/L**		Analysis Date: **08-Feb-2022 14:00**				
Client ID:			Run ID: **Balance1_402076**		SeqNo: **6499147**		PrepDate:		DF: **1**		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual	
Residue, Total	172	10.0					174	1.16	20		

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: R402085 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-021022** Units: **mg/L** Analysis Date: **10-Feb-2022 14:22**
Client ID: Run ID: **Balance1_402085** SeqNo: **6499477** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-021022** Units: **mg/L** Analysis Date: **10-Feb-2022 14:22**
Client ID: Run ID: **Balance1_402085** SeqNo: **6499478** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1086	10.0	1000	0	109	85 - 115				

DUP Sample ID: **HS22020425-01DUP** Units: **mg/L** Analysis Date: **10-Feb-2022 14:22**
Client ID: Run ID: **Balance1_402085** SeqNo: **6499476** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	28	10.0					28	0	5	

The following samples were analyzed in this batch: HS22011359-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: R402127 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-021122** Units: **mg/L** Analysis Date: **11-Feb-2022 14:14**
Client ID: Run ID: **Balance1_402127** SeqNo: **6500417** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-021122** Units: **mg/L** Analysis Date: **11-Feb-2022 14:14**
Client ID: Run ID: **Balance1_402127** SeqNo: **6500418** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1062	10.0	1000	0	106	85 - 115				

DUP Sample ID: **HS22020425-07DUP** Units: **mg/L** Analysis Date: **11-Feb-2022 14:14**
Client ID: Run ID: **Balance1_402127** SeqNo: **6500416** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	104	10.0					104	0	5	

The following samples were analyzed in this batch: HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: R402158 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY E300.0, REV 2.1, 1993**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **11-Feb-2022 07:17**
Client ID: Run ID: **ICS-Integrion_402158** SeqNo: **6500954** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **11-Feb-2022 07:22**
Client ID: Run ID: **ICS-Integrion_402158** SeqNo: **6500955** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	8.055	0.200	8	0	101	90 - 110				

MS Sample ID: **HS22011359-01MS** Units: **mg/L** Analysis Date: **11-Feb-2022 11:28**
Client ID: **SW-3** Run ID: **ICS-Integrion_402158** SeqNo: **6500961** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	18.66	1.00	20	0.345	91.6	80 - 120				

MSD Sample ID: **HS22011359-01MSD** Units: **mg/L** Analysis Date: **11-Feb-2022 11:33**
Client ID: **SW-3** Run ID: **ICS-Integrion_402158** SeqNo: **6500962** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.3	1.00	20	0.345	94.8	80 - 120	18.66	3.35	20	

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: R402198 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-021422** Units: **mg/L** Analysis Date: **14-Feb-2022 13:20**
Client ID: Run ID: **Balance1_402198** SeqNo: **6501717** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-021422** Units: **mg/L** Analysis Date: **14-Feb-2022 13:20**
Client ID: Run ID: **Balance1_402198** SeqNo: **6501719** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39	2.00	40	0	97.5	78 - 114				

LCSD Sample ID: **WLCSDW-021422** Units: **mg/L** Analysis Date: **14-Feb-2022 13:20**
Client ID: Run ID: **Balance1_402198** SeqNo: **6501718** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37	2.00	40	0	92.5	78 - 114	39	5.26	18	

MS Sample ID: **HS22020251-01MS** Units: **mg/L** Analysis Date: **14-Feb-2022 13:20**
Client ID: Run ID: **Balance1_402198** SeqNo: **6501713** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.6	2.00	40	4.4	85.5	78 - 114				

The following samples were analyzed in this batch: HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: HS22011359

QC BATCH REPORT

Batch ID: R402221 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-021222** Units: **mg/L** Analysis Date: **12-Feb-2022 16:52**
Client ID: Run ID: **Balance1_402221** SeqNo: **6502037** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-021222** Units: **mg/L** Analysis Date: **12-Feb-2022 16:52**
Client ID: Run ID: **Balance1_402221** SeqNo: **6502038** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	89	2.50	100	0	89.0	85 - 115				

DUP Sample ID: **HS22020384-01DUP** Units: **mg/L** Analysis Date: **12-Feb-2022 16:52**
Client ID: Run ID: **Balance1_402221** SeqNo: **6502027** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	25.5	2.50					26.25	2.9	5	

DUP Sample ID: **HS22020327-02DUP** Units: **mg/L** Analysis Date: **12-Feb-2022 16:52**
Client ID: Run ID: **Balance1_402221** SeqNo: **6502021** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	25	2.50					24.5	2.02	5	

The following samples were analyzed in this batch: HS22011359-01 HS22011359-02 HS22011359-03 HS22011359-04 HS22011359-05

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
WorkOrder: **HS22011359**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

RIGHT SOLUTIONS | RIGHT PARTNER

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-3, SW-4, SW-5, SW-6, SW-10
Work Order: HS22011359

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22011359-01	SW-3	Login	1/31/2022 12:56:12 PM	NDR	MET015
HS22011359-01	SW-3	Login	1/31/2022 12:56:12 PM	NDR	EXT091
HS22011359-01	SW-3	Login	1/31/2022 12:56:12 PM	NDR	WET227
HS22011359-01	SW-3	Login	1/31/2022 12:56:12 PM	NDR	WET227
HS22011359-01	SW-3	Login	1/31/2022 12:56:12 PM	NDR	WET227
HS22011359-01	SW-3	Login	1/31/2022 12:56:12 PM	NDR	WET227
HS22011359-01	SW-3	Login	1/31/2022 12:56:12 PM	NDR	WET227

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS22011359 **Date/Time Received:** **31-Jan-2022 11:50**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By: */S/ Nilesh D. Ranchod* 31-Jan-2022 13:01 **Reviewed by:** */S/ Corey Grandits* 01-Feb-2022 18:33

eSignature Date/Time eSignature Date/Time

Matrices: **WATER** Carrier name: **DHL**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:252583
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s):	16.5c/17.0c, 16.6c/17.1c, 16.0c/16.5c c UC/C	IR 31
Cooler(s)/Kit(s):	48065/48073/48235	
Date/Time sample(s) sent to storage:	01/31/2022 13:15	

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: Samples Logged per Sample Labels
SW-3 1/21/22 08:45, SW-4 121/22 10:50, SW-5 1/21/22 10:50, SW-6 1/21/22 12:10, SW-10 1/21/22 06:45

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 252583

HS22011359

, WV

ERM, Inc

SW-3, SW-4, SW-5, SW-6, SW-10

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	
Work Order		Project Number	
Company Name	ERM	Bill To Company	ERM
Send Report To	Selina Pradhan	Invoice Attn	AP
Address	300 West Summit Avenue	Address	300 West Summit Avenue
City/State/Zip	Charlotte | NC | 28203	City/State/Zip	Charlotte | NC | 28203
Phone		Phone	
Fax		Fax	
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	SW-3	1.21.22	13:45	W		9	X	X	X	X	X	X	X	X			
2	SW-4	1.21.22	10:50	W		9											
3	SW-5	1.21.22	10:30	W		9											
4	SW-6	1.21.22	14:10	W		9											
5	SW-10	1.21.22	16:45	W		9											
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by:	Date: 1.21.22	Time: 11:50	Received by:	
Relinquished by:	Date:	Time:	Received by (Laboratory):	
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
48265	16.5
48273	16.6
48235	16.7

QC Package: (Check One Box Below)

- [X] Level II Std QC
- [ ] Level III Std QC/Raw Data
- [ ] Level IV SW846/CLP
- [ ] Other
- [ ] TRRP Checklist
- [ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

3R431 CLF0.5

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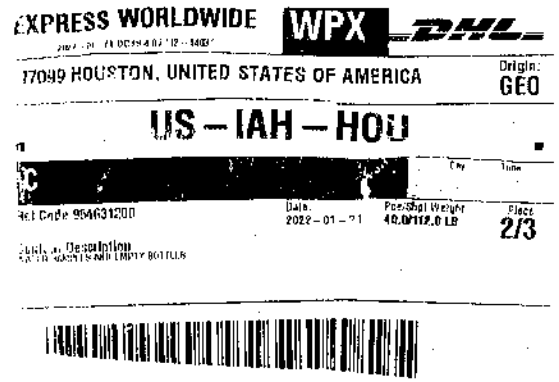

EXPRESS WORLDWIDE WPX DHL

77049 HOUSTON, UNITED STATES OF AMERICA

Origin: GEO

US – IAH – HOU

[redacted]

Act Code: 9546312D0

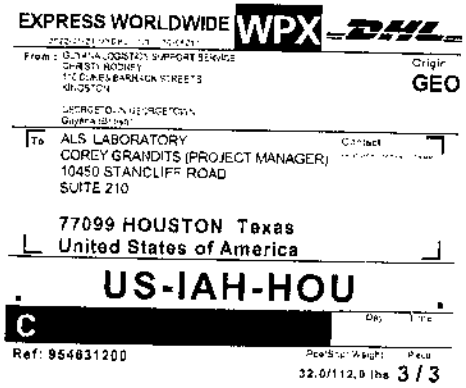
Date: 2022-01-21

Pce/Shpt Weight: 40.0/112.0 LB

Piece: 2/3

Delivery Description: [illegible] BOTTLES

LB1026 (6/11) OMN


EXPRESS WORLDWIDE WPX DHL

From : GUYANA LOGISTICS SUPPORT SERVICE
CHRISTI RODNEY
112 CAMPBELLTOWN STREETS
KINGSTON
GEORGETOWN GEORGETOWN
Guyana (GY)

Origin
GEO

To ALS LABORATORY
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210

77099 HOUSTON Texas
United States of America

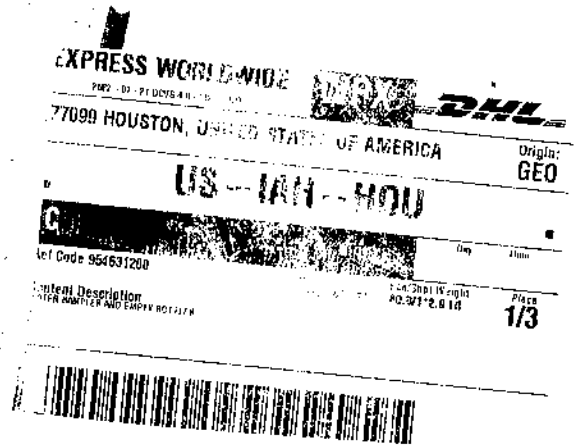
US-IAH-HOU

C [redacted]

Ref: 954631200

Pcs/Sack Weight Pcs
32.0/112.0 lbs 3 / 3

78 x 14 x 13



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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 14, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22011379**

Laboratory Results for: **Gas to Energy - EIA Study-SW11**

Dear Selina Pradhan,

ALS Environmental received 1 sample(s) on Jan 28, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
Work Order: HS22011379

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22011379-01	SW11	Sludge		22-Jan-2022 00:00	28-Jan-2022 10:15	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - EIA Study-SW11
Work Order: HS22011379

Work Order Comments

• The analysis for sulfide was subcontracted to ALS Holland, MI. Final report attached.

The analysis for grain size was subcontracted to ALS Kelso, WA. Final report attached.

ECD Organics by Method SW8081

Batch ID: 175008

Sample ID: LCS-175008

• The multi-response compounds toxaphene and chlordane were not included in the spiking solution for the LCS.

Sample ID: LCS1-175008

• Mirex LCS/LCSD provided as batch quality control.

Sample ID: SW11 (HS22011379-01)

• This sample was analyzed at a dilution in the 8081 Pesticide analysis due to sample matrix interference. Reporting limits were adjusted accordingly.

Sample ID: SW11 (HS22011379-01MS)

• The multi-response compounds toxaphene and chlordane were not included in the spiking solution for the MS/MSD.

• The recovery of the Matrix Spike (MS) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The recovery of the MS may be due to sample matrix interference.

Sample ID: SW11 (HS22011379-01MSD)

• The recovery of the Matrix Spike Duplicate (MSD) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The failed recovery of the MSD may be due to sample matrix interference.

ECD Organics by Method SW8082

Batch ID: 175007

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 174986

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW6020A

Batch ID: 175158

Sample ID: HS22011266-01MS

• MS and MSD are for an unrelated sample

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Client: ERM, Inc **CASE NARRATIVE**
Project: Gas to Energy - EIA Study-SW11
Work Order: HS22011379

Metals by Method SW7471B

Batch ID: 175091

Sample ID: HS22020179-01MS

- MS and MSD are for an unrelated sample

WetChemistry by Method M2540G

Batch ID: R401818

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9060

Batch ID: 175315

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
Sample ID: SW11
Collection Date: 22-Jan-2022 00:00

ANALYTICAL REPORT
WorkOrder:HS22011379
Lab ID:HS22011379-01
Matrix:Sludge

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SW8270 SIM	**Method:SW8270SIM**				Prep:SW3541 / 02-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
2-Methylnaphthalene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Acenaphthene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Acenaphthylene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Anthracene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Benz(a)anthracene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Benzo(a)pyrene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Benzo(b)fluoranthene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Benzo(g,h,i)perylene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Benzo(k)fluoranthene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Chrysene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Dibenz(a,h)anthracene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Dibenzofuran	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Fluoranthene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Fluorene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Indeno(1,2,3-cd)pyrene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Naphthalene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Phenanthrene	**0.75**		**0.33**	**0.33**	**ug/Kg**	1	03-Feb-2022 18:40
Pyrene	U		0.33	0.33	ug/Kg	1	03-Feb-2022 18:40
Surr: 2-Fluorobiphenyl	*86.0*			*40-140*	*%REC*	*1*	*03-Feb-2022 18:40*
Surr: 4-Terphenyl-d14	*97.8*			*40-140*	*%REC*	*1*	*03-Feb-2022 18:40*
Surr: Nitrobenzene-d5	*84.8*			*40-140*	*%REC*	*1*	*03-Feb-2022 18:40*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
Sample ID: SW11
Collection Date: 22-Jan-2022 00:00

ANALYTICAL REPORT
WorkOrder:HS22011379
Lab ID:HS22011379-01
Matrix:Sludge

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ORGANOCHLORINE PESTICIDES BY SW8081B		**Method:SW8081**		Prep:SW3541 / 02-Feb-2022			Analyst: JBA
4,4´-DDD		U	1.6	1.6	ug/Kg	5	08-Feb-2022 09:57
4,4´-DDE		U	1.6	1.6	ug/Kg	5	08-Feb-2022 09:57
4,4´-DDT		U	1.6	1.6	ug/Kg	5	08-Feb-2022 09:57
Aldrin		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
alpha-BHC		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
beta-BHC		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
Chlordane		U	8.2	8.2	ug/Kg	5	08-Feb-2022 09:57
delta-BHC		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
Dieldrin		U	1.6	1.6	ug/Kg	5	08-Feb-2022 09:57
Endosulfan I		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
Endosulfan II		U	1.6	1.6	ug/Kg	5	08-Feb-2022 09:57
Endosulfan sulfate		U	1.6	1.6	ug/Kg	5	08-Feb-2022 09:57
Endrin		U	1.6	1.6	ug/Kg	5	08-Feb-2022 09:57
Endrin aldehyde		U	1.6	1.6	ug/Kg	5	08-Feb-2022 09:57
Endrin ketone		U	1.6	1.6	ug/Kg	5	08-Feb-2022 09:57
gamma-BHC		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
Heptachlor		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
Heptachlor epoxide		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
Methoxychlor		U	8.2	8.2	ug/Kg	5	08-Feb-2022 09:57
Toxaphene		U	8.2	8.2	ug/Kg	5	08-Feb-2022 09:57
alpha-Chlordane		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
gamma-Chlordane		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
Surr: Decachlorobiphenyl	*128*			*59-144*	*%REC*	*5*	*08-Feb-2022 09:57*
Surr: Tetrachloro-m-xylene	*118*			*56.9-130*	*%REC*	*5*	*08-Feb-2022 09:57*
MISCELLANEOUS PESTICIDES BY SW8081B		**Method:SW8081**		Prep:SW3541 / 02-Feb-2022			Analyst: JBA
Mirex		U	0.82	0.82	ug/Kg	5	08-Feb-2022 09:57
PCBS BY SW8082A		**Method:SW8082**		Prep:SW3541 / 02-Feb-2022			Analyst: JBA
Aroclor 1016		U	0.41	1.6	ug/Kg	1	03-Feb-2022 11:49
Aroclor 1221		U	0.55	1.6	ug/Kg	1	03-Feb-2022 11:49
Aroclor 1232		U	0.44	1.6	ug/Kg	1	03-Feb-2022 11:49
Aroclor 1242		U	0.58	1.6	ug/Kg	1	03-Feb-2022 11:49
Aroclor 1248		U	0.58	1.6	ug/Kg	1	03-Feb-2022 11:49
Aroclor 1254		U	0.46	1.6	ug/Kg	1	03-Feb-2022 11:49
Aroclor 1260		U	0.24	1.6	ug/Kg	1	03-Feb-2022 11:49
Surr: Decachlorobiphenyl	*122*			*54-143*	*%REC*	*1*	*03-Feb-2022 11:49*
Surr: Tetrachloro-m-xylene	*76.0*			*50-140*	*%REC*	*1*	*03-Feb-2022 11:49*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
Sample ID: SW11
Collection Date: 22-Jan-2022 00:00

ANALYTICAL REPORT
WorkOrder:HS22011379
Lab ID:HS22011379-01
Matrix:Sludge

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A		**Method:SW6020A**			Prep:SW3050B / 09-Feb-2022		Analyst: JC
Antimony	U		0.0615	0.473	mg/Kg	1	09-Feb-2022 21:03
Arsenic	**5.20**		**0.0663**	**0.473**	**mg/Kg**	1	09-Feb-2022 21:03
Beryllium	**0.383**	J	**0.0199**	**0.473**	**mg/Kg**	1	09-Feb-2022 21:03
Cadmium	U		0.0256	0.473	mg/Kg	1	09-Feb-2022 21:03
Chromium	**8.37**		**0.0218**	**0.473**	**mg/Kg**	1	09-Feb-2022 21:03
Cobalt	**3.24**		**0.0142**	**0.473**	**mg/Kg**	1	09-Feb-2022 21:03
Copper	**2.86**		**0.0360**	**0.189**	**mg/Kg**	1	09-Feb-2022 21:03
Lead	**5.41**		**0.0123**	**0.473**	**mg/Kg**	1	09-Feb-2022 21:03
Molybdenum	**0.0794**	J	**0.0170**	**0.473**	**mg/Kg**	1	09-Feb-2022 21:03
Nickel	**5.39**		**0.0454**	**0.473**	**mg/Kg**	1	09-Feb-2022 21:03
Selenium	**0.232**	J	**0.0862**	**0.473**	**mg/Kg**	1	09-Feb-2022 21:03
Silver	U		0.0142	0.473	mg/Kg	1	09-Feb-2022 21:03
Thallium	U		0.211	0.473	mg/Kg	1	09-Feb-2022 21:03
Vanadium	**11.5**		**0.0710**	**0.473**	**mg/Kg**	1	09-Feb-2022 21:03
Zinc	**23.4**		**0.161**	**0.473**	**mg/Kg**	1	09-Feb-2022 21:03
MERCURY BY SW7471B		**Method:SW7471B**			Prep:SW7471B / 07-Feb-2022		Analyst: MSC
Mercury	**0.0142**		**0.000512**	**0.00362**	**mg/Kg**	1	07-Feb-2022 13:11
TOTAL SOLIDS BY SM2540G-2011		**Method:M2540G**					Analyst: KAH
Total Solids	**24.6**		**0.0100**	**0.0100**	**wt%**	1	08-Feb-2022 10:30
TOTAL ORGANIC CARBON BY SW9060A		**Method:SW9060**			Prep:SW9060 / 11-Feb-2022		Analyst: JAC
Total Organic Carbon	**0.720**		**0.0596**	**0.0596**	**wt%-dry**	1	11-Feb-2022 17:08
SUBCONTRACT ANALYSIS - GRAIN SIZE		**Method:NA**					Analyst: SUBK
Subcontract Analysis	See Attached		0		NA	1	10-Feb-2022 09:38
SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS		**Method:NA**					Analyst: SUBHO
Subcontract Analysis	See Attached		0		NA	1	10-Feb-2022 13:12

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Weight / Prep Log

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

Batch ID: 174986 **Start Date:** 02 Feb 2022 11:00 **End Date:** 02 Feb 2022 14:00
Method: SV SOXHLET EXTRACT-LOWLEVEL-SW3541 **Prep Code:** 3541_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011379-01		30.25 (g)	1 (mL)	0.03306	1-L glass, Neat

Batch ID: 175007 **Start Date:** 02 Feb 2022 13:00 **End Date:** 02 Feb 2022 17:30
Method: PCB_3541_LO **Prep Code:** PCBPR_SOX_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011379-01		30.45 (grams)	1 (mL)	0.03284	1-L glass, Neat

Batch ID: 175008 **Start Date:** 02 Feb 2022 13:00 **End Date:** 02 Feb 2022 17:00
Method: PEST_LOW_SOIL 3541 **Prep Code:** PESTPR_S_3541LO

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011379-01		30.45 (g)	1 (mL)	0.03284	1-L glass, Neat

Batch ID: 175091 **Start Date:** 07 Feb 2022 09:30 **End Date:** 07 Feb 2022 11:30
Method: MERCURY PREP - SOLID - 7471B **Prep Code:** HG_S_LOWPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011379-01		0.5505 (grams)	40 (mL)	72.66	1-L glass, Neat

Batch ID: 175158 **Start Date:** 09 Feb 2022 07:30 **End Date:** 08 Feb 2022 13:30
Method: METALS PREP - SOLIDS - SW3050B **Prep Code:** 3050_I_LOW

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011379-01		0.5281 (g)	50 (mL)	94.68	1-L glass, Neat

Batch ID: 175315 **Start Date:** 11 Feb 2022 12:00 **End Date:** 11 Feb 2022 13:30
Method: TOC SOLID PREP **Prep Code:** TOC_SOLID_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22011379-01		0.2013 (grams)	0.2 (mL)	0.9935	1-L glass, Neat

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 174986 (0)	**Test Name :** SW8270 SIM				**Matrix:** Sludge	
HS22011379-01	SW11	22 Jan 2022 00:00		02 Feb 2022 11:00	03 Feb 2022 18:40	1
Batch ID: 175007 (0)	**Test Name :** PCBS BY SW8082A				**Matrix:** Sludge	
HS22011379-01	SW11	22 Jan 2022 00:00		02 Feb 2022 13:00	03 Feb 2022 11:49	1
Batch ID: 175008 (0)	**Test Name :** MISCELLANEOUS PESTICIDES BY SW8081B				**Matrix:** Sludge	
HS22011379-01	SW11	22 Jan 2022 00:00		02 Feb 2022 13:00	08 Feb 2022 09:57	5
HS22011379-01	SW11	22 Jan 2022 00:00		02 Feb 2022 13:00	08 Feb 2022 09:57	5
Batch ID: 175091 (0)	**Test Name :** MERCURY BY SW7471B				**Matrix:** Sludge	
HS22011379-01	SW11	22 Jan 2022 00:00		07 Feb 2022 09:30	07 Feb 2022 13:11	1
Batch ID: 175158 (0)	**Test Name :** METALS BY SW6020A				**Matrix:** Sludge	
HS22011379-01	SW11	22 Jan 2022 00:00		09 Feb 2022 13:30	09 Feb 2022 21:03	1
Batch ID: 175315 (0)	**Test Name :** TOTAL ORGANIC CARBON BY SW9060A				**Matrix:** Sludge	
HS22011379-01	SW11	22 Jan 2022 00:00		11 Feb 2022 12:00	11 Feb 2022 17:08	1
Batch ID: R401818 (0)	**Test Name :** TOTAL SOLIDS BY SM2540G-2011				**Matrix:** Sludge	
HS22011379-01	SW11	22 Jan 2022 00:00			08 Feb 2022 10:30	1
Batch ID: R401944 (0)	**Test Name :** SUBCONTRACT ANALYSIS - GRAIN SIZE				**Matrix:** Sludge	
HS22011379-01	SW11	22 Jan 2022 00:00			10 Feb 2022 09:38	1
Batch ID: R401981 (0)	**Test Name :** SUBCONTRACT ANALYSIS - SULFIDE 9034 - SOLIDS				**Matrix:** Sludge	
HS22011379-01	SW11	22 Jan 2022 00:00			10 Feb 2022 13:12	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175007 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MBLK Sample ID: **MBLK-175007** Units: **ug/Kg** Analysis Date: **03-Feb-2022 13:15**
Client ID: Run ID: **ECD_7_401677** SeqNo: **6490881** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	U	1.7								
Aroclor 1221	U	1.7								
Aroclor 1232	U	1.7								
Aroclor 1242	U	1.7								
Aroclor 1248	U	1.7								
Aroclor 1254	U	1.7								
Aroclor 1260	U	1.7								
Surr: Decachlorobiphenyl	*0.6944*	*0.16*	*0.6667*	*0*	*104*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.6394*	*0.16*	*0.6667*	*0*	*95.9*	*50 - 140*				

LCS Sample ID: **LCS-175007** Units: **ug/Kg** Analysis Date: **03-Feb-2022 13:33**
Client ID: Run ID: **ECD_7_401677** SeqNo: **6490882** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	14.98	1.7	16.67	0	89.9	53 - 135				
Aroclor 1260	14.57	1.7	16.67	0	87.4	54 - 137				
Surr: Decachlorobiphenyl	*0.6488*	*0.16*	*0.6667*	*0*	*97.3*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.6995*	*0.16*	*0.6667*	*0*	*105*	*50 - 140*				

MS Sample ID: **HS22011379-01MS** Units: **ug/Kg** Analysis Date: **03-Feb-2022 12:06**
Client ID: **SW11** Run ID: **ECD_7_401677** SeqNo: **6490877** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	17.28	1.7	16.62	0	104	53 - 135				
Aroclor 1260	21.24	1.7	16.62	0	128	54 - 137				
Surr: Decachlorobiphenyl	*0.8104*	*0.16*	*0.6647*	*0*	*122*	*54 - 143*				
Surr: Tetrachloro-m-xylene	*0.8606*	*0.16*	*0.6647*	*0*	*129*	*50 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175007 (0) **Instrument: ECD_7** **Method: PCBS BY SW8082A**

MSD Sample ID: **HS22011379-01MSD** Units: **ug/Kg** Analysis Date: **03-Feb-2022 12:24**
Client ID: **SW11** Run ID: **ECD_7_401677** SeqNo: **6490878** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	15.65	1.7	16.56	0	94.5	53 - 135	17.28	9.91	30	
Aroclor 1260	19.88	1.7	16.56	0	120	54 - 137	21.24	6.59	30	
Surr: Decachlorobiphenyl	*0.6415*	*0.16*	*0.6623*	*0*	*96.9*	*54 - 143*	*0.8104*	*23.3*	*30*	
Surr: Tetrachloro-m-xylene	*0.7761*	*0.16*	*0.6623*	*0*	*117*	*50 - 140*	*0.8606*	*10.3*	*30*	

The following samples were analyzed in this batch: HS22011379-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175008 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

MBLK Sample ID: **MBLK-175008** Units: **ug/Kg** Analysis Date: **08-Feb-2022 12:30**
Client ID: Run ID: **ECD_11_401888** SeqNo: **6495392** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	U	0.33								
4,4´-DDE	U	0.33								
4,4´-DDT	U	0.33								
Aldrin	U	0.17								
alpha-BHC	U	0.17								
alpha-Chlordane	U	0.17								
beta-BHC	U	0.17								
Chlordane	U	1.7								
delta-BHC	U	0.17								
Dieldrin	U	0.33								
Endosulfan I	U	0.17								
Endosulfan II	U	0.33								
Endosulfan sulfate	U	0.33								
Endrin	U	0.33								
Endrin aldehyde	U	0.33								
Endrin ketone	U	0.33								
gamma-BHC	U	0.17								
gamma-Chlordane	U	0.17								
Heptachlor	U	0.17								
Heptachlor epoxide	U	0.17								
Methoxychlor	U	1.7								
Toxaphene	U	1.7								
Surr: Decachlorobiphenyl	*0.816*	*0*	*0.6667*	*0*	*122*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.7218*	*0*	*0.6667*	*0*	*108*	*56.9 - 130*				

MBLK Sample ID: **MBLK-175008** Units: **ug/Kg** Analysis Date: **08-Feb-2022 12:30**
Client ID: Run ID: **ECD_11_401888** SeqNo: **6495408** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mirex	U	0.17								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175008 (0) **Instrument: ECD_11** **Method: ORGANOCHLORINE PESTICIDES BY SW8081B**

LCS Sample ID: **LCS-175008** Units: **ug/Kg** Analysis Date: **08-Feb-2022 07:43**
Client ID: Run ID: **ECD_11_401888** SeqNo: **6495388** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	1.892	0.33	1.667	0	114	53 - 138				
4,4´-DDE	1.866	0.33	1.667	0	112	57 - 136				
4,4´-DDT	2.253	0.33	1.667	0	135	53 - 139				
Aldrin	0.9363	0.17	0.8333	0	112	52 - 130				
alpha-BHC	0.9615	0.17	0.8333	0	115	52 - 130				
alpha-Chlordane	0.9774	0.17	0.8333	0	117	55 - 132				
beta-BHC	0.9423	0.17	0.8333	0	113	62 - 130				
delta-BHC	0.9058	0.17	0.8333	0	109	41 - 137				
Dieldrin	1.888	0.33	1.667	0	113	54 - 138				
Endosulfan I	0.8273	0.17	0.8333	0	99.3	55 - 132				
Endosulfan II	1.428	0.33	1.667	0	85.7	59 - 134				
Endosulfan sulfate	1.791	0.33	1.667	0	107	54 - 141				
Endrin	2.373	0.33	1.667	0	142	60 - 157				
Endrin aldehyde	1.779	0.33	1.667	0	107	56 - 146				
Endrin ketone	1.906	0.33	1.667	0	114	56 - 153				
gamma-BHC	0.9783	0.17	0.8333	0	117	52 - 133				
gamma-Chlordane	0.9344	0.17	0.8333	0	112	60 - 129				
Heptachlor	1.017	0.17	0.8333	0	122	54 - 134				
Heptachlor epoxide	0.7667	0.17	0.8333	0	92.0	58 - 130				
Methoxychlor	10.39	1.7	8.33	0	125	60 - 140				
Surr: Decachlorobiphenyl	*0.8424*	*0*	*0.6667*	*0*	*126*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.6375*	*0*	*0.6667*	*0*	*95.6*	*56.9 - 130*				

LCS Sample ID: **LCS1-175008** Units: **ug/Kg** Analysis Date: **08-Feb-2022 08:05**
Client ID: Run ID: **ECD_11_401888** SeqNo: **6495405** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mirex	0.7654	0.17	0.8333	0	91.9	50 - 150				

LCSD Sample ID: **LCSD1-175008** Units: **ug/Kg** Analysis Date: **08-Feb-2022 08:28**
Client ID: Run ID: **ECD_11_401888** SeqNo: **6495406** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mirex	0.7118	0.17	0.8333	0	85.4	50 - 150	0.7654	7.26	30	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175008 (0) **Instrument:** ECD_11 **Method:** ORGANOCHLORINE PESTICIDES BY SW8081B

MS Sample ID: **HS22011379-01MS** Units: **ug/Kg** Analysis Date: **08-Feb-2022 10:19**
Client ID: **SW11** Run ID: **ECD_11_401888** SeqNo: **6495390** PrepDate: **02-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
4,4´-DDD	2.123	1.6	1.662	0.02562	126	53 - 138				
4,4´-DDE	2.111	1.6	1.662	0.03514	125	57 - 136				
4,4´-DDT	2.864	1.6	1.662	0.1934	161	53 - 139				S
Aldrin	0.9462	0.83	0.8308	0	114	52 - 130				
alpha-BHC	0.9447	0.83	0.8308	0	114	52 - 130				
alpha-Chlordane	1.138	0.83	0.8308	0.001806	137	55 - 132				S
beta-BHC	1.289	0.83	0.8308	0	155	62 - 130				S
delta-BHC	1.059	0.83	0.8308	0.006732	127	41 - 137				
Dieldrin	2.081	1.6	1.662	0.001642	125	54 - 138				
Endosulfan I	1.044	0.83	0.8308	0	126	55 - 132				
Endosulfan II	2.19	1.6	1.662	0	132	59 - 134				
Endosulfan sulfate	2.372	1.6	1.662	0	143	54 - 141				S
Endrin	2.068	1.6	1.662	0	124	60 - 157				
Endrin aldehyde	2.192	1.6	1.662	0.007553	131	56 - 146				
Endrin ketone	2.377	1.6	1.662	0.008046	143	56 - 153				
gamma-BHC	1.054	0.83	0.8308	0	127	52 - 133				
gamma-Chlordane	1.057	0.83	0.8308	0.03514	123	60 - 129				
Heptachlor	1.161	0.83	0.8308	0.0156	138	54 - 134				S
Heptachlor epoxide	1.085	0.83	0.8308	0	131	58 - 130				S
Methoxychlor	13.42	8.3	8.305	0.05386	161	60 - 140				S
Surr: Decachlorobiphenyl	*0.9108*	*0*	*0.6647*	*0*	*137*	*59 - 144*				
Surr: Tetrachloro-m-xylene	*0.79*	*0*	*0.6647*	*0*	*119*	*56.9 - 130*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175008 (0) **Instrument:** ECD_11 **Method:** ORGANOCHLORINE PESTICIDES BY SW8081B

MSD Sample ID: **HS22011379-01MSD** Units: **ug/Kg** Analysis Date: **08-Feb-2022 10:41**
Client ID: **SW11** Run ID: **ECD_11_401888** SeqNo: **6495391** PrepDate: **02-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
4,4´-DDD	2.265	1.6	1.656	0	137	53 - 138	2.123	6.47	30	
4,4´-DDE	2.253	1.6	1.656	0	136	57 - 136	2.111	6.54	30	S
4,4´-DDT	3.131	1.6	1.656	0	189	53 - 139	2.864	8.89	30	S
Aldrin	1.006	0.83	0.8278	0	122	52 - 130	0.9462	6.14	30	
alpha-BHC	0.9949	0.83	0.8278	0	120	52 - 130	0.9447	5.18	30	
alpha-Chlordane	1.22	0.83	0.8278	0	147	55 - 132	1.138	6.92	30	S
beta-BHC	1.266	0.83	0.8278	0	153	62 - 130	1.289	1.82	30	S
delta-BHC	1.14	0.83	0.8278	0	138	41 - 137	1.059	7.35	30	S
Dieldrin	2.209	1.6	1.656	0	133	54 - 138	2.081	5.98	30	
Endosulfan I	1.137	0.83	0.8278	0	137	55 - 132	1.044	8.47	30	S
Endosulfan II	2.332	1.6	1.656	0	141	59 - 134	2.19	6.3	30	S
Endosulfan sulfate	2.555	1.6	1.656	0	154	54 - 141	2.372	7.41	30	S
Endrin	2.442	1.6	1.656	0	147	60 - 157	2.068	16.6	30	
Endrin aldehyde	2.256	1.6	1.656	0	136	56 - 146	2.192	2.89	30	
Endrin ketone	2.501	1.6	1.656	0	151	56 - 153	2.377	5.08	30	
gamma-BHC	1.095	0.83	0.8278	0	132	52 - 133	1.054	3.8	30	
gamma-Chlordane	1.122	0.83	0.8278	0	136	60 - 129	1.057	5.94	30	S
Heptachlor	1.271	0.83	0.8278	0	154	54 - 134	1.161	9.09	30	S
Heptachlor epoxide	1.141	0.83	0.8278	0	138	58 - 130	1.085	5.02	30	S
Methoxychlor	14.91	8.3	8.275	0	180	60 - 140	13.42	10.5	30	S
Surr: Decachlorobiphenyl	*0.87*	*0*	*0.6623*	*0*	*131*	*59 - 144*	*0.9108*	*4.57*	*30*	
Surr: Tetrachloro-m-xylene	*0.7561*	*0*	*0.6623*	*0*	*114*	*56.9 - 130*	*0.79*	*4.38*	*30*	

The following samples were analyzed in this batch: HS22011379-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175091 (0) **Instrument: HG03** **Method: MERCURY BY SW7471B**

MBLK Sample ID: **MBLK-175091** Units: **ug/Kg** Analysis Date: **07-Feb-2022 12:56**
Client ID: Run ID: **HG03_401726** SeqNo: **6491760** PrepDate: **07-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	1.244	3.45								J

LCS Sample ID: **LCS-175091** Units: **ug/Kg** Analysis Date: **07-Feb-2022 12:58**
Client ID: Run ID: **HG03_401726** SeqNo: **6491761** PrepDate: **07-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	395.7	3.51	351.4	0	113	80 - 120				

MS Sample ID: **HS22020179-01MS** Units: **ug/Kg** Analysis Date: **07-Feb-2022 13:07**
Client ID: Run ID: **HG03_401726** SeqNo: **6491726** PrepDate: **07-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	497.1	3.42	342.8	71.28	124	80 - 120				S

MSD Sample ID: **HS22020179-01MSD** Units: **ug/Kg** Analysis Date: **07-Feb-2022 13:09**
Client ID: Run ID: **HG03_401726** SeqNo: **6491727** PrepDate: **07-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	462.5	3.36	337.1	71.28	116	80 - 120	497.1	7.21	20	

The following samples were analyzed in this batch: HS22011379-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175158 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

MBLK Sample ID: **MBLK-175158** Units: **mg/Kg** Analysis Date: **09-Feb-2022 20:11**
Client ID: Run ID: **ICPMS04_401877** SeqNo: **6496550** PrepDate: **09-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.494								
Arsenic	U	0.494								
Beryllium	U	0.494								
Cadmium	U	0.494								
Chromium	U	0.494								
Cobalt	U	0.494								
Copper	U	0.198								
Lead	U	0.494								
Molybdenum	U	0.494								
Nickel	U	0.494								
Selenium	U	0.494								
Silver	U	0.494								
Thallium	U	0.494								
Vanadium	U	0.494								
Zinc	U	0.494								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175158 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

LCS Sample ID: **LCS-175158** Units: **mg/Kg** Analysis Date: **09-Feb-2022 20:14**
Client ID: Run ID: **ICPMS04_401877** SeqNo: **6496551** PrepDate: **09-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	10.07	0.490	9.794	0	103	80 - 120				
Arsenic	9.981	0.490	9.794	0	102	80 - 120				
Beryllium	9.252	0.490	9.794	0	94.5	80 - 120				
Cadmium	9.906	0.490	9.794	0	101	80 - 120				
Chromium	9.985	0.490	9.794	0	102	80 - 120				
Cobalt	10.16	0.490	9.794	0	104	80 - 120				
Copper	10.38	0.196	9.794	0	106	80 - 120				
Lead	10.13	0.490	9.794	0	103	80 - 120				
Molybdenum	9.624	0.490	9.794	0	98.3	80 - 120				
Nickel	10.58	0.490	9.794	0	108	80 - 120				
Selenium	10.1	0.490	9.794	0	103	80 - 120				
Silver	9.688	0.490	9.794	0	98.9	80 - 120				
Thallium	10.15	0.490	9.794	0	104	80 - 120				
Vanadium	10.21	0.490	9.794	0	104	80 - 120				
Zinc	10.15	0.490	9.794	0	104	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175158 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

MS Sample ID: **HS22011266-01MS** Units: **mg/Kg** Analysis Date: **09-Feb-2022 20:20**
Client ID: Run ID: **ICPMS04_401877** SeqNo: **6496554** PrepDate: **09-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	3.806	0.477	9.542	0.1059	38.8	75 - 125				S
Arsenic	12.32	0.477	9.542	3.298	94.6	75 - 125				
Beryllium	10.59	0.477	9.542	0.6903	104	75 - 125				
Cadmium	10.18	0.477	9.542	0.4468	102	75 - 125				
Chromium	23.16	0.477	9.542	12.4	113	75 - 125				
Cobalt	13.93	0.477	9.542	4.522	98.6	75 - 125				
Copper	16.45	0.191	9.542	7.694	91.7	75 - 125				
Lead	37.34	0.477	9.542	24.99	129	75 - 125				S
Molybdenum	8.381	0.477	9.542	0.1428	86.3	75 - 125				
Nickel	17.37	0.477	9.542	8.108	97.1	75 - 125				
Selenium	9.52	0.477	9.542	0.5643	93.9	75 - 125				
Silver	9.18	0.477	9.542	0.07251	95.4	75 - 125				
Thallium	10.26	0.477	9.542	0.2146	105	75 - 125				
Vanadium	32.15	0.477	9.542	22.83	97.7	75 - 125				
Zinc	54.98	0.477	9.542	47.94	73.7	75 - 125				SO

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175158 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

MSD Sample ID: **HS22011266-01MSD** Units: **mg/Kg** Analysis Date: **09-Feb-2022 20:23**
Client ID: Run ID: **ICPMS04_401877** SeqNo: **6496555** PrepDate: **09-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	3.553	0.471	9.418	0.1059	36.6	75 - 125	3.806	6.87	20	S
Arsenic	12.19	0.471	9.418	3.298	94.5	75 - 125	12.32	1.06	20	
Beryllium	10.34	0.471	9.418	0.6903	102	75 - 125	10.59	2.4	20	
Cadmium	9.69	0.471	9.418	0.4468	98.1	75 - 125	10.18	4.98	20	
Chromium	23.43	0.471	9.418	12.4	117	75 - 125	23.16	1.15	20	
Cobalt	13.64	0.471	9.418	4.522	96.8	75 - 125	13.93	2.11	20	
Copper	16.09	0.188	9.418	7.694	89.1	75 - 125	16.45	2.21	20	
Lead	35.79	0.471	9.418	24.99	115	75 - 125	37.34	4.23	20	
Molybdenum	8.122	0.471	9.418	0.1428	84.7	75 - 125	8.381	3.14	20	
Nickel	17.21	0.471	9.418	8.108	96.7	75 - 125	17.37	0.917	20	
Selenium	9.395	0.471	9.418	0.5643	93.8	75 - 125	9.52	1.32	20	
Silver	8.688	0.471	9.418	0.07251	91.5	75 - 125	9.18	5.51	20	
Thallium	9.925	0.471	9.418	0.2146	103	75 - 125	10.26	3.28	20	
Vanadium	32.59	0.471	9.418	22.83	104	75 - 125	32.15	1.36	20	
Zinc	55.67	0.471	9.418	47.94	82.1	75 - 125	54.98	1.26	20	O

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175158 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

PDS Sample ID: **HS22011266-01PDS** Units: **mg/Kg** Analysis Date: **09-Feb-2022 20:27**
Client ID: Run ID: **ICPMS04_401877** SeqNo: **6496557** PrepDate: **09-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	9.742	0.475	9.491	0.1059	102	75 - 125				
Arsenic	12.73	0.475	9.491	3.298	99.3	75 - 125				
Beryllium	10.11	0.475	9.491	0.6903	99.2	75 - 125				
Cadmium	9.473	0.475	9.491	0.4468	95.1	75 - 125				
Chromium	21.7	0.475	9.491	12.4	98.0	75 - 125				
Cobalt	13.45	0.475	9.491	4.522	94.1	75 - 125				
Copper	16.39	0.190	9.491	7.694	91.7	75 - 125				
Lead	34.17	0.475	9.491	24.99	96.7	75 - 125				
Molybdenum	9.405	0.475	9.491	0.1428	97.6	75 - 125				
Nickel	17.06	0.475	9.491	8.108	94.3	75 - 125				
Selenium	9.812	0.475	9.491	0.5643	97.4	75 - 125				
Silver	8.937	0.475	9.491	0.07251	93.4	75 - 125				
Thallium	9.662	0.475	9.491	0.2146	99.5	75 - 125				
Vanadium	32.48	0.475	9.491	22.83	102	75 - 125				
Zinc	56.16	0.475	9.491	47.94	86.6	75 - 125				O

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175158 (0) **Instrument: ICPMS04** **Method: METALS BY SW6020A**

SD Sample ID: **HS22011266-01SD** Units: **mg/Kg** Analysis Date: **09-Feb-2022 20:18**
Client ID: Run ID: **ICPMS04_401877** SeqNo: **6496553** PrepDate: **09-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	2.37					0.1059	0	10	
Arsenic	3.486	2.37					3.298	5.69	10	
Beryllium	0.6614	2.37					0.6903	0	10	J
Cadmium	0.4724	2.37					0.4468	0	10	J
Chromium	12.77	2.37					12.4	2.98	10	
Cobalt	4.657	2.37					4.522	2.99	10	
Copper	8.052	0.949					7.694	4.65	10	
Lead	25.53	2.37					24.99	2.17	10	
Molybdenum	0.153	2.37					0.1428	0	10	J
Nickel	8.368	2.37					8.108	3.21	10	
Selenium	0.4617	2.37					0.5643	0	10	J
Silver	0.07394	2.37					0.07251	0	10	J
Thallium	U	2.37					0.2146	0	10	
Vanadium	23.22	2.37					22.83	1.73	10	
Zinc	50.19	2.37					47.94	4.69	10	

The following samples were analyzed in this batch: HS22011379-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 174986 (0) **Instrument: SV-6** **Method: SW8270 SIM**

MBLK Sample ID: **MBLK-174986** Units: **ug/Kg** Analysis Date: **03-Feb-2022 13:33**
Client ID: Run ID: **SV-6_401547** SeqNo: **6489350** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.33								
2-Methylnaphthalene	U	0.33								
Acenaphthene	U	0.33								
Acenaphthylene	U	0.33								
Anthracene	U	0.33								
Benz(a)anthracene	U	0.33								
Benzo(a)pyrene	U	0.33								
Benzo(b)fluoranthene	U	0.33								
Benzo(g,h,i)perylene	U	0.33								
Benzo(k)fluoranthene	U	0.33								
Chrysene	U	0.33								
Dibenz(a,h)anthracene	U	0.33								
Dibenzofuran	U	0.33								
Fluoranthene	U	0.33								
Fluorene	U	0.33								
Indeno(1,2,3-cd)pyrene	U	0.33								
Naphthalene	U	0.33								
Phenanthrene	U	0.33								
Pyrene	U	0.33								
Surr: 2-Fluorobiphenyl	*3.202*	*0*	*2.66*	*0*	*120*	*40 - 140*				
Surr: 4-Terphenyl-d14	*3.111*	*0*	*2.66*	*0*	*117*	*40 - 140*				
Surr: Nitrobenzene-d5	*2.796*	*0*	*2.66*	*0*	*105*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 174986 (0) **Instrument: SV-6** **Method: SW8270 SIM**

LCS Sample ID: **LCS-174986** Units: **ug/Kg** Analysis Date: **03-Feb-2022 13:53**
Client ID: Run ID: **SV-6_401547** SeqNo: **6489351** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	2.428	0.33	2.66	0	91.3	40 - 140				
2-Methylnaphthalene	2.084	0.33	2.66	0	78.3	40 - 140				
Acenaphthene	1.716	0.33	2.66	0	64.5	40 - 140				
Acenaphthylene	2.062	0.33	2.66	0	77.5	40 - 140				
Anthracene	2.258	0.33	2.66	0	84.9	40 - 140				
Benz(a)anthracene	1.584	0.33	2.66	0	59.5	40 - 140				
Benzo(a)pyrene	2.26	0.33	2.66	0	85.0	40 - 140				
Benzo(b)fluoranthene	2.13	0.33	2.66	0	80.1	40 - 140				
Benzo(g,h,i)perylene	2.146	0.33	2.66	0	80.7	40 - 140				
Benzo(k)fluoranthene	2.994	0.33	2.66	0	113	40 - 140				
Chrysene	2.522	0.33	2.66	0	94.8	40 - 140				
Dibenz(a,h)anthracene	2.027	0.33	2.66	0	76.2	40 - 140				
Dibenzofuran	2.357	0.33	2.66	0	88.6	40 - 140				
Fluoranthene	2.189	0.33	2.66	0	82.3	40 - 140				
Fluorene	2.226	0.33	2.66	0	83.7	40 - 140				
Indeno(1,2,3-cd)pyrene	2.53	0.33	2.66	0	95.1	40 - 140				
Naphthalene	2.802	0.33	2.66	0	105	40 - 140				
Phenanthrene	2.35	0.33	2.66	0	88.4	40 - 140				
Pyrene	2.512	0.33	2.66	0	94.5	40 - 140				
Surr: 2-Fluorobiphenyl	*2.791*	*0*	*2.66*	*0*	*105*	*40 - 140*				
Surr: 4-Terphenyl-d14	*2.921*	*0*	*2.66*	*0*	*110*	*40 - 140*				
Surr: Nitrobenzene-d5	*2.593*	*0*	*2.66*	*0*	*97.5*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 174986 (0) **Instrument: SV-6** **Method: SW8270 SIM**

MS Sample ID: **HS22020019-05MS** Units: **ug/Kg** Analysis Date: **03-Feb-2022 17:59**
Client ID: Run ID: **SV-6_401547** SeqNo: **6489357** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	2.507	0.33	2.647	0.2438	85.5	40 - 140				
2-Methylnaphthalene	2.535	0.33	2.647	0.3712	81.8	40 - 140				
Acenaphthene	1.805	0.33	2.647	0.0835	65.1	40 - 140				
Acenaphthylene	2.406	0.33	2.647	0	90.9	40 - 140				
Anthracene	2.283	0.33	2.647	0.05259	84.3	40 - 140				
Benz(a)anthracene	1.713	0.33	2.647	0	64.7	40 - 140				
Benzo(a)pyrene	2.155	0.33	2.647	0.3957	66.5	40 - 140				
Benzo(b)fluoranthene	2.034	0.33	2.647	0	76.9	40 - 140				
Benzo(g,h,i)perylene	2.315	0.33	2.647	0	87.5	40 - 140				
Benzo(k)fluoranthene	2.94	0.33	2.647	0	111	40 - 140				
Chrysene	2.256	0.33	2.647	0	85.2	40 - 140				
Dibenz(a,h)anthracene	2.012	0.33	2.647	0	76.0	40 - 140				
Dibenzofuran	2.278	0.33	2.647	0.07069	83.4	40 - 140				
Fluoranthene	2.152	0.33	2.647	0.1944	74.0	40 - 140				
Fluorene	2.413	0.33	2.647	0	91.2	40 - 140				
Indeno(1,2,3-cd)pyrene	2.497	0.33	2.647	0	94.3	40 - 140				
Naphthalene	3.279	0.33	2.647	0.4236	108	40 - 140				
Phenanthrene	3.441	0.33	2.647	0.3142	118	40 - 140				
Pyrene	2.142	0.33	2.647	0.1237	76.3	40 - 140				
Surr: 2-Fluorobiphenyl	*2.637*	*0*	*2.647*	*0*	*99.6*	*40 - 140*				
Surr: 4-Terphenyl-d14	*2.483*	*0*	*2.647*	*0*	*93.8*	*40 - 140*				
Surr: Nitrobenzene-d5	*2.151*	*0*	*2.647*	*0*	*81.3*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 174986 (0) **Instrument: SV-6** **Method: SW8270 SIM**

MSD Sample ID: **HS22020019-05MSD** Units: **ug/Kg** Analysis Date: **03-Feb-2022 18:19**
Client ID: Run ID: **SV-6_401547** SeqNo: **6489358** PrepDate: **02-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	2.41	0.33	2.654	0.2438	81.6	40 - 140	2.507	3.94	30	
2-Methylnaphthalene	2.686	0.33	2.654	0.3712	87.2	40 - 140	2.535	5.76	30	
Acenaphthene	1.958	0.33	2.654	0.0835	70.6	40 - 140	1.805	8.13	30	
Acenaphthylene	2.597	0.33	2.654	0	97.9	40 - 140	2.406	7.65	30	
Anthracene	2.42	0.33	2.654	0.05259	89.2	40 - 140	2.283	5.8	30	
Benz(a)anthracene	2.086	0.33	2.654	0	78.6	40 - 140	1.713	19.6	30	
Benzo(a)pyrene	2.725	0.33	2.654	0.3957	87.8	40 - 140	2.155	23.4	30	
Benzo(b)fluoranthene	2.598	0.33	2.654	0	97.9	40 - 140	2.034	24.3	30	
Benzo(g,h,i)perylene	2.576	0.33	2.654	0	97.1	40 - 140	2.315	10.7	30	
Benzo(k)fluoranthene	3.073	0.33	2.654	0	116	40 - 140	2.94	4.44	30	
Chrysene	2.307	0.33	2.654	0	86.9	40 - 140	2.256	2.24	30	
Dibenz(a,h)anthracene	2.445	0.33	2.654	0	92.1	40 - 140	2.012	19.5	30	
Dibenzofuran	2.499	0.33	2.654	0.07069	91.5	40 - 140	2.278	9.25	30	
Fluoranthene	2.461	0.33	2.654	0.1944	85.4	40 - 140	2.152	13.4	30	
Fluorene	2.595	0.33	2.654	0	97.8	40 - 140	2.413	7.29	30	
Indeno(1,2,3-cd)pyrene	2.662	0.33	2.654	0	100	40 - 140	2.497	6.39	30	
Naphthalene	3.326	0.33	2.654	0.4236	109	40 - 140	3.279	1.42	30	
Phenanthrene	3.632	0.33	2.654	0.3142	125	40 - 140	3.441	5.39	30	
Pyrene	2.433	0.33	2.654	0.1237	87.0	40 - 140	2.142	12.7	30	
Surr: 2-Fluorobiphenyl	*2.657*	*0*	*2.654*	*0*	*100*	*40 - 140*	*2.637*	*0.756*	*30*	
Surr: 4-Terphenyl-d14	*2.852*	*0*	*2.654*	*0*	*107*	*40 - 140*	*2.483*	*13.8*	*30*	
Surr: Nitrobenzene-d5	*2.82*	*0*	*2.654*	*0*	*106*	*40 - 140*	*2.151*	*26.9*	*30*	

The following samples were analyzed in this batch: HS22011379-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: 175315 (0) **Instrument: TOC_03** **Method: TOTAL ORGANIC CARBON BY SW9060A**

MBLK Sample ID: **MBLK-175315** Units: **wt%-dry** Analysis Date: **11-Feb-2022 17:08**
Client ID: Run ID: **TOC_03_402101** SeqNo: **6499717** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	U	0.0596								

LCS Sample ID: **LCS-175315** Units: **wt%-dry** Analysis Date: **11-Feb-2022 17:08**
Client ID: Run ID: **TOC_03_402101** SeqNo: **6499715** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.542	0.0571	3.804	0	93.1	80 - 120				

LCSD Sample ID: **LCSD-175315** Units: **wt%-dry** Analysis Date: **11-Feb-2022 17:08**
Client ID: Run ID: **TOC_03_402101** SeqNo: **6499716** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.601	0.0578	3.852	0	93.5	80 - 120	3.542	1.67	20	

MS Sample ID: **HS22011379-01MS** Units: **wt%-dry** Analysis Date: **11-Feb-2022 17:08**
Client ID: **SW11** Run ID: **TOC_03_402101** SeqNo: **6499713** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	4.093	0.0582	3.878	0.7203	87.0	80 - 120				

MSD Sample ID: **HS22011379-01MSD** Units: **wt%-dry** Analysis Date: **11-Feb-2022 17:08**
Client ID: **SW11** Run ID: **TOC_03_402101** SeqNo: **6499714** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Organic Carbon	3.731	0.0562	3.747	0.7203	80.4	80 - 120	4.093	9.25	20	

The following samples were analyzed in this batch: HS22011379-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: HS22011379

QC BATCH REPORT

Batch ID: R401818 (0) **Instrument:** Balance1 **Method:** TOTAL SOLIDS BY SM2540G-2011

DUP Sample ID: **HS22011311-01DUP** Units: **wt%** Analysis Date: **08-Feb-2022 10:30**
Client ID: Run ID: **Balance1_401818** SeqNo: **6493921** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Solids	66.17	0.0100					65.79	0.581	20	

The following samples were analyzed in this batch: HS22011379-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
WorkOrder: **HS22011379**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
Date	
mg/Kg	Milligrams per Kilogram
UG/KG	Micrograms per Kilograms

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-33	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: Gas to Energy - EIA Study-SW11
Work Order: HS22011379

SAMPLE TRACKING

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS22011379-01	SW11	Login	1/31/2022 5:26:34 PM	NDR	N045
HS22011379-01	SW11	Login	1/31/2022 5:26:34 PM	NDR	N045

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Sample Receipt Checklist

Work Order ID: HS22011379 **Date/Time Received:** **28-Jan-2022 10:15**

Client Name: ERM NC **Received by:** **Pablo Marinez**

Completed By:	/S/ Nilesh D. Ranchod	31-Jan-2022 17:47	**Reviewed by:**	/S/ Corey Grandits	01-Feb-2022 18:35
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **Soil** Carrier name: **FedEx International Priority**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	24.1°C/24.6C UC/C		IR #31
Cooler(s)/Kit(s):	Box		
Date/Time sample(s) sent to storage:	01/31/2022 18:00		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes: Collection date of 1/22/22 logged in per client email

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page ____ of ____

HS22011379

ERM Inc
Gas to Energy - EIA Study-SW11

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	
Work Order		Project Number	
Company Name	ERM	Bill To Company	ERM
Send Report To	Selina Pradhan	Invoice Attn.	AP
Address		Address	
City/State/Zip		City/State/Zip	
Phone		Phone	
Fax		Fax	
e-Mail Address		e-Mail Address	

A	8270SIM PAHs
B	8081 Pesticides
C	ICP_S_LOW 16 Metals
D	8082 PCBs
E	Total Solids
F	TOC
G	Sub Sulfide Holland
H	Sub ALS Kelso Grain Size - 3 Week TAT
I	
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	SW11			S	8	2	X	X	X	X	X	X	X	X			
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign

Shipment Method:

Required Turnaround Time: ☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other ____

Results Due Date:

Relinquished by:	Date: 1/25/12	Time: 1015	Received by:	
Relinquished by:	Date:	Time:	Received by (Laboratory):	
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

Notes:

Cooler Temp. 4°C

2.4.1

QC Package: (Check Box Below)

- X Level II: Standard QC
- ☐ Level III: Std QC + Raw Data
- ☐ Level IV: SW846 CLP-Like
- ☐ Other: ____
- ☐ TRRP-Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

IvL # 31

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COC 405.

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ORIGN ID:GEOA 592292017

GUYANA LOGISTICS & SUPPORT SERVICES
110 DUKE & BARRACK STREETS
KINGSTON
GEORGETOWN,
GUYANA GY

SHIP DATE: 25JAN22
ACTWGT: 15.50 LB
CAD: 2450808/FXSF0107
DIMS: 12x12x15 IN

BILL SENDER

TO ALS ENVIRONMENTAL
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656

INV:
PO:
DEPT:
REF

(US)

56DJ4/F289/FE4A

TRK# 0430 2891 1652 1747

10:30A
INTL PRIORITY

XA SGRA

77099
IAH
TX-US

After printing this label
CONSIGNEE COPY - PLEASE PLACE IN FRONT OF POUCH
1. Fold the printed page along the horizontal line.
2. Place label in shipping pouch and affix it to your shipment.

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For those shipments transported solely by road, if a conflict arises between the provisions of the CMR and this Air Waybill, the terms of the CMR shall prevail. LIMITATION OF LIABILITY. If not governed by the Warsaw Convention, the CMR, or other international treaties, laws, other government regulations, orders, or requirements, FedEx's maximum liability for damage, loss, delay, shortage, mis-delivery, nondelivery, misinformation or failure to provide information in connection with your shipment is limited by this Agreement and as set out in the terms and conditions of the contract of carriage. Please refer to the contract of carriage set forth in the applicable FedEx Service Guide or its equivalent to determine the contractual limitation. FedEx does not provide cargo liability or all-risk assurance, but you may pay an additional charge for each additional U.S. $100 (or equivalent local currency for the country of origin) of declared value for carriage. 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The invalidity or unenforceability of any provisions shall not affect any other part of this Air Waybill. Unless otherwise indicated, FEDERAL EXPRESS CORPORATION, 2005 Corporate Avenue, Memphis, TN 38132, USA, is the first carrier of this shipment. Email address located at www.fedex.com.

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ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

February 09, 2022

Analytical Report for Service Request No: K2201015

Corey Grandits
ALS Environmental - Houston
10450 Stancliff Road
Suite 210
Houston, TX 77099

RE: HS22011379

Dear Corey,

Enclosed are the results of the sample(s) submitted to our laboratory February 01, 2022
For your reference, these analyses have been assigned our service request number **K2201015.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3260. You may also contact me via email at Luke.Rahn@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Luke Rahn
Project Manager

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ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

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Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

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ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

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Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ALS Environmental - US
Project: HS22011379
Sample Matrix: Soil

Service Request: K2201015
Date Received: 02/01/2022

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

One soil sample was received for analysis at ALS Environmental on 02/01/2022. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The sample was stored at minimum in accordance with the analytical method requirements.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by _____ Date 02/09/2022

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Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Acs copy

K2201015

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

SAMPLING STATE: **North Carolina** **COC ID:** **18066**

SUBCONTRACT TO:

ALS Environmental Kelso
1317 S. 13th Avenue
Kelso, WA 98626

Phone: +1 360 501 3312

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	Corey Grandits
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	Corey.Grandits@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS22011379
TSR:	Houston House Acct

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS22011379-01**	**SW11**	**Soil**	**25 Jan 2022 00:00**
	Sub Grainsize ALS Kelso ASTM D422			23 Feb 2022

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: STD (Laboratory Standard QC: method blank and LCS required)

Relinquished By: _____ Date/Time: 1.31.22 19:30

Received By: _____ Date/Time: 2/1/22 1015

Cooler ID(s): _____ Temperature(s): _____

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PM LR

Cooler Receipt and Preservation Form

Client ALS/Houston Service Request K22 01015

Received: 2/1/22 Opened: 2/1/22 By: Unloaded: 2/1/22 By:

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? 2, front
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
3.0	—	IR01	180666	—		5300 5227 5306	

4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N
15. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? NA Y N Under filled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: _____

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Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

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Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2201015
Project:	HS22011379	**Date Collected:**	01/25/22
Sample Matrix:	Soil	**Date Received:**	02/1/22
Analysis Method:	160.3 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
SW11	K2201015-001	**33.8**	-	-	1	02/03/22 15:03	

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General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2201015
Project:	HS22011379	**Date Collected:**	01/25/22
Sample Matrix:	Soil	**Date Received:**	02/01/22
		Date Analyzed:	02/07/22

Particle Size Determination
ASTM D422

Sample Name: SW11
Lab Code: K2201015-001

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0000	100.00
Sand, Very Coarse	**No.20 (0.850 mm)**	0.1833	99.57
Sand, Coarse	**No.40 (0.425 mm)**	0.2741	98.93
Sand, Medium	**No.60 (0.250 mm)**	0.2271	98.40
Sand, Fine	**No.140 (0.106 mm)**	0.2868	97.73
Sand, Very Fine	**No.200 (0.0750 mm)**	0.1243	97.44

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	96.26
0.005 mm	63.72
0.001 mm	51.51

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ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	ALS Environmental - US	**Service Request:**	K2201015
Project:	HS22011379	**Date Collected:**	01/25/22
Sample Matrix:	Soil	**Date Received:**	02/01/22
		Date Analyzed:	02/07/22

Particle Size Determination
ASTM D422

Sample Name: SW11
Lab Code: K2201015-001DUP

Gravel and Sand
(Sieve Analysis)

Description	Sieve Size	Weight (g)	Percent Passing
Gravel (19.0 mm)	**No.3/4"(19.0 mm)**	0.0000	100.00
Gravel (9.50 mm)	**No.3/8"(9.50 mm)**	0.0000	100.00
Gravel, Medium	**No.4 (4.75 mm)**	0.0000	100.00
Gravel, Fine	**No.10 (2.00 mm)**	0.0000	100.00
Sand, Very Coarse	**No.20 (0.850 mm)**	0.2423	99.37
Sand, Coarse	**No.40 (0.425 mm)**	0.2967	98.61
Sand, Medium	**No.60 (0.250 mm)**	0.2117	98.06
Sand, Fine	**No.140 (0.106 mm)**	0.2509	97.41
Sand, Very Fine	**No.200 (0.0750 mm)**	0.0686	97.23

Silt and Clay
(Hydrometer Analysis)

Particle Diameter	Percent Passing
0.074 mm	96.21
0.005 mm	62.60
0.001 mm	42.53

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10-Feb-2022

Corey Grandits
ALS Environmental
10450 Stancliff Rd
Suite 210
Houston, TX 77099

Re: **HS22011379** Work Order: **22020063**

Dear Corey,

ALS Environmental received 1 sample on 01-Feb-2022 09:30 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 9.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Chad Whelton

Chad Whelton
Project Manager

Client: ALS Environmental
Project: HS22011379
Work Order: **22020063**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
22020063-01	SW11	Soil	HS22011379-01	1/25/2022	2/1/2022 09:30	☐

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Client:	ALS Environmental
Project:	HS22011379
Work Order:	22020063

Case Narrative

Batch 191275, Method SW9034, Sample SW11 (22020063-01A): Sample analyzed after hold time due to being received after expiration date.

Batch 191354, Method SW9034, Sample SW11 (22020063-01A): Sample analyzed after hold time due to being received after expiration date.

Batch 191275, Method SW9034, Sample 22020063-01A MS/MSD: The MS/MSD recovery was below the lower control limit. The corresponding result in the parent sample may be biased low for this analyte: acid soluble sulfide.

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Client: ALS Environmental
Project: HS22011379
WorkOrder: **22020063**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
mg/Kg	Milligrams per Kilogram

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ALS Environmental
Project: HS22011379 **Work Order:** 22020063
Sample ID: SW11 **Lab ID:** 22020063-01
Collection Date: 1/25/2022 **Matrix:** SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
SULFIDE			**SW9034**		Prep: SW9030B 2/4/22 17:20	Analyst: **TJH**
Sulfide (Acid Insoluble)	ND	H	100	mg/Kg	1	2/4/2022 06:45 PM
Sulfide (Acid Soluble)	ND	H	98	mg/Kg	1	2/3/2022 04:00 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

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Batch ID: **191275** Instrument ID **WETCHEM** Method: **SW9034**

MBLK Sample ID: **MBLK-191275-191275** Units: **mg/Kg** Analysis Date: **2/3/2022 04:00 PM**
Client ID: Run ID: **WETCHEM_220203K** SeqNo: **8151473** Prep Date: **2/2/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	ND	99								

LCS Sample ID: **LCS-191275-191275** Units: **mg/Kg** Analysis Date: **2/3/2022 04:00 PM**
Client ID: Run ID: **WETCHEM_220203K** SeqNo: **8151474** Prep Date: **2/2/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	636	100	1075	0	59.2	32-99	0			

MS Sample ID: **22020063-01A MS** Units: **mg/Kg** Analysis Date: **2/3/2022 04:00 PM**
Client ID: **SW11** Run ID: **WETCHEM_220203K** SeqNo: **8151189** Prep Date: **2/2/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	308.3	99	1062	0	29	32-99	0			SH

MSD Sample ID: **22020063-01A MSD** Units: **mg/Kg** Analysis Date: **2/3/2022 04:00 PM**
Client ID: **SW11** Run ID: **WETCHEM_220203K** SeqNo: **8151190** Prep Date: **2/2/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Soluble)	310.1	99	1069	0	29	32-99	308.3	0.595	30	SH

The following samples were analyzed in this batch: 22020063-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ALS Environmental
Work Order: 22020063
Project: HS22011379

QC BATCH REPORT

Batch ID: **191354** Instrument ID **WETCHEM** Method: **SW9034**

MBLK Sample ID: **MBLK-191354-191354** Units: **mg/Kg** Analysis Date: **2/4/2022 06:45 PM**
Client ID: Run ID: **WETCHEM_220204L** SeqNo: **8153817** Prep Date: **2/4/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	ND	100								

LCS Sample ID: **LCS-191354-191354** Units: **mg/Kg** Analysis Date: **2/4/2022 06:45 PM**
Client ID: Run ID: **WETCHEM_220204L** SeqNo: **8153818** Prep Date: **2/4/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	828	100	1075	0	77	59-124	0			

MS Sample ID: **22020071-01A MS** Units: **mg/Kg** Analysis Date: **2/4/2022 06:45 PM**
Client ID: Run ID: **WETCHEM_220204L** SeqNo: **8153821** Prep Date: **2/4/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	1143	99	1066	359.3	73.5	59-124	0			H

MSD Sample ID: **22020071-01A MSD** Units: **mg/Kg** Analysis Date: **2/4/2022 06:45 PM**
Client ID: Run ID: **WETCHEM_220204L** SeqNo: **8153822** Prep Date: **2/4/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfide (Acid Insoluble)	1241	99	1069	359.3	82.5	59-124	1143	8.2	30	H

The following samples were analyzed in this batch: 22020063-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

22020063

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

SAMPLING STATE: **North Carolina** **COC ID:** **18065**

SUBCONTRACT TO:

ALS Group USA, Corp.
3352 - 128th Ave
Holland, MI 494249263 **Phone:** +1 616 399 6070

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	Corey Grandits
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	Corey.Grandits@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS22011379
TSR:	Houston House Acct

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED		DUE DATE
1.	**HS22011379-01**	**SW11**	**Soil**	**25 Jan 2022 00:00**
	9030 Sub Total Sulfide ALS Holland MI		11 Feb 2022

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: STD (Laboratory Standard QC: method blank and LCS required)

Relinquished By: _____ Date/Time: 1.31.22 15:00

Received By: _____ Date/Time: 2/1/22 0930

Cooler ID(s): _____ Temperature(s): IR3 2.5°C

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Sample Receipt Checklist

Client Name: **ALS - HOUSTON** Date/Time Received: **01-Feb-22 09:30**

Work Order: **22020063** Received by: **LYS**

Checklist completed by Lydia Sweet (eSignature) 01-Feb-22 (Date) Reviewed by: Chad Whelton (eSignature) 02-Feb-22 (Date)

Matrices: Soil

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	2.5/3.5c	IR3	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	2/1/2022 2:57:47 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

SRC Page 1 of 1

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 22, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22020287**

Laboratory Results for: **SW-5, SW-11, R-1, R-3**

Dear Selina Pradhan,

ALS Environmental received 4 sample(s) on Feb 07, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: DAYNA.FISHER
Corey Grandits
Project Manager

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
Work Order: HS22020287

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22020287-01	SW-5	Water		01-Feb-2022 12:26	07-Feb-2022 09:45	☐
HS22020287-02	SW-11	Water		01-Feb-2022 11:08	07-Feb-2022 09:45	☐
HS22020287-03	R-1	Water		02-Feb-2022 10:08	07-Feb-2022 09:45	☐
HS22020287-04	R-3	Water		02-Feb-2022 10:51	07-Feb-2022 09:45	☐

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW-5, SW-11, R-1, R-3
Work Order: HS22020287

Work Order Comments

- Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

  The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

Work Order Comments

- Sample received outside method holding time for Dissolved Oxygen. Dissolved Oxygen is an immediate test. Sample results are flagged with an "H" qualifier.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 175124

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW6020A

Batch ID: 175468

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 175281

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500-O G

Batch ID: R402435

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E300

Batch ID: R402638

Sample ID: MBLK

- Reporting limit(s) is/are elevated due to dilution for high concentrations of non-target analytes for samples reported in batch ID 402638

WetChemistry by Method Calculation

Batch ID: R402697

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2520

Batch ID: R402654

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW-5, SW-11, R-1, R-3
Work Order: HS22020287

WetChemistry by Method E1664A

Batch ID: R402579

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540B

Batch ID: R402076

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R401749

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R401904

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540D

Batch ID: R401862,R401926

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 175430

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 175337

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
Sample ID: SW-5
Collection Date: 01-Feb-2022 12:26

ANALYTICAL REPORT
WorkOrder:HS22020287
Lab ID:HS22020287-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 08-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Acenaphthene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Acenaphthylene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Benz(a)anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Chrysene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Dibenzofuran	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Fluorene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Naphthalene	**0.014**		**0.010**	**0.010**	**ug/L**	1	11-Feb-2022 17:27
Phenanthrene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:27
Surr: 2-Fluorobiphenyl	*99.4*			*40-140*	*%REC*	*1*	*11-Feb-2022 17:27*
Surr: 4-Terphenyl-d14	*101*			*40-140*	*%REC*	*1*	*11-Feb-2022 17:27*
Surr: Nitrobenzene-d5	*98.3*			*40-140*	*%REC*	*1*	*11-Feb-2022 17:27*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 17-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	18-Feb-2022 17:40
Arsenic	**0.000525**	J	**0.000400**	**0.00200**	**mg/L**	1	18-Feb-2022 17:40
Beryllium	**0.000425**	J	**0.000200**	**0.00200**	**mg/L**	1	18-Feb-2022 17:40
Cadmium	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:40
Chromium	U		0.000400	0.00400	mg/L	1	18-Feb-2022 17:40
Cobalt	**0.00193**	J	**0.000200**	**0.00500**	**mg/L**	1	18-Feb-2022 17:40
Copper	U		0.00100	0.00200	mg/L	1	18-Feb-2022 17:40
Lead	**0.000671**	J	**0.000600**	**0.00200**	**mg/L**	1	18-Feb-2022 17:40
Molybdenum	U		0.000600	0.00500	mg/L	1	18-Feb-2022 17:40
Nickel	**0.00454**		**0.000600**	**0.00200**	**mg/L**	1	18-Feb-2022 17:40
Selenium	U		0.00110	0.00200	mg/L	1	18-Feb-2022 17:40
Silver	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:40
Thallium	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:40
Vanadium	**0.000612**	J	**0.000600**	**0.00500**	**mg/L**	1	18-Feb-2022 17:40
Zinc	**0.0239**		**0.00200**	**0.00400**	**mg/L**	1	18-Feb-2022 17:40

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
Sample ID: SW-5
Collection Date: 01-Feb-2022 12:26

ANALYTICAL REPORT
WorkOrder:HS22020287
Lab ID:HS22020287-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A			**Method:SW7470A**		Prep:SW7470A / 11-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	11-Feb-2022 12:53
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)			**Method:Calculation**				Analyst: RPM
Nitrogen, Total	**0.41**	J	**0.10**	**0.50**	**mg/L**	1	21-Feb-2022 21:42
OIL & GREASE (HEM) BY E1664A			**Method:E1664A**				Analyst: KAH
Oil and Grease	**4.12**		**0.610**	**2.00**	**mg/L**	1	18-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993			**Method:E300**				Analyst: YP
Nitrate/Nitrite (as N)	**0.184**	J	**0.150**	**1.00**	**mg/L**	5	18-Feb-2022 15:07
PHOSPHORUS BY E365.3-1978			**Method:E365.3**		Prep:E365.3 / 16-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	16-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011			**Method:M2540B**				Analyst: KAH
Residue, Total	**104**		**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011			**Method:M2540C**				Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**70.0**		**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 15:02
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011			**Method:M2540D**				Analyst: CWG
Suspended Solids (Residue, Non-Filterable)	U		2.50	2.50	mg/L	1	08-Feb-2022 11:02
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011			**Method:M4500 NH3 D**		Prep:M4500-N C / 10-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.23**	J	**0.10**	**0.50**	**mg/L**	1	11-Feb-2022 13:43
DISSOLVED OXYGEN BY SM4500-O G			**Method:M4500-O G**				Analyst: TH
Oxygen, Dissolved	**10.5**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY			**Method:SM2520**				Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C			**Method:SW9040C**				Analyst: CWG
pH	**3.56**	H	**0.100**	**0.100**	**pH Units**	1	07-Feb-2022 16:55
Temp Deg C @pH	**22.5**	H	**0**	**0**	**DEG C**	1	07-Feb-2022 16:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
Sample ID: SW-11
Collection Date: 01-Feb-2022 11:08

ANALYTICAL REPORT
WorkOrder:HS22020287
Lab ID:HS22020287-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 08-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Acenaphthene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Acenaphthylene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Benz(a)anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Chrysene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Dibenzofuran	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Fluorene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Naphthalene	**0.013**		**0.010**	**0.010**	**ug/L**	1	11-Feb-2022 17:48
Phenanthrene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 17:48
Surr: 2-Fluorobiphenyl	*98.5*			*40-140*	*%REC*	*1*	*11-Feb-2022 17:48*
Surr: 4-Terphenyl-d14	*128*			*40-140*	*%REC*	*1*	*11-Feb-2022 17:48*
Surr: Nitrobenzene-d5	*91.3*			*40-140*	*%REC*	*1*	*11-Feb-2022 17:48*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 17-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	18-Feb-2022 17:42
Arsenic	**0.00254**		**0.000400**	**0.00200**	**mg/L**	1	18-Feb-2022 17:42
Beryllium	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:42
Cadmium	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:42
Chromium	**0.000637**	J	**0.000400**	**0.00400**	**mg/L**	1	18-Feb-2022 17:42
Cobalt	**0.00129**	J	**0.000200**	**0.00500**	**mg/L**	1	18-Feb-2022 17:42
Copper	U		0.00100	0.00200	mg/L	1	18-Feb-2022 17:42
Lead	U		0.000600	0.00200	mg/L	1	18-Feb-2022 17:42
Molybdenum	U		0.000600	0.00500	mg/L	1	18-Feb-2022 17:42
Nickel	**0.00162**	J	**0.000600**	**0.00200**	**mg/L**	1	18-Feb-2022 17:42
Selenium	U		0.00110	0.00200	mg/L	1	18-Feb-2022 17:42
Silver	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:42
Thallium	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:42
Vanadium	**0.00170**	J	**0.000600**	**0.00500**	**mg/L**	1	18-Feb-2022 17:42
Zinc	**0.00350**	J	**0.00200**	**0.00400**	**mg/L**	1	18-Feb-2022 17:42

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
Sample ID: SW-11
Collection Date: 01-Feb-2022 11:08

ANALYTICAL REPORT
WorkOrder:HS22020287
Lab ID:HS22020287-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A			**Method:SW7470A**		Prep:SW7470A / 11-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	11-Feb-2022 13:01
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)			**Method:Calculation**				Analyst: RPM
Nitrogen, Total	**1.3**		**0.10**	**0.50**	**mg/L**	1	21-Feb-2022 21:42
OIL & GREASE (HEM) BY E1664A			**Method:E1664A**				Analyst: KAH
Oil and Grease	**2.02**		**0.610**	**2.00**	**mg/L**	1	18-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993			**Method:E300**				Analyst: YP
Nitrate/Nitrite (as N)	**0.376**	J	**0.150**	**1.00**	**mg/L**	5	18-Feb-2022 15:23
PHOSPHORUS BY E365.3-1978			**Method:E365.3**		Prep:E365.3 / 16-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.171**		**0.0200**	**0.0500**	**mg/L**	1	16-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011			**Method:M2540B**				Analyst: KAH
Residue, Total	**112**		**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011			**Method:M2540C**				Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**58.0**		**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 15:02
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011			**Method:M2540D**				Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**46.7**		**2.50**	**2.50**	**mg/L**	1	08-Feb-2022 11:02
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011			**Method:M4500 NH3 D**		Prep:M4500-N C / 10-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.97**		**0.10**	**0.50**	**mg/L**	1	11-Feb-2022 13:43
DISSOLVED OXYGEN BY SM4500-O G			**Method:M4500-O G**				Analyst: TH
Oxygen, Dissolved	**11.1**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY			**Method:SM2520**				Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C			**Method:SW9040C**				Analyst: CWG
pH	**5.88**	H	**0.100**	**0.100**	**pH Units**	1	07-Feb-2022 16:55
Temp Deg C @pH	**22.5**	H	**0**	**0**	**DEG C**	1	07-Feb-2022 16:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
Sample ID: R-1
Collection Date: 02-Feb-2022 10:08

ANALYTICAL REPORT
WorkOrder:HS22020287
Lab ID:HS22020287-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 08-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Acenaphthene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Acenaphthylene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Benz(a)anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Chrysene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Dibenzofuran	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Fluorene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Naphthalene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Phenanthrene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:08
Surr: 2-Fluorobiphenyl	*87.1*			*40-140*	*%REC*	*1*	*11-Feb-2022 18:08*
Surr: 4-Terphenyl-d14	*111*			*40-140*	*%REC*	*1*	*11-Feb-2022 18:08*
Surr: Nitrobenzene-d5	*71.1*			*40-140*	*%REC*	*1*	*11-Feb-2022 18:08*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 17-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	18-Feb-2022 17:44
Arsenic	**0.00667**		**0.000400**	**0.00200**	**mg/L**	1	18-Feb-2022 17:44
Beryllium	**0.000723**	J	**0.000200**	**0.00200**	**mg/L**	1	18-Feb-2022 17:44
Cadmium	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:44
Chromium	**0.00990**		**0.000400**	**0.00400**	**mg/L**	1	18-Feb-2022 17:44
Cobalt	**0.00700**		**0.000200**	**0.00500**	**mg/L**	1	18-Feb-2022 17:44
Copper	**0.0183**		**0.00100**	**0.00200**	**mg/L**	1	18-Feb-2022 17:44
Lead	**0.0108**		**0.000600**	**0.00200**	**mg/L**	1	18-Feb-2022 17:44
Molybdenum	U		0.000600	0.00500	mg/L	1	18-Feb-2022 17:44
Nickel	**0.00869**		**0.000600**	**0.00200**	**mg/L**	1	18-Feb-2022 17:44
Selenium	U		0.00110	0.00200	mg/L	1	18-Feb-2022 17:44
Silver	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:44
Thallium	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:44
Vanadium	**0.0196**		**0.000600**	**0.00500**	**mg/L**	1	18-Feb-2022 17:44
Zinc	**0.0510**		**0.00200**	**0.00400**	**mg/L**	1	18-Feb-2022 17:44

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
Sample ID: R-1
Collection Date: 02-Feb-2022 10:08

ANALYTICAL REPORT
WorkOrder:HS22020287
Lab ID:HS22020287-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 11-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	11-Feb-2022 13:03
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**0.66**		**0.10**	**0.50**	**mg/L**	1	21-Feb-2022 21:42
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**2.10**		**0.610**	**2.00**	**mg/L**	1	18-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.311**	J	**0.150**	**1.00**	**mg/L**	5	18-Feb-2022 15:28
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 16-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0340**	J	**0.0200**	**0.0500**	**mg/L**	1	16-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**1,670**		**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**1,230**		**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 15:02
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**718**		**2.50**	**2.50**	**mg/L**	1	09-Feb-2022 17:51
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 10-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.35**	J	**0.10**	**0.50**	**mg/L**	1	11-Feb-2022 13:43
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.2**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**6.25**	H	**0.100**	**0.100**	**pH Units**	1	07-Feb-2022 16:55
Temp Deg C @pH	**22.4**	H	**0**	**0**	**DEG C**	1	07-Feb-2022 16:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
Sample ID: R-3
Collection Date: 02-Feb-2022 10:51

ANALYTICAL REPORT
WorkOrder:HS22020287
Lab ID:HS22020287-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 08-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Acenaphthene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Acenaphthylene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Benz(a)anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Chrysene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Dibenzofuran	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Fluoranthene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Fluorene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Naphthalene	**0.045**		**0.010**	**0.010**	**ug/L**	1	11-Feb-2022 18:28
Phenanthrene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Pyrene	U		0.010	0.010	ug/L	1	11-Feb-2022 18:28
Surr: 2-Fluorobiphenyl	*96.8*			*40-140*	*%REC*	*1*	*11-Feb-2022 18:28*
Surr: 4-Terphenyl-d14	*132*			*40-140*	*%REC*	*1*	*11-Feb-2022 18:28*
Surr: Nitrobenzene-d5	*94.8*			*40-140*	*%REC*	*1*	*11-Feb-2022 18:28*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 17-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	18-Feb-2022 17:52
Arsenic	**0.00228**		**0.000400**	**0.00200**	**mg/L**	1	18-Feb-2022 17:52
Beryllium	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:52
Cadmium	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:52
Chromium	**0.00320**	J	**0.000400**	**0.00400**	**mg/L**	1	18-Feb-2022 17:52
Cobalt	**0.00202**	J	**0.000200**	**0.00500**	**mg/L**	1	18-Feb-2022 17:52
Copper	**0.00175**	J	**0.00100**	**0.00200**	**mg/L**	1	18-Feb-2022 17:52
Lead	**0.00279**		**0.000600**	**0.00200**	**mg/L**	1	18-Feb-2022 17:52
Molybdenum	U		0.000600	0.00500	mg/L	1	18-Feb-2022 17:52
Nickel	**0.00276**		**0.000600**	**0.00200**	**mg/L**	1	18-Feb-2022 17:52
Selenium	U		0.00110	0.00200	mg/L	1	18-Feb-2022 17:52
Silver	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:52
Thallium	U		0.000200	0.00200	mg/L	1	18-Feb-2022 17:52
Vanadium	**0.00602**		**0.000600**	**0.00500**	**mg/L**	1	18-Feb-2022 17:52
Zinc	**0.0151**		**0.00200**	**0.00400**	**mg/L**	1	18-Feb-2022 17:52

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
Sample ID: R-3
Collection Date: 02-Feb-2022 10:51

ANALYTICAL REPORT
WorkOrder:HS22020287
Lab ID:HS22020287-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 11-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	11-Feb-2022 13:04
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: RPM
Nitrogen, Total	**0.54**		**0.10**	**0.50**	**mg/L**	1	21-Feb-2022 21:42
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.27**	J	**0.610**	**2.00**	**mg/L**	1	18-Feb-2022 14:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.262**	J	**0.150**	**1.00**	**mg/L**	5	18-Feb-2022 15:34
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 16-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	16-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**174**		**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**64.0**		**5.00**	**10.0**	**mg/L**	1	08-Feb-2022 15:02
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**98.0**		**2.50**	**2.50**	**mg/L**	1	09-Feb-2022 17:51
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 10-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.28**	J	**0.10**	**0.50**	**mg/L**	1	11-Feb-2022 13:43
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.7**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**5.08**	H	**0.100**	**0.100**	**pH Units**	1	07-Feb-2022 16:55
Temp Deg C @pH	**22.2**	H	**0**	**0**	**DEG C**	1	07-Feb-2022 16:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

Batch ID: 175124 **Start Date:** 08 Feb 2022 07:49 **End Date:** 08 Feb 2022 13:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020287-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020287-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020287-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020287-04	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 175281 **Start Date:** 11 Feb 2022 07:30 **End Date:** 11 Feb 2022 10:30
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020287-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020287-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020287-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020287-04		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 175337 **Start Date:** 10 Feb 2022 11:00 **End Date:** 10 Feb 2022 15:30
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020287-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020287-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020287-03		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020287-04		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 175430 **Start Date:** 16 Feb 2022 11:00 **End Date:** 16 Feb 2022 12:30
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020287-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020287-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020287-03		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020287-04		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

Batch ID: 175468 **Start Date:** 17 Feb 2022 11:30 **End Date:** 17 Feb 2022 15:30
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020287-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020287-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020287-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020287-04		10 (mL)	10 (mL)	1	120 plastic HNO3

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 175124 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26		08 Feb 2022 07:49	11 Feb 2022 17:27	1
HS22020287-02	SW-11	01 Feb 2022 11:08		08 Feb 2022 07:49	11 Feb 2022 17:48	1
HS22020287-03	R-1	02 Feb 2022 10:08		08 Feb 2022 07:49	11 Feb 2022 18:08	1
HS22020287-04	R-3	02 Feb 2022 10:51		08 Feb 2022 07:49	11 Feb 2022 18:28	1
Batch ID: 175281 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26		11 Feb 2022 07:30	11 Feb 2022 12:53	1
HS22020287-02	SW-11	01 Feb 2022 11:08		11 Feb 2022 07:30	11 Feb 2022 13:01	1
HS22020287-03	R-1	02 Feb 2022 10:08		11 Feb 2022 07:30	11 Feb 2022 13:03	1
HS22020287-04	R-3	02 Feb 2022 10:51		11 Feb 2022 07:30	11 Feb 2022 13:04	1
Batch ID: 175337 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26		10 Feb 2022 11:00	11 Feb 2022 13:43	1
HS22020287-02	SW-11	01 Feb 2022 11:08		10 Feb 2022 11:00	11 Feb 2022 13:43	1
HS22020287-03	R-1	02 Feb 2022 10:08		10 Feb 2022 11:00	11 Feb 2022 13:43	1
HS22020287-04	R-3	02 Feb 2022 10:51		10 Feb 2022 11:00	11 Feb 2022 13:43	1
Batch ID: 175430 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26		16 Feb 2022 11:00	16 Feb 2022 15:30	1
HS22020287-02	SW-11	01 Feb 2022 11:08		16 Feb 2022 11:00	16 Feb 2022 15:30	1
HS22020287-03	R-1	02 Feb 2022 10:08		16 Feb 2022 11:00	16 Feb 2022 15:30	1
HS22020287-04	R-3	02 Feb 2022 10:51		16 Feb 2022 11:00	16 Feb 2022 15:30	1
Batch ID: 175468 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26		17 Feb 2022 15:30	18 Feb 2022 17:40	1
HS22020287-02	SW-11	01 Feb 2022 11:08		17 Feb 2022 15:30	18 Feb 2022 17:42	1
HS22020287-03	R-1	02 Feb 2022 10:08		17 Feb 2022 15:30	18 Feb 2022 17:44	1
HS22020287-04	R-3	02 Feb 2022 10:51		17 Feb 2022 15:30	18 Feb 2022 17:52	1
Batch ID: R401749 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26			07 Feb 2022 16:55	1
HS22020287-02	SW-11	01 Feb 2022 11:08			07 Feb 2022 16:55	1
HS22020287-03	R-1	02 Feb 2022 10:08			07 Feb 2022 16:55	1
HS22020287-04	R-3	02 Feb 2022 10:51			07 Feb 2022 16:55	1
Batch ID: R401862 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26			08 Feb 2022 11:02	1
HS22020287-02	SW-11	01 Feb 2022 11:08			08 Feb 2022 11:02	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R401904 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26			08 Feb 2022 15:02	1
HS22020287-02	SW-11	01 Feb 2022 11:08			08 Feb 2022 15:02	1
HS22020287-03	R-1	02 Feb 2022 10:08			08 Feb 2022 15:02	1
HS22020287-04	R-3	02 Feb 2022 10:51			08 Feb 2022 15:02	1
Batch ID: R401926 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22020287-03	R-1	02 Feb 2022 10:08			09 Feb 2022 17:51	1
HS22020287-04	R-3	02 Feb 2022 10:51			09 Feb 2022 17:51	1
Batch ID: R402076 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26			08 Feb 2022 14:00	1
HS22020287-02	SW-11	01 Feb 2022 11:08			08 Feb 2022 14:00	1
HS22020287-03	R-1	02 Feb 2022 10:08			08 Feb 2022 14:00	1
HS22020287-04	R-3	02 Feb 2022 10:51			08 Feb 2022 14:00	1
Batch ID: R402435 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26			17 Feb 2022 11:55	1
HS22020287-02	SW-11	01 Feb 2022 11:08			17 Feb 2022 11:55	1
HS22020287-03	R-1	02 Feb 2022 10:08			17 Feb 2022 11:55	1
HS22020287-04	R-3	02 Feb 2022 10:51			17 Feb 2022 11:55	1
Batch ID: R402579 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26			18 Feb 2022 14:25	1
HS22020287-02	SW-11	01 Feb 2022 11:08			18 Feb 2022 14:25	1
HS22020287-03	R-1	02 Feb 2022 10:08			18 Feb 2022 14:25	1
HS22020287-04	R-3	02 Feb 2022 10:51			18 Feb 2022 14:25	1
Batch ID: R402638 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26			18 Feb 2022 15:07	5
HS22020287-02	SW-11	01 Feb 2022 11:08			18 Feb 2022 15:23	5
HS22020287-03	R-1	02 Feb 2022 10:08			18 Feb 2022 15:28	5
HS22020287-04	R-3	02 Feb 2022 10:51			18 Feb 2022 15:34	5
Batch ID: R402654 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26			21 Feb 2022 13:28	1
HS22020287-02	SW-11	01 Feb 2022 11:08			21 Feb 2022 13:28	1
HS22020287-03	R-1	02 Feb 2022 10:08			21 Feb 2022 13:28	1
HS22020287-04	R-3	02 Feb 2022 10:51			21 Feb 2022 13:28	1
Batch ID: R402697 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22020287-01	SW-5	01 Feb 2022 12:26			21 Feb 2022 21:42	1
HS22020287-02	SW-11	01 Feb 2022 11:08			21 Feb 2022 21:42	1
HS22020287-03	R-1	02 Feb 2022 10:08			21 Feb 2022 21:42	1
HS22020287-04	R-3	02 Feb 2022 10:51			21 Feb 2022 21:42	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175281 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-175281** Units: **mg/L** Analysis Date: **11-Feb-2022 12:25**
Client ID: Run ID: **HG03_402072** SeqNo: **6499261** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U		0.000200								

LCS Sample ID: **LCS-175281** Units: **mg/L** Analysis Date: **11-Feb-2022 12:32**
Client ID: Run ID: **HG03_402072** SeqNo: **6499264** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00498		0.000200	0.005	0	99.6	80 - 120				

MS Sample ID: **HS22020458-05MS** Units: **mg/L** Analysis Date: **11-Feb-2022 12:41**
Client ID: Run ID: **HG03_402072** SeqNo: **6499266** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00495		0.000200	0.005	-0.000002	99.0	75 - 125				

MSD Sample ID: **HS22020458-05MSD** Units: **mg/L** Analysis Date: **11-Feb-2022 12:43**
Client ID: Run ID: **HG03_402072** SeqNo: **6499267** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00494		0.000200	0.005	-0.000002	98.8	75 - 125	0.00495	0.202	20	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175468 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-175468** Units: **mg/L** Analysis Date: **21-Feb-2022 13:37**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6511942** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175468 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-175468** Units: **mg/L** Analysis Date: **18-Feb-2022 16:48**
Client ID: Run ID: **ICPMS06_402556** SeqNo: **6510142** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05695	0.00200	0.05	0	114	80 - 120				
Arsenic	0.05385	0.00200	0.05	0	108	80 - 120				
Beryllium	0.05374	0.00200	0.05	0	107	80 - 120				
Cadmium	0.05395	0.00200	0.05	0	108	80 - 120				
Chromium	0.05288	0.00400	0.05	0	106	80 - 120				
Cobalt	0.05276	0.00500	0.05	0	106	80 - 120				
Copper	0.0538	0.00200	0.05	0	108	80 - 120				
Lead	0.05067	0.00200	0.05	0	101	80 - 120				
Molybdenum	0.05219	0.00500	0.05	0	104	80 - 120				
Nickel	0.05399	0.00200	0.05	0	108	80 - 120				
Selenium	0.055	0.00200	0.05	0	110	80 - 120				
Silver	0.05413	0.00200	0.05	0	108	80 - 120				
Thallium	0.05103	0.00200	0.05	0	102	80 - 120				
Vanadium	0.05193	0.00500	0.05	0	104	80 - 120				
Zinc	0.05579	0.00400	0.05	0	112	80 - 120				

MS Sample ID: **HS22020813-26MS** Units: **mg/L** Analysis Date: **21-Feb-2022 13:43**
Client ID: Run ID: **ICPMS06_402663** SeqNo: **6511945** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05169	0.00200	0.05	0.000097	103	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175468 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22020813-26MS** Units: **mg/L** Analysis Date: **18-Feb-2022 16:54**
Client ID: Run ID: **ICPMS06_402556** SeqNo: **6510145** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.05533	0.00200	0.05	0.000183	110	80 - 120				
Beryllium	0.056	0.00200	0.05	0.000015	112	80 - 120				
Cadmium	0.05643	0.00200	0.05	0.000011	113	80 - 120				
Chromium	0.0568	0.00400	0.05	0.001077	111	80 - 120				
Cobalt	0.05695	0.00500	0.05	0.000165	114	80 - 120				
Copper	0.05809	0.00200	0.05	0.000289	116	80 - 120				
Lead	0.0572	0.00200	0.05	0.002143	110	80 - 120				
Molybdenum	0.05505	0.00500	0.05	0.000106	110	80 - 120				
Nickel	0.05776	0.00200	0.05	0.000565	114	80 - 120				
Selenium	0.05833	0.00200	0.05	-0.000262	117	80 - 120				
Silver	0.05654	0.00200	0.05	0.000001	113	80 - 120				
Thallium	0.05487	0.00200	0.05	0.000038	110	80 - 120				
Vanadium	0.05609	0.00500	0.05	0.000987	110	80 - 120				
Zinc	0.06248	0.00400	0.05	0.002947	119	80 - 120				

MSD Sample ID: **HS22020813-26MSD** Units: **mg/L** Analysis Date: **18-Feb-2022 16:56**
Client ID: Run ID: **ICPMS06_402556** SeqNo: **6510146** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05989	0.00200	0.05	0.000116	120	80 - 120	0.06027	0.639	20	
Arsenic	0.05476	0.00200	0.05	0.000183	109	80 - 120	0.05533	1.03	20	
Beryllium	0.05375	0.00200	0.05	0.000015	107	80 - 120	0.056	4.11	20	
Cadmium	0.05682	0.00200	0.05	0.000011	114	80 - 120	0.05643	0.699	20	
Chromium	0.05622	0.00400	0.05	0.001077	110	80 - 120	0.0568	1.03	20	
Cobalt	0.056	0.00500	0.05	0.000165	112	80 - 120	0.05695	1.68	20	
Copper	0.05733	0.00200	0.05	0.000289	114	80 - 120	0.05809	1.32	20	
Lead	0.05757	0.00200	0.05	0.002143	111	80 - 120	0.0572	0.636	20	
Molybdenum	0.05516	0.00500	0.05	0.000106	110	80 - 120	0.05505	0.2	20	
Nickel	0.05656	0.00200	0.05	0.000565	112	80 - 120	0.05776	2.1	20	
Selenium	0.0577	0.00200	0.05	-0.000262	116	80 - 120	0.05833	1.09	20	
Silver	0.05708	0.00200	0.05	0.000001	114	80 - 120	0.05654	0.965	20	
Thallium	0.05546	0.00200	0.05	0.000038	111	80 - 120	0.05487	1.07	20	
Vanadium	0.05518	0.00500	0.05	0.000987	108	80 - 120	0.05609	1.65	20	
Zinc	0.06211	0.00400	0.05	0.002947	118	80 - 120	0.06248	0.586	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175468 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

PDS Sample ID: **HS22020813-26PDS** Units: **mg/L** Analysis Date: **18-Feb-2022 16:58**
Client ID: Run ID: **ICPMS06_402556** SeqNo: **6510147** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1134	0.00200	0.1	0.000116	113	75 - 125				
Arsenic	0.1091	0.00200	0.1	0.000183	109	75 - 125				
Beryllium	0.1063	0.00200	0.1	0.000015	106	75 - 125				
Cadmium	0.111	0.00200	0.1	0.000011	111	75 - 125				
Chromium	0.1113	0.00400	0.1	0.001077	110	75 - 125				
Cobalt	0.1142	0.00500	0.1	0.000165	114	75 - 125				
Copper	0.1124	0.00200	0.1	0.000289	112	75 - 125				
Lead	0.1083	0.00200	0.1	0.002143	106	75 - 125				
Molybdenum	0.1084	0.00500	0.1	0.000106	108	75 - 125				
Nickel	0.1109	0.00200	0.1	0.000565	110	75 - 125				
Selenium	0.1138	0.00200	0.1	-0.000262	114	75 - 125				
Silver	0.1092	0.00200	0.1	0.000001	109	75 - 125				
Thallium	0.1035	0.00200	0.1	0.000038	103	75 - 125				
Vanadium	0.1087	0.00500	0.1	0.000987	108	75 - 125				
Zinc	0.1177	0.00400	0.1	0.002947	115	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175468 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22020813-26SD** Units: **mg/L** Analysis Date: **18-Feb-2022 16:52**
Client ID: Run ID: **ICPMS06_402556** SeqNo: **6510144** PrepDate: **17-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000116	0	10	
Arsenic	U	0.0100					0.000183	0	10	
Beryllium	U	0.0100					0.000015	0	10	
Cadmium	U	0.0100					0.000011	0	10	
Chromium	U	0.0200					0.001077	0	10	
Cobalt	U	0.0250					0.000165	0	10	
Copper	U	0.0100					0.000289	0	10	
Lead	U	0.0100					0.002143	0	10	
Molybdenum	U	0.0250					0.000106	0	10	
Nickel	U	0.0100					0.000565	0	10	
Selenium	U	0.0100					-0.000262	0	10	
Silver	U	0.0100					0.000001	0	10	
Thallium	U	0.0100					0.000038	0	10	
Vanadium	U	0.0250					0.000987	0	10	
Zinc	U	0.0200					0.002947	0	10	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175124 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-175124** Units: **ug/L** Analysis Date: **11-Feb-2022 13:25**
Client ID: Run ID: **SV-6_402091** SeqNo: **6499576** PrepDate: **08-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.06245*	*0*	*0.08*	*0*	*78.1*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.1002*	*0*	*0.08*	*0*	*125*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.06613*	*0*	*0.08*	*0*	*82.7*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175124 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-175124** Units: **ug/L** Analysis Date: **11-Feb-2022 13:45**
Client ID: Run ID: **SV-6_402091** SeqNo: **6499577** PrepDate: **08-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.07751	0.010	0.08	0	96.9	40 - 140				
2-Methylnaphthalene	0.05718	0.010	0.08	0	71.5	40 - 140				
Acenaphthene	0.04219	0.010	0.08	0	52.7	40 - 140				
Acenaphthylene	0.06317	0.010	0.08	0	79.0	40 - 140				
Anthracene	0.07381	0.010	0.08	0	92.3	40 - 140				
Benz(a)anthracene	0.05594	0.010	0.08	0	69.9	40 - 140				
Benzo(a)pyrene	0.07292	0.010	0.08	0	91.1	40 - 140				
Benzo(b)fluoranthene	0.05673	0.010	0.08	0	70.9	40 - 140				
Benzo(g,h,i)perylene	0.07195	0.010	0.08	0	89.9	40 - 140				
Benzo(k)fluoranthene	0.08212	0.010	0.08	0	103	40 - 140				
Chrysene	0.08638	0.010	0.08	0	108	40 - 140				
Dibenz(a,h)anthracene	0.06829	0.010	0.08	0	85.4	40 - 140				
Dibenzofuran	0.06338	0.010	0.08	0	79.2	40 - 140				
Fluoranthene	0.07233	0.010	0.08	0	90.4	40 - 140				
Fluorene	0.06352	0.010	0.08	0	79.4	40 - 140				
Indeno(1,2,3-cd)pyrene	0.08514	0.010	0.08	0	106	40 - 140				
Naphthalene	0.07847	0.010	0.08	0	98.1	40 - 140				
Phenanthrene	0.05011	0.010	0.08	0	62.6	40 - 140				
Pyrene	0.07445	0.010	0.08	0	93.1	40 - 140				
Surr: 2-Fluorobiphenyl	*0.06806*	*0*	*0.08*	*0*	*85.1*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.09111*	*0*	*0.08*	*0*	*114*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.06492*	*0*	*0.08*	*0*	*81.2*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175124 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-175124** Units: **ug/L** Analysis Date: **11-Feb-2022 14:06**
Client ID: Run ID: **SV-6_402091** SeqNo: **6499578** PrepDate: **08-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.07208	0.010	0.08	0	90.1	40 - 140	0.07751	7.27	20	
2-Methylnaphthalene	0.0597	0.010	0.08	0	74.6	40 - 140	0.05718	4.31	20	
Acenaphthene	0.04609	0.010	0.08	0	57.6	40 - 140	0.04219	8.83	20	
Acenaphthylene	0.06501	0.010	0.08	0	81.3	40 - 140	0.06317	2.87	20	
Anthracene	0.07228	0.010	0.08	0	90.3	40 - 140	0.07381	2.1	20	
Benz(a)anthracene	0.05218	0.010	0.08	0	65.2	40 - 140	0.05594	6.96	20	
Benzo(a)pyrene	0.07133	0.010	0.08	0	89.2	40 - 140	0.07292	2.19	20	
Benzo(b)fluoranthene	0.05197	0.010	0.08	0	65.0	40 - 140	0.05673	8.75	20	
Benzo(g,h,i)perylene	0.07097	0.010	0.08	0	88.7	40 - 140	0.07195	1.37	20	
Benzo(k)fluoranthene	0.09544	0.010	0.08	0	119	40 - 140	0.08212	15	20	
Chrysene	0.08875	0.010	0.08	0	111	40 - 140	0.08638	2.71	20	
Dibenz(a,h)anthracene	0.06663	0.010	0.08	0	83.3	40 - 140	0.06829	2.45	20	
Dibenzofuran	0.0641	0.010	0.08	0	80.1	40 - 140	0.06338	1.12	20	
Fluoranthene	0.06765	0.010	0.08	0	84.6	40 - 140	0.07233	6.69	20	
Fluorene	0.062	0.010	0.08	0	77.5	40 - 140	0.06352	2.41	20	
Indeno(1,2,3-cd)pyrene	0.08506	0.010	0.08	0	106	40 - 140	0.08514	0.0952	20	
Naphthalene	0.08024	0.010	0.08	0	100	40 - 140	0.07847	2.23	20	
Phenanthrene	0.05016	0.010	0.08	0	62.7	40 - 140	0.05011	0.106	20	
Pyrene	0.07727	0.010	0.08	0	96.6	40 - 140	0.07445	3.72	20	
Surr: 2-Fluorobiphenyl	*0.06079*	*0*	*0.08*	*0*	*76.0*	*40 - 140*	*0.06806*	*11.3*	*20*	
Surr: 4-Terphenyl-d14	*0.08862*	*0*	*0.08*	*0*	*111*	*40 - 140*	*0.09111*	*2.78*	*20*	
Surr: Nitrobenzene-d5	*0.0604*	*0*	*0.08*	*0*	*75.5*	*40 - 140*	*0.06492*	*7.22*	*20*	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175337 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-175337** Units: **mg/L** Analysis Date: **11-Feb-2022 13:43**
Client ID: Run ID: **WetChem_HS_402171** SeqNo: **6501295** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-175337** Units: **mg/L** Analysis Date: **11-Feb-2022 13:43**
Client ID: Run ID: **WetChem_HS_402171** SeqNo: **6501294** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	21.64	0.50	20	0	108	85 - 115				

MS Sample ID: **HS22020226-03MS** Units: **mg/L** Analysis Date: **11-Feb-2022 13:43**
Client ID: Run ID: **WetChem_HS_402171** SeqNo: **6501292** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	18.82	0.50	20	0.244	92.9	75 - 125				

MSD Sample ID: **HS22020226-03MSD** Units: **mg/L** Analysis Date: **11-Feb-2022 13:43**
Client ID: Run ID: **WetChem_HS_402171** SeqNo: **6501293** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19	0.50	20	0.244	93.8	75 - 125	18.82	0.91	20	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: 175430 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-175430** Units: **mg/L** Analysis Date: **16-Feb-2022 15:30**
Client ID: Run ID: **UV-2450_402383** SeqNo: **6506243** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-175430** Units: **mg/L** Analysis Date: **16-Feb-2022 15:30**
Client ID: Run ID: **UV-2450_402383** SeqNo: **6506242** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.229	0.0500	0.25	0	91.6	80 - 120				

MS Sample ID: **HS22020233-01MS** Units: **mg/L** Analysis Date: **16-Feb-2022 15:30**
Client ID: Run ID: **UV-2450_402383** SeqNo: **6506240** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.231	0.0500	0.25	0.013	87.2	80 - 120				

MSD Sample ID: **HS22020233-01MSD** Units: **mg/L** Analysis Date: **16-Feb-2022 15:30**
Client ID: Run ID: **UV-2450_402383** SeqNo: **6506241** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.233	0.0500	0.25	0.013	88.0	80 - 120	0.231	0.862	20	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: R401749 (0) **Instrument: WetChem_HS** **Method: PH BY SW9040C**

DUP Sample ID: **HS22020240-01DUP** Units: **pH Units** Analysis Date: **07-Feb-2022 16:55**
Client ID: Run ID: **WetChem_HS_401749** SeqNo: **6492388** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	6.58	0.100					6.56	0.304	10	
Temp Deg C @pH	22	0					22.2	0.905	10	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: R401862 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-020822** Units: **mg/L** Analysis Date: **08-Feb-2022 11:02**
Client ID: Run ID: **Balance1_401862** SeqNo: **6494973** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-020822** Units: **mg/L** Analysis Date: **08-Feb-2022 11:02**
Client ID: Run ID: **Balance1_401862** SeqNo: **6494974** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	96	2.50	100	0	96.0	85 - 115				

DUP Sample ID: **HS22020287-02DUP** Units: **mg/L** Analysis Date: **08-Feb-2022 11:02**
Client ID: **SW-11** Run ID: **Balance1_401862** SeqNo: **6494972** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	44.67	2.50					46.67	4.38	5	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: R401904 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-020822** Units: **mg/L** Analysis Date: **08-Feb-2022 15:02**
Client ID: Run ID: **Balance1_401904** SeqNo: **6495700** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-020822** Units: **mg/L** Analysis Date: **08-Feb-2022 15:02**
Client ID: Run ID: **Balance1_401904** SeqNo: **6495701** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1112	10.0	1000	0	111	85 - 115				

DUP Sample ID: **HS22020284-01DUP** Units: **mg/L** Analysis Date: **08-Feb-2022 15:02**
Client ID: Run ID: **Balance1_401904** SeqNo: **6495695** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1294	10.0					1306	0.923	5	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: R401926 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-020922** Units: **mg/L** Analysis Date: **09-Feb-2022 17:51**
Client ID: Run ID: **Balance1_401926** SeqNo: **6496084** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-020922** Units: **mg/L** Analysis Date: **09-Feb-2022 17:51**
Client ID: Run ID: **Balance1_401926** SeqNo: **6496085** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	91	2.50	100	0	91.0	85 - 115				

DUP Sample ID: **HS22020244-01DUP** Units: **mg/L** Analysis Date: **09-Feb-2022 17:51**
Client ID: Run ID: **Balance1_401926** SeqNo: **6496080** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	48.67	2.50					48	1.38	5	

DUP Sample ID: **HS22020083-02DUP** Units: **mg/L** Analysis Date: **09-Feb-2022 17:51**
Client ID: Run ID: **Balance1_401926** SeqNo: **6496067** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	19.5	2.50					20	2.53	5	

The following samples were analyzed in this batch: HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: R402076 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R402076** Units: **mg/L** Analysis Date: **08-Feb-2022 14:00**
Client ID: Run ID: **Balance1_402076** SeqNo: **6499146** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R402076** Units: **mg/L** Analysis Date: **08-Feb-2022 14:00**
Client ID: Run ID: **Balance1_402076** SeqNo: **6499145** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	1064	10.0	1000	0	106	85 - 115				

DUP Sample ID: **HS22020287-04DUP** Units: **mg/L** Analysis Date: **08-Feb-2022 14:00**
Client ID: **R-3** Run ID: **Balance1_402076** SeqNo: **6499147** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	172	10.0					174	1.16	20	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: **R402435 (0)** **Instrument:** **ManTech01** **Method:** **DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS22020287-02DUP** Units: **mg/L** Analysis Date: **17-Feb-2022 11:55**
Client ID: **SW-11** Run ID: **ManTech01_402435** SeqNo: **6507254** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.12	1.00					11.1	0.18	20	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: R402579 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-021822** Units: **mg/L** Analysis Date: **18-Feb-2022 14:25**
Client ID: Run ID: **Balance1_402579** SeqNo: **6510075** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-021822** Units: **mg/L** Analysis Date: **18-Feb-2022 14:25**
Client ID: Run ID: **Balance1_402579** SeqNo: **6510077** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39	2.00	40	0	97.5	78 - 114				

LCSD Sample ID: **WLCSDW-021822** Units: **mg/L** Analysis Date: **18-Feb-2022 14:25**
Client ID: Run ID: **Balance1_402579** SeqNo: **6510076** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.9	2.00	40	0	97.2	78 - 114	39	0.257	18	

MS Sample ID: **HS22020469-01MS** Units: **mg/L** Analysis Date: **18-Feb-2022 14:25**
Client ID: Run ID: **Balance1_402579** SeqNo: **6510060** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.6	2.00	40	3.226	88.4	78 - 114				

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: R402638 (0) **Instrument:** ICS-Integrion **Method:** NITRATE/NITRITE BY E300.0, REV 2.1, 1993

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **18-Feb-2022 08:58**
Client ID: Run ID: **ICS-Integrion_402638** SeqNo: **6511535** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **18-Feb-2022 09:03**
Client ID: Run ID: **ICS-Integrion_402638** SeqNo: **6511536** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	8.024	0.200	8	0	100	90 - 110				

MS Sample ID: **HS22020394-02MS** Units: **mg/L** Analysis Date: **18-Feb-2022 14:08**
Client ID: Run ID: **ICS-Integrion_402638** SeqNo: **6511543** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.21	1.00	20	1.264	89.7	80 - 120				

MS Sample ID: **HS22020287-01MS** Units: **mg/L** Analysis Date: **18-Feb-2022 15:12**
Client ID: **SW-5** Run ID: **ICS-Integrion_402638** SeqNo: **6511554** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	18.64	1.00	20	0.1835	92.3	80 - 120				

MSD Sample ID: **HS22020394-02MSD** Units: **mg/L** Analysis Date: **18-Feb-2022 14:14**
Client ID: Run ID: **ICS-Integrion_402638** SeqNo: **6511544** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.77	1.00	20	1.264	92.5	80 - 120	19.21	2.85	20	

MSD Sample ID: **HS22020287-01MSD** Units: **mg/L** Analysis Date: **18-Feb-2022 15:17**
Client ID: **SW-5** Run ID: **ICS-Integrion_402638** SeqNo: **6511555** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.26	1.00	20	0.1835	95.4	80 - 120	18.64	3.29	20	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

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Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: HS22020287

QC BATCH REPORT

Batch ID: **R402654 (0)** **Instrument:** **WetChem_HS** **Method:** **SALINITY**

DUP Sample ID: **HS22020287-03DUP** Units: **ppt** Analysis Date: **21-Feb-2022 13:28**
Client ID: **R-1** Run ID: **WetChem_HS_402654** SeqNo: **6511813** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22020287-01 HS22020287-02 HS22020287-03 HS22020287-04

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-5, SW-11, R-1, R-3
WorkOrder: **HS22020287**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-34	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

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Sample Receipt Checklist

Work Order ID: HS22020287 **Date/Time Received:** **07-Feb-2022 09:45**

Client Name: ERM NC **Received by:** **Nilesh D. Ranchod**

Completed By: */S/ Nilesh D. Ranchod* (eSignature) 07-Feb-2022 13:00 (Date/Time) **Reviewed by:** */S/ Corey Grandits* (eSignature) 08-Feb-2022 12:44 (Date/Time)

Matrices: **WATER** Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☐	No ☑	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s):	11.2c/11.7c, 10.9c/11.4c c UC/C	IR 31
Cooler(s)/Kit(s):	47764/48067	
Date/Time sample(s) sent to storage:	02/07/2022 14:00	

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: SW11 & R-1 Amb btls 2 of 2 received broken. COC collection no date and time labels = SW-5 Date : 01/02/2022 12:26, SW-11 Date : 01/02/2022 11:08, R-1 Date : 02/02/2022 10:08 , R-3 Date : 02/02/2022 10:51

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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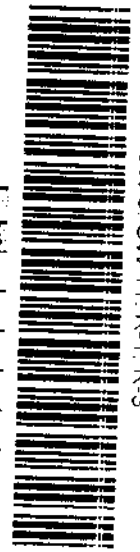
☑ ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page ____ of ____

☐ ALS Laboratory Group
3352 128th Avenue
Holland, Michigan 49424
(Tel) 616.399.6070
(Fax) 616.399.6185



HS2020287

ERM Inc

SW-5, SW-11, R-1, R-3

ALS Project Manager: | Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name		A	8270SIM PAHs
Work Order		Project Number		B	Dissolved Oxygen
Company Name	ERM	Bill To Company	ERM	C	ICP_TW 16 Metals
Send Report To	Selina Pradhan	Invoice Attn.	AP	D	Total Nitrogen
Address		Address		E	Oil & Grease
				F	Phosphorus
City/State/Zip		City/State/Zip		G	pH
Phone		Phone		H	Salinity
Fax		Fax		I	TSS, TDS, & TS
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	SW 5	02/02/2022	12:26	W			X	X	X	X	X	X	X	X	X		
2	SW 11	02/02/2022	11:03														
3	R 1	02/02/2022	10:03														
4	R 3	02/02/2022	10:51														
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s): Please Print & Sign | Shipment Method: | Required Turnaround Time: ☑ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other ____ | Results Due Date:

Relinquished by:	Date:	Time:	Received by:	Notes:
Relinquished by:	Date: 2.7.22	Time: 09.45	Received by (Laboratory): NR	Cooler Temp.
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

QC Package: (Check Box Below)

X	Level II: Standard QC		TRRP-Checklist
	Level III: Std QC + Raw Data		TRRP Level IV
	Level IV: SW846 CLP-Like		
	Other: ____		

Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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47764 - 11.2
48067 - 10.9
Ice # 31 CF +0.5.

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TOXIC SUBSTANCES CONTROL ACT (TSCA) CERTIFICATION

DATE: 2022-01-02

(CHECK ONE SECTION ONLY)

POSITIVE CERTIFICATION:

"I HEREBY CERTIFY THAT ALL CHEMICAL SUBSTANCES IN THIS SHIPMENT COMPLY WITH ALL APPLICABLE RULES OR ORDERS UNDER TSCA AND THAT I AM NOT OFFERING A CHEMICAL SUBSTANCE FOR ENTRY IN VIOLATION OF TSCA OR ANY APPLICABLE RULE OR ORDER THEREUNDER.

OR

NEGATIVE CERTIFICATION: ☒

"I CERTIFY THAT ALL CHEMICALS IN THIS SHIPMENT ARE NOT SUBJECT TO TSCA."

NAME: ERM Guyana Inc

COMPANY ADDRESS: 210 New Market Street, North Cummings burg, Guyana

AUTHORIZED NAME: Waldyke Prince

AUTHORIZED SIGNATURE: Waldyke Prince

District Representative.

TITLE: Samples for Analysis

FEDERAL EXPRESS AWB#_____

IF THE CERTIFIER IS UNSURE IF THEIR CHEMICAL SUBSTANCE IS SUBJECT TO TSCA COMPLIANCE, CONTACT THE ENVIRONMENTAL PROTECTION AGENCY, TSCA ASSISTANCE OFFICE, WASHINGTON, DC (202) 554 1404 BETWEEN 08:30AM TO 05:00 PM EST.

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47764 FEB 07 2022

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International Multiple-Piece Shipment
PIECE 3 OF 4
IMPS

Master Air Waybill Number
FedEx Express
2894 3455 4757
137296 REV 8/08 RRD

R - 1
R - 3

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ORIGIN ID:GEOA 5922252017

GUYANA LOGISTICS & SUPPORT SERVICES
110 DUKE & BARRACK STREETS
KINGSTON
GEORGETOWN
GUYANA GY

SHIP DATE: 01FEB22
ACTWGT: 35.00 LB
CAD: 2450080/FXSF0107
DIMS: 23x13x14 IN

BILL SENDER

TO ALS ENVIRONMENTAL
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656

(US)

REF:
INV:
PO:
DEPT:

FedEx Express

J221402281852/ew

TRK# 2893 7083 1212
0430

10:30A
INTL PRIORITY

XA SGRA

TX-US IAH 77099

48067

FEB 07 2022

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SW - 5
SW - 11

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 24, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22020425**

Laboratory Results for: **SW-9,SW2,SW3,SW4,SW6,SW7,SW8**

Dear Selina Pradhan,

ALS Environmental received 7 sample(s) on Feb 09, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
Corey Grandits
Project Manager

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Work Order: HS22020425

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22020425-01	SW-9	Water		04-Feb-2022 06:56	09-Feb-2022 10:40	☐
HS22020425-02	SW-2	Water		04-Feb-2022 12:33	09-Feb-2022 10:40	☐
HS22020425-03	SW-3	Water		04-Feb-2022 11:37	09-Feb-2022 10:40	☐
HS22020425-04	SW-4	Water		04-Feb-2022 10:48	09-Feb-2022 10:40	☐
HS22020425-05	SW-6	Water		04-Feb-2022 08:56	09-Feb-2022 10:40	☐
HS22020425-06	SW-7	Water		04-Feb-2022 10:15	09-Feb-2022 10:40	☐
HS22020425-07	SW-8	Water		04-Feb-2022 10:00	09-Feb-2022 10:40	☐

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Client: ERM, Inc **CASE NARRATIVE**
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Work Order: HS22020425

Work Order Comments

• Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 175230

Sample ID: LCSD-175230

• The RPD between the LCS and LCSD was outside of the control limit.

Metals by Method SW6020A

Batch ID: 175574

Sample ID: HS22020880-17MS

• MS and MSD are for an unrelated sample (Copper)

Metals by Method SW7470A

Batch ID: 175281,175334

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540B

Batch ID: R402458

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E1664A

Batch ID: R402659,R402867

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method Calculation

Batch ID: R402829

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E300

Batch ID: R402799

Sample ID: MBLK

• The reporting limit(s) is/are elevated due to dilution for high concentrations of non-targeted analyte/s for samples reported in Batch ID 402799

WetChemistry by Method SM2520

Batch ID: R402654

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc **CASE NARRATIVE**
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Work Order: HS22020425

WetChemistry by Method M4500-O G

Batch ID: R402435

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R402027

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C

Batch ID: R402085,R402127

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540D

Batch ID: R402032

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 175697

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 175533

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-9
Collection Date: 04-Feb-2022 06:56

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 10-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Acenaphthene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Acenaphthylene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Benz(a)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Chrysene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Dibenzofuran	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Fluorene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Naphthalene	**0.010**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 14:04
Phenanthrene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 14:04
Surr: 2-Fluorobiphenyl	*72.3*			*40-140*	*%REC*	*1*	*22-Feb-2022 14:04*
Surr: 4-Terphenyl-d14	*112*			*40-140*	*%REC*	*1*	*22-Feb-2022 14:04*
Surr: Nitrobenzene-d5	*70.3*			*40-140*	*%REC*	*1*	*22-Feb-2022 14:04*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 21-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	22-Feb-2022 15:37
Arsenic	**0.000940**	J	**0.000400**	**0.00200**	**mg/L**	1	22-Feb-2022 15:37
Beryllium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:37
Cadmium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:37
Chromium	**0.000685**	J	**0.000400**	**0.00400**	**mg/L**	1	22-Feb-2022 15:37
Cobalt	**0.000310**	J	**0.000200**	**0.00500**	**mg/L**	1	22-Feb-2022 15:37
Copper	**0.00696**		**0.00100**	**0.00200**	**mg/L**	1	22-Feb-2022 15:37
Lead	U		0.000600	0.00200	mg/L	1	22-Feb-2022 15:37
Molybdenum	U		0.000600	0.00500	mg/L	1	22-Feb-2022 15:37
Nickel	U		0.000600	0.00200	mg/L	1	22-Feb-2022 15:37
Selenium	U		0.00110	0.00200	mg/L	1	22-Feb-2022 15:37
Silver	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:37
Thallium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:37
Vanadium	U		0.000600	0.00500	mg/L	1	22-Feb-2022 15:37
Zinc	**0.00374**	J	**0.00200**	**0.00400**	**mg/L**	1	22-Feb-2022 15:37

Note: See Qualifiers Page for a list of qualifiers and their explanation.

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Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-9
Collection Date: 04-Feb-2022 06:56

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A			**Method:SW7470A**		Prep:SW7470A / 11-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	11-Feb-2022 13:09
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)			**Method:Calculation**				Analyst: YP
Nitrogen, Total	**0.97**		**0.10**	**0.50**	**mg/L**	1	23-Feb-2022 11:02
OIL & GREASE (HEM) BY E1664A			**Method:E1664A**				Analyst: KAH
Oil and Grease	**3.67**		**0.610**	**2.00**	**mg/L**	1	21-Feb-2022 13:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993			**Method:E300**				Analyst: YP
Nitrate/Nitrite (as N)	**0.186**	J	**0.150**	**1.00**	**mg/L**	5	22-Feb-2022 19:28
PHOSPHORUS BY E365.3-1978			**Method:E365.3**		Prep:E365.3 / 23-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	23-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011			**Method:M2540B**				Analyst: KAH
Residue, Total	**46.0**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011			**Method:M2540C**				Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**28.0**		**5.00**	**10.0**	**mg/L**	1	10-Feb-2022 14:22
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011			**Method:M2540D**				Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**12.5**		**2.50**	**2.50**	**mg/L**	1	10-Feb-2022 17:44
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011			**Method:M4500 NH3 D**		Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.78**		**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G			**Method:M4500-O G**				Analyst: TH
Oxygen, Dissolved	**10.8**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY			**Method:SM2520**				Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C			**Method:SW9040C**				Analyst: CWG
pH	**3.92**	H	**0.100**	**0.100**	**pH Units**	1	10-Feb-2022 16:58
Temp Deg C @pH	**22.3**	H	**0**	**0**	**DEG C**	1	10-Feb-2022 16:58

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-2
Collection Date: 04-Feb-2022 12:33

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 10-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	**0.036**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
2-Methylnaphthalene	**0.034**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Acenaphthene	**0.019**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Acenaphthylene	**0.012**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Anthracene	**0.020**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Benz(a)anthracene	**0.018**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Benzo(a)pyrene	**0.046**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Benzo(b)fluoranthene	**0.057**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Benzo(g,h,i)perylene	**0.045**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Benzo(k)fluoranthene	**0.043**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Chrysene	**0.022**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Dibenz(a,h)anthracene	**0.031**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Dibenzofuran	**0.016**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Fluoranthene	**0.025**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Fluorene	**0.015**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Indeno(1,2,3-cd)pyrene	**0.045**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Naphthalene	**0.049**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Phenanthrene	**0.030**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Pyrene	**0.025**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 16:51
Surr: 2-Fluorobiphenyl	*94.8*			*40-140*	*%REC*	*1*	*22-Feb-2022 16:51*
Surr: 4-Terphenyl-d14	*126*			*40-140*	*%REC*	*1*	*22-Feb-2022 16:51*
Surr: Nitrobenzene-d5	*116*			*40-140*	*%REC*	*1*	*22-Feb-2022 16:51*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 21-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	22-Feb-2022 15:39
Arsenic	**0.00250**		**0.000400**	**0.00200**	**mg/L**	1	22-Feb-2022 15:39
Beryllium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:39
Cadmium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:39
Chromium	**0.00225**	J	**0.000400**	**0.00400**	**mg/L**	1	22-Feb-2022 15:39
Cobalt	**0.00103**	J	**0.000200**	**0.00500**	**mg/L**	1	22-Feb-2022 15:39
Copper	**0.00240**		**0.00100**	**0.00200**	**mg/L**	1	22-Feb-2022 15:39
Lead	**0.00212**		**0.000600**	**0.00200**	**mg/L**	1	22-Feb-2022 15:39
Molybdenum	U		0.000600	0.00500	mg/L	1	22-Feb-2022 15:39
Nickel	**0.00243**		**0.000600**	**0.00200**	**mg/L**	1	22-Feb-2022 15:39
Selenium	U		0.00110	0.00200	mg/L	1	22-Feb-2022 15:39
Silver	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:39
Thallium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:39
Vanadium	**0.00350**	J	**0.000600**	**0.00500**	**mg/L**	1	22-Feb-2022 15:39
Zinc	**0.00913**		**0.00200**	**0.00400**	**mg/L**	1	22-Feb-2022 15:39

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-2
Collection Date: 04-Feb-2022 12:33

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 11-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	11-Feb-2022 13:11
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.51**		**0.10**	**0.50**	**mg/L**	1	23-Feb-2022 11:02
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**3.28**		**0.610**	**2.00**	**mg/L**	1	21-Feb-2022 13:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.189**	J	**0.150**	**1.00**	**mg/L**	5	22-Feb-2022 19:44
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 23-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	23-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**106**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**104**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:14
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non-Filterable)	U		2.50	2.50	mg/L	1	10-Feb-2022 17:44
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.32**	J	**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.6**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**6.66**	H	**0.100**	**0.100**	**pH Units**	1	10-Feb-2022 16:58
Temp Deg C @pH	**22.7**	H	**0**	**0**	**DEG C**	1	10-Feb-2022 16:58

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-3
Collection Date: 04-Feb-2022 11:37

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 10-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	**0.012**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 17:11
2-Methylnaphthalene	**0.013**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 17:11
Acenaphthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Acenaphthylene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Anthracene	**0.010**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 17:11
Benz(a)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Benzo(g,h,i)perylene	**0.011**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 17:11
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Chrysene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Dibenzofuran	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Fluoranthene	**0.011**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 17:11
Fluorene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Indeno(1,2,3-cd)pyrene	**0.011**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 17:11
Naphthalene	**0.017**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 17:11
Phenanthrene	**0.015**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 17:11
Pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:11
Surr: 2-Fluorobiphenyl	*69.8*			*40-140*	*%REC*	*1*	*22-Feb-2022 17:11*
Surr: 4-Terphenyl-d14	*130*			*40-140*	*%REC*	*1*	*22-Feb-2022 17:11*
Surr: Nitrobenzene-d5	*106*			*40-140*	*%REC*	*1*	*22-Feb-2022 17:11*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 21-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	22-Feb-2022 15:41
Arsenic	**0.000566**	J	**0.000400**	**0.00200**	**mg/L**	1	22-Feb-2022 15:41
Beryllium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:41
Cadmium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:41
Chromium	**0.000432**	J	**0.000400**	**0.00400**	**mg/L**	1	22-Feb-2022 15:41
Cobalt	**0.000372**	J	**0.000200**	**0.00500**	**mg/L**	1	22-Feb-2022 15:41
Copper	U		0.00100	0.00200	mg/L	1	22-Feb-2022 15:41
Lead	U		0.000600	0.00200	mg/L	1	22-Feb-2022 15:41
Molybdenum	U		0.000600	0.00500	mg/L	1	22-Feb-2022 15:41
Nickel	**0.000699**	J	**0.000600**	**0.00200**	**mg/L**	1	22-Feb-2022 15:41
Selenium	U		0.00110	0.00200	mg/L	1	22-Feb-2022 15:41
Silver	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:41
Thallium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:41
Vanadium	**0.000864**	J	**0.000600**	**0.00500**	**mg/L**	1	22-Feb-2022 15:41
Zinc	**0.00603**		**0.00200**	**0.00400**	**mg/L**	1	22-Feb-2022 15:41

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-3
Collection Date: 04-Feb-2022 11:37

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A			**Method:SW7470A**		Prep:SW7470A / 11-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	11-Feb-2022 13:12
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)			**Method:Calculation**				Analyst: YP
Nitrogen, Total	**0.72**		**0.10**	**0.50**	**mg/L**	1	23-Feb-2022 11:02
OIL & GREASE (HEM) BY E1664A			**Method:E1664A**				Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	21-Feb-2022 13:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993			**Method:E300**				Analyst: YP
Nitrate/Nitrite (as N)	**0.191**	J	**0.150**	**1.00**	**mg/L**	5	22-Feb-2022 19:49
PHOSPHORUS BY E365.3-1978			**Method:E365.3**		Prep:E365.3 / 23-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	23-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011			**Method:M2540B**				Analyst: KAH
Residue, Total	**42.0**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011			**Method:M2540C**				Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**14.0**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:14
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011			**Method:M2540D**				Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**13.6**		**2.50**	**2.50**	**mg/L**	1	10-Feb-2022 17:44
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011			**Method:M4500 NH3 D**		Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.53**		**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G			**Method:M4500-O G**				Analyst: TH
Oxygen, Dissolved	**10.5**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY			**Method:SM2520**				Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C			**Method:SW9040C**				Analyst: CWG
pH	**4.95**	H	**0.100**	**0.100**	**pH Units**	1	10-Feb-2022 16:58
Temp Deg C @pH	**22.9**	H	**0**	**0**	**DEG C**	1	10-Feb-2022 16:58

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-4
Collection Date: 04-Feb-2022 10:48

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 10-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Acenaphthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Acenaphthylene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Benz(a)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Chrysene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Dibenzofuran	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Fluorene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Naphthalene	**0.014**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 17:31
Phenanthrene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:31
Surr: 2-Fluorobiphenyl	*97.7*			*40-140*	*%REC*	*1*	*22-Feb-2022 17:31*
Surr: 4-Terphenyl-d14	*119*			*40-140*	*%REC*	*1*	*22-Feb-2022 17:31*
Surr: Nitrobenzene-d5	*99.1*			*40-140*	*%REC*	*1*	*22-Feb-2022 17:31*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 21-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	22-Feb-2022 15:57
Arsenic	U		0.000400	0.00200	mg/L	1	22-Feb-2022 15:57
Beryllium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:57
Cadmium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:57
Chromium	U		0.000400	0.00400	mg/L	1	22-Feb-2022 15:57
Cobalt	**0.000294**	J	**0.000200**	**0.00500**	**mg/L**	1	22-Feb-2022 15:57
Copper	U		0.00100	0.00200	mg/L	1	22-Feb-2022 15:57
Lead	U		0.000600	0.00200	mg/L	1	22-Feb-2022 15:57
Molybdenum	U		0.000600	0.00500	mg/L	1	22-Feb-2022 15:57
Nickel	**0.000939**	J	**0.000600**	**0.00200**	**mg/L**	1	22-Feb-2022 15:57
Selenium	U		0.00110	0.00200	mg/L	1	22-Feb-2022 15:57
Silver	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:57
Thallium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:57
Vanadium	U		0.000600	0.00500	mg/L	1	22-Feb-2022 15:57
Zinc	**0.00583**		**0.00200**	**0.00400**	**mg/L**	1	22-Feb-2022 15:57

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-4
Collection Date: 04-Feb-2022 10:48

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A			**Method:SW7470A**		Prep:SW7470A / 14-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	14-Feb-2022 15:12
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)			**Method:Calculation**				Analyst: YP
Nitrogen, Total	**0.74**		**0.10**	**0.50**	**mg/L**	1	23-Feb-2022 11:02
OIL & GREASE (HEM) BY E1664A			**Method:E1664A**				Analyst: KAH
Oil and Grease	U		0.610	2.00	mg/L	1	21-Feb-2022 13:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993			**Method:E300**				Analyst: YP
Nitrate/Nitrite (as N)	**0.187**	J	**0.150**	**1.00**	**mg/L**	5	22-Feb-2022 19:54
PHOSPHORUS BY E365.3-1978			**Method:E365.3**		Prep:E365.3 / 23-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	23-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011			**Method:M2540B**				Analyst: KAH
Residue, Total	**28.0**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011			**Method:M2540C**				Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**14.0**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:14
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011			**Method:M2540D**				Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**9.43**		**2.50**	**2.50**	**mg/L**	1	10-Feb-2022 17:44
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011			**Method:M4500 NH3 D**		Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.55**		**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G			**Method:M4500-O G**				Analyst: TH
Oxygen, Dissolved	**10.8**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY			**Method:SM2520**				Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C			**Method:SW9040C**				Analyst: CWG
pH	**4.45**	H	**0.100**	**0.100**	**pH Units**	1	10-Feb-2022 16:58
Temp Deg C @pH	**22.7**	H	**0**	**0**	**DEG C**	1	10-Feb-2022 16:58

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-6
Collection Date: 04-Feb-2022 08:56

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 10-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Acenaphthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Acenaphthylene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Benz(a)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Chrysene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Dibenzofuran	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Fluorene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Naphthalene	**0.012**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 17:51
Phenanthrene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 17:51
Surr: 2-Fluorobiphenyl	*78.0*			*40-140*	*%REC*	*1*	*22-Feb-2022 17:51*
Surr: 4-Terphenyl-d14	*80.4*			*40-140*	*%REC*	*1*	*22-Feb-2022 17:51*
Surr: Nitrobenzene-d5	*76.6*			*40-140*	*%REC*	*1*	*22-Feb-2022 17:51*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 21-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	22-Feb-2022 15:59
Arsenic	**0.000646**	J	**0.000400**	**0.00200**	**mg/L**	1	22-Feb-2022 15:59
Beryllium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:59
Cadmium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:59
Chromium	**0.000871**	J	**0.000400**	**0.00400**	**mg/L**	1	22-Feb-2022 15:59
Cobalt	**0.000254**	J	**0.000200**	**0.00500**	**mg/L**	1	22-Feb-2022 15:59
Copper	U		0.00100	0.00200	mg/L	1	22-Feb-2022 15:59
Lead	U		0.000600	0.00200	mg/L	1	22-Feb-2022 15:59
Molybdenum	U		0.000600	0.00500	mg/L	1	22-Feb-2022 15:59
Nickel	**0.00103**	J	**0.000600**	**0.00200**	**mg/L**	1	22-Feb-2022 15:59
Selenium	U		0.00110	0.00200	mg/L	1	22-Feb-2022 15:59
Silver	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:59
Thallium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 15:59
Vanadium	**0.000677**	J	**0.000600**	**0.00500**	**mg/L**	1	22-Feb-2022 15:59
Zinc	**0.00549**		**0.00200**	**0.00400**	**mg/L**	1	22-Feb-2022 15:59

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-6
Collection Date: 04-Feb-2022 08:56

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 14-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	14-Feb-2022 15:14
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.78**		**0.10**	**0.50**	**mg/L**	1	23-Feb-2022 11:02
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.66**	J	**0.610**	**2.00**	**mg/L**	1	21-Feb-2022 13:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.188**	J	**0.150**	**1.00**	**mg/L**	5	22-Feb-2022 20:00
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 23-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	23-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**56.0**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**36.0**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:14
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**18.0**		**2.50**	**2.50**	**mg/L**	1	10-Feb-2022 17:44
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.59**		**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.7**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**4.16**	H	**0.100**	**0.100**	**pH Units**	1	10-Feb-2022 16:58
Temp Deg C @pH	**22.2**	H	**0**	**0**	**DEG C**	1	10-Feb-2022 16:58

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-7
Collection Date: 04-Feb-2022 10:15

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-06
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 10-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
2-Methylnaphthalene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Acenaphthene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Acenaphthylene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Benz(a)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Benzo(a)pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Benzo(b)fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Benzo(g,h,i)perylene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Benzo(k)fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Chrysene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Dibenzofuran	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Fluorene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Indeno(1,2,3-cd)pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Naphthalene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Phenanthrene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:12
Surr: 2-Fluorobiphenyl	*81.6*			*40-140*	*%REC*	*1*	*22-Feb-2022 18:12*
Surr: 4-Terphenyl-d14	*117*			*40-140*	*%REC*	*1*	*22-Feb-2022 18:12*
Surr: Nitrobenzene-d5	*74.1*			*40-140*	*%REC*	*1*	*22-Feb-2022 18:12*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 21-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	22-Feb-2022 16:00
Arsenic	**0.000444**	J	**0.000400**	**0.00200**	**mg/L**	1	22-Feb-2022 16:00
Beryllium	**0.000606**	J	**0.000200**	**0.00200**	**mg/L**	1	22-Feb-2022 16:00
Cadmium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 16:00
Chromium	**0.000575**	J	**0.000400**	**0.00400**	**mg/L**	1	22-Feb-2022 16:00
Cobalt	**0.00178**	J	**0.000200**	**0.00500**	**mg/L**	1	22-Feb-2022 16:00
Copper	U		0.00100	0.00200	mg/L	1	22-Feb-2022 16:00
Lead	U		0.000600	0.00200	mg/L	1	22-Feb-2022 16:00
Molybdenum	U		0.000600	0.00500	mg/L	1	22-Feb-2022 16:00
Nickel	**0.00481**		**0.000600**	**0.00200**	**mg/L**	1	22-Feb-2022 16:00
Selenium	U		0.00110	0.00200	mg/L	1	22-Feb-2022 16:00
Silver	U		0.000200	0.00200	mg/L	1	22-Feb-2022 16:00
Thallium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 16:00
Vanadium	U		0.000600	0.00500	mg/L	1	22-Feb-2022 16:00
Zinc	**0.0400**		**0.00200**	**0.00400**	**mg/L**	1	22-Feb-2022 16:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-7
Collection Date: 04-Feb-2022 10:15

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-06
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A			**Method:SW7470A**		Prep:SW7470A / 14-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	14-Feb-2022 15:16
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)			**Method:Calculation**				Analyst: YP
Nitrogen, Total	**1.2**		**0.10**	**0.50**	**mg/L**	1	23-Feb-2022 11:02
OIL & GREASE (HEM) BY E1664A			**Method:E1664A**				Analyst: KAH
Oil and Grease	**2.10**		**0.610**	**2.00**	**mg/L**	1	21-Feb-2022 13:25
NITRATE/NITRITE BY E300.0, REV 2.1, 1993			**Method:E300**				Analyst: YP
Nitrate/Nitrite (as N)	**0.360**	J	**0.150**	**1.00**	**mg/L**	5	22-Feb-2022 20:05
PHOSPHORUS BY E365.3-1978			**Method:E365.3**		Prep:E365.3 / 23-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.266**		**0.0200**	**0.0500**	**mg/L**	1	23-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011			**Method:M2540B**				Analyst: KAH
Residue, Total	**114**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011			**Method:M2540C**				Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**116**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:14
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011			**Method:M2540D**				Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**47.5**		**2.50**	**2.50**	**mg/L**	1	10-Feb-2022 17:44
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011			**Method:M4500 NH3 D**		Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.87**		**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G			**Method:M4500-O G**				Analyst: TH
Oxygen, Dissolved	**10.2**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY			**Method:SM2520**				Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C			**Method:SW9040C**				Analyst: CWG
pH	**3.09**	H	**0.100**	**0.100**	**pH Units**	1	10-Feb-2022 16:58
Temp Deg C @pH	**22.5**	H	**0**	**0**	**DEG C**	1	10-Feb-2022 16:58

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-8
Collection Date: 04-Feb-2022 10:00

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-07
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 10-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
2-Methylnaphthalene	**0.011**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 18:32
Acenaphthene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Acenaphthylene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Benz(a)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Benzo(a)pyrene	**0.012**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 18:32
Benzo(b)fluoranthene	**0.011**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 18:32
Benzo(g,h,i)perylene	**0.015**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 18:32
Benzo(k)fluoranthene	**0.016**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 18:32
Chrysene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Dibenz(a,h)anthracene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Dibenzofuran	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Fluoranthene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Fluorene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Indeno(1,2,3-cd)pyrene	**0.011**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 18:32
Naphthalene	**0.020**		**0.010**	**0.010**	**ug/L**	1	22-Feb-2022 18:32
Phenanthrene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Pyrene	U		0.010	0.010	ug/L	1	22-Feb-2022 18:32
Surr: 2-Fluorobiphenyl	*84.4*			*40-140*	*%REC*	*1*	*22-Feb-2022 18:32*
Surr: 4-Terphenyl-d14	*117*			*40-140*	*%REC*	*1*	*22-Feb-2022 18:32*
Surr: Nitrobenzene-d5	*65.1*			*40-140*	*%REC*	*1*	*22-Feb-2022 18:32*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 21-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	22-Feb-2022 16:02
Arsenic	**0.00188**	J	**0.000400**	**0.00200**	**mg/L**	1	22-Feb-2022 16:02
Beryllium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 16:02
Cadmium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 16:02
Chromium	**0.000560**	J	**0.000400**	**0.00400**	**mg/L**	1	22-Feb-2022 16:02
Cobalt	**0.000519**	J	**0.000200**	**0.00500**	**mg/L**	1	22-Feb-2022 16:02
Copper	U		0.00100	0.00200	mg/L	1	22-Feb-2022 16:02
Lead	U		0.000600	0.00200	mg/L	1	22-Feb-2022 16:02
Molybdenum	U		0.000600	0.00500	mg/L	1	22-Feb-2022 16:02
Nickel	**0.00171**	J	**0.000600**	**0.00200**	**mg/L**	1	22-Feb-2022 16:02
Selenium	U		0.00110	0.00200	mg/L	1	22-Feb-2022 16:02
Silver	U		0.000200	0.00200	mg/L	1	22-Feb-2022 16:02
Thallium	U		0.000200	0.00200	mg/L	1	22-Feb-2022 16:02
Vanadium	U		0.000600	0.00500	mg/L	1	22-Feb-2022 16:02
Zinc	**0.0185**		**0.00200**	**0.00400**	**mg/L**	1	22-Feb-2022 16:02

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
Sample ID: SW-8
Collection Date: 04-Feb-2022 10:00

ANALYTICAL REPORT
WorkOrder:HS22020425
Lab ID:HS22020425-07
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 14-Feb-2022		Analyst: MSC
Mercury	**0.0000420**	J	**0.0000300**	**0.000200**	**mg/L**	1	14-Feb-2022 15:17
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**3.0**		**0.10**	**0.50**	**mg/L**	1	23-Feb-2022 11:02
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**5.86**		**0.610**	**2.00**	**mg/L**	1	23-Feb-2022 13:50
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.194**	J	**0.150**	**1.00**	**mg/L**	5	22-Feb-2022 20:31
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 23-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	23-Feb-2022 15:30
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: KAH
Residue, Total	**182**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:00
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**104**		**5.00**	**10.0**	**mg/L**	1	11-Feb-2022 14:14
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**22.0**		**2.50**	**2.50**	**mg/L**	1	10-Feb-2022 17:44
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**2.8**		**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**10.3**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**6.38**	H	**0.100**	**0.100**	**pH Units**	1	10-Feb-2022 16:58
Temp Deg C @pH	**22.6**	H	**0**	**0**	**DEG C**	1	10-Feb-2022 16:58

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

Batch ID: 175230 **Start Date:** 10 Feb 2022 07:57 **End Date:** 10 Feb 2022 14:00
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020425-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020425-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020425-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020425-04	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020425-05	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020425-06	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020425-07	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 175281 **Start Date:** 11 Feb 2022 07:30 **End Date:** 11 Feb 2022 10:30
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020425-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-03		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 175334 **Start Date:** 14 Feb 2022 10:30 **End Date:** 14 Feb 2022 13:30
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020425-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-05		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-06		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-07		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 175533 **Start Date:** 17 Feb 2022 10:30 **End Date:** 17 Feb 2022 14:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020425-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020425-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020425-03		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020425-04		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020425-05		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020425-06		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020425-07		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

Batch ID: 175574 **Start Date:** 21 Feb 2022 09:30 **End Date:** 21 Feb 2022 13:30
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020425-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-05		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-06		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020425-07		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 175697 **Start Date:** 23 Feb 2022 10:00 **End Date:** 23 Feb 2022 12:00
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020425-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020425-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020425-03		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020425-04		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020425-05		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020425-06		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020425-07		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 175230 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56		10 Feb 2022 07:57	22 Feb 2022 14:04	1
HS22020425-02	SW-2	04 Feb 2022 12:33		10 Feb 2022 07:57	22 Feb 2022 16:51	1
HS22020425-03	SW-3	04 Feb 2022 11:37		10 Feb 2022 07:57	22 Feb 2022 17:11	1
HS22020425-04	SW-4	04 Feb 2022 10:48		10 Feb 2022 07:57	22 Feb 2022 17:31	1
HS22020425-05	SW-6	04 Feb 2022 08:56		10 Feb 2022 07:57	22 Feb 2022 17:51	1
HS22020425-06	SW-7	04 Feb 2022 10:15		10 Feb 2022 07:57	22 Feb 2022 18:12	1
HS22020425-07	SW-8	04 Feb 2022 10:00		10 Feb 2022 07:57	22 Feb 2022 18:32	1
Batch ID: 175281 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56		11 Feb 2022 07:30	11 Feb 2022 13:09	1
HS22020425-02	SW-2	04 Feb 2022 12:33		11 Feb 2022 07:30	11 Feb 2022 13:11	1
HS22020425-03	SW-3	04 Feb 2022 11:37		11 Feb 2022 07:30	11 Feb 2022 13:12	1
Batch ID: 175334 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22020425-04	SW-4	04 Feb 2022 10:48		14 Feb 2022 10:30	14 Feb 2022 15:12	1
HS22020425-05	SW-6	04 Feb 2022 08:56		14 Feb 2022 10:30	14 Feb 2022 15:14	1
HS22020425-06	SW-7	04 Feb 2022 10:15		14 Feb 2022 10:30	14 Feb 2022 15:16	1
HS22020425-07	SW-8	04 Feb 2022 10:00		14 Feb 2022 10:30	14 Feb 2022 15:17	1
Batch ID: 175533 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020425-02	SW-2	04 Feb 2022 12:33		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020425-03	SW-3	04 Feb 2022 11:37		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020425-04	SW-4	04 Feb 2022 10:48		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020425-05	SW-6	04 Feb 2022 08:56		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020425-06	SW-7	04 Feb 2022 10:15		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020425-07	SW-8	04 Feb 2022 10:00		17 Feb 2022 10:30	18 Feb 2022 15:30	1
Batch ID: 175574 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56		21 Feb 2022 13:30	22 Feb 2022 15:37	1
HS22020425-02	SW-2	04 Feb 2022 12:33		21 Feb 2022 13:30	22 Feb 2022 15:39	1
HS22020425-03	SW-3	04 Feb 2022 11:37		21 Feb 2022 13:30	22 Feb 2022 15:41	1
HS22020425-04	SW-4	04 Feb 2022 10:48		21 Feb 2022 13:30	22 Feb 2022 15:57	1
HS22020425-05	SW-6	04 Feb 2022 08:56		21 Feb 2022 13:30	22 Feb 2022 15:59	1
HS22020425-06	SW-7	04 Feb 2022 10:15		21 Feb 2022 13:30	22 Feb 2022 16:00	1
HS22020425-07	SW-8	04 Feb 2022 10:00		21 Feb 2022 13:30	22 Feb 2022 16:02	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 175697 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56		23 Feb 2022 10:00	23 Feb 2022 15:30	1
HS22020425-02	SW-2	04 Feb 2022 12:33		23 Feb 2022 10:00	23 Feb 2022 15:30	1
HS22020425-03	SW-3	04 Feb 2022 11:37		23 Feb 2022 10:00	23 Feb 2022 15:30	1
HS22020425-04	SW-4	04 Feb 2022 10:48		23 Feb 2022 10:00	23 Feb 2022 15:30	1
HS22020425-05	SW-6	04 Feb 2022 08:56		23 Feb 2022 10:00	23 Feb 2022 15:30	1
HS22020425-06	SW-7	04 Feb 2022 10:15		23 Feb 2022 10:00	23 Feb 2022 15:30	1
HS22020425-07	SW-8	04 Feb 2022 10:00		23 Feb 2022 10:00	23 Feb 2022 15:30	1
Batch ID: R402027 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56			10 Feb 2022 16:58	1
HS22020425-02	SW-2	04 Feb 2022 12:33			10 Feb 2022 16:58	1
HS22020425-03	SW-3	04 Feb 2022 11:37			10 Feb 2022 16:58	1
HS22020425-04	SW-4	04 Feb 2022 10:48			10 Feb 2022 16:58	1
HS22020425-05	SW-6	04 Feb 2022 08:56			10 Feb 2022 16:58	1
HS22020425-06	SW-7	04 Feb 2022 10:15			10 Feb 2022 16:58	1
HS22020425-07	SW-8	04 Feb 2022 10:00			10 Feb 2022 16:58	1
Batch ID: R402032 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56			10 Feb 2022 17:44	1
HS22020425-02	SW-2	04 Feb 2022 12:33			10 Feb 2022 17:44	1
HS22020425-03	SW-3	04 Feb 2022 11:37			10 Feb 2022 17:44	1
HS22020425-04	SW-4	04 Feb 2022 10:48			10 Feb 2022 17:44	1
HS22020425-05	SW-6	04 Feb 2022 08:56			10 Feb 2022 17:44	1
HS22020425-06	SW-7	04 Feb 2022 10:15			10 Feb 2022 17:44	1
HS22020425-07	SW-8	04 Feb 2022 10:00			10 Feb 2022 17:44	1
Batch ID: R402085 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56			10 Feb 2022 14:22	1
Batch ID: R402127 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22020425-02	SW-2	04 Feb 2022 12:33			11 Feb 2022 14:14	1
HS22020425-03	SW-3	04 Feb 2022 11:37			11 Feb 2022 14:14	1
HS22020425-04	SW-4	04 Feb 2022 10:48			11 Feb 2022 14:14	1
HS22020425-05	SW-6	04 Feb 2022 08:56			11 Feb 2022 14:14	1
HS22020425-06	SW-7	04 Feb 2022 10:15			11 Feb 2022 14:14	1
HS22020425-07	SW-8	04 Feb 2022 10:00			11 Feb 2022 14:14	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R402435 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56			17 Feb 2022 11:55	1
HS22020425-02	SW-2	04 Feb 2022 12:33			17 Feb 2022 11:55	1
HS22020425-03	SW-3	04 Feb 2022 11:37			17 Feb 2022 11:55	1
HS22020425-04	SW-4	04 Feb 2022 10:48			17 Feb 2022 11:55	1
HS22020425-05	SW-6	04 Feb 2022 08:56			17 Feb 2022 11:55	1
HS22020425-06	SW-7	04 Feb 2022 10:15			17 Feb 2022 11:55	1
HS22020425-07	SW-8	04 Feb 2022 10:00			17 Feb 2022 11:55	1
Batch ID: R402458 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56			11 Feb 2022 14:00	1
HS22020425-02	SW-2	04 Feb 2022 12:33			11 Feb 2022 14:00	1
HS22020425-03	SW-3	04 Feb 2022 11:37			11 Feb 2022 14:00	1
HS22020425-04	SW-4	04 Feb 2022 10:48			11 Feb 2022 14:00	1
HS22020425-05	SW-6	04 Feb 2022 08:56			11 Feb 2022 14:00	1
HS22020425-06	SW-7	04 Feb 2022 10:15			11 Feb 2022 14:00	1
HS22020425-07	SW-8	04 Feb 2022 10:00			11 Feb 2022 14:00	1
Batch ID: R402654 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56			21 Feb 2022 13:28	1
HS22020425-02	SW-2	04 Feb 2022 12:33			21 Feb 2022 13:28	1
HS22020425-03	SW-3	04 Feb 2022 11:37			21 Feb 2022 13:28	1
HS22020425-04	SW-4	04 Feb 2022 10:48			21 Feb 2022 13:28	1
HS22020425-05	SW-6	04 Feb 2022 08:56			21 Feb 2022 13:28	1
HS22020425-06	SW-7	04 Feb 2022 10:15			21 Feb 2022 13:28	1
HS22020425-07	SW-8	04 Feb 2022 10:00			21 Feb 2022 13:28	1
Batch ID: R402659 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56			21 Feb 2022 13:25	1
HS22020425-02	SW-2	04 Feb 2022 12:33			21 Feb 2022 13:25	1
HS22020425-03	SW-3	04 Feb 2022 11:37			21 Feb 2022 13:25	1
HS22020425-04	SW-4	04 Feb 2022 10:48			21 Feb 2022 13:25	1
HS22020425-05	SW-6	04 Feb 2022 08:56			21 Feb 2022 13:25	1
HS22020425-06	SW-7	04 Feb 2022 10:15			21 Feb 2022 13:25	1
Batch ID: R402799 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56			22 Feb 2022 19:28	5
HS22020425-02	SW-2	04 Feb 2022 12:33			22 Feb 2022 19:44	5
HS22020425-03	SW-3	04 Feb 2022 11:37			22 Feb 2022 19:49	5
HS22020425-04	SW-4	04 Feb 2022 10:48			22 Feb 2022 19:54	5
HS22020425-05	SW-6	04 Feb 2022 08:56			22 Feb 2022 20:00	5
HS22020425-06	SW-7	04 Feb 2022 10:15			22 Feb 2022 20:05	5
HS22020425-07	SW-8	04 Feb 2022 10:00			22 Feb 2022 20:31	5

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R402829 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22020425-01	SW-9	04 Feb 2022 06:56			23 Feb 2022 11:02	1
HS22020425-02	SW-2	04 Feb 2022 12:33			23 Feb 2022 11:02	1
HS22020425-03	SW-3	04 Feb 2022 11:37			23 Feb 2022 11:02	1
HS22020425-04	SW-4	04 Feb 2022 10:48			23 Feb 2022 11:02	1
HS22020425-05	SW-6	04 Feb 2022 08:56			23 Feb 2022 11:02	1
HS22020425-06	SW-7	04 Feb 2022 10:15			23 Feb 2022 11:02	1
HS22020425-07	SW-8	04 Feb 2022 10:00			23 Feb 2022 11:02	1
Batch ID: R402867 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22020425-07	SW-8	04 Feb 2022 10:00			23 Feb 2022 13:50	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175281 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-175281** Units: **mg/L** Analysis Date: **11-Feb-2022 12:25**
Client ID: Run ID: **HG03_402072** SeqNo: **6499261** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U		0.000200								

LCS Sample ID: **LCS-175281** Units: **mg/L** Analysis Date: **11-Feb-2022 12:32**
Client ID: Run ID: **HG03_402072** SeqNo: **6499264** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00498		0.000200	0.005	0	99.6	80 - 120				

MS Sample ID: **HS22020458-05MS** Units: **mg/L** Analysis Date: **11-Feb-2022 12:41**
Client ID: Run ID: **HG03_402072** SeqNo: **6499266** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00495		0.000200	0.005	-0.000002	99.0	75 - 125				

MSD Sample ID: **HS22020458-05MSD** Units: **mg/L** Analysis Date: **11-Feb-2022 12:43**
Client ID: Run ID: **HG03_402072** SeqNo: **6499267** PrepDate: **11-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00494		0.000200	0.005	-0.000002	98.8	75 - 125	0.00495	0.202	20	

The following samples were analyzed in this batch: HS22020425-01 HS22020425-02 HS22020425-03

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175334 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-175334** Units: **mg/L** Analysis Date: **14-Feb-2022 14:57**
Client ID: Run ID: **HG03_402203** SeqNo: **6501795** PrepDate: **14-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U		0.000200								

LCS Sample ID: **LCS-175334** Units: **mg/L** Analysis Date: **14-Feb-2022 15:00**
Client ID: Run ID: **HG03_402203** SeqNo: **6501796** PrepDate: **14-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00454		0.000200	0.005	0	90.8	80 - 120				

MS Sample ID: **HS22020597-01MS** Units: **mg/L** Analysis Date: **14-Feb-2022 15:03**
Client ID: Run ID: **HG03_402203** SeqNo: **6501798** PrepDate: **14-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00497		0.000200	0.005	-0.000014	99.7	75 - 125				

MSD Sample ID: **HS22020597-01MSD** Units: **mg/L** Analysis Date: **14-Feb-2022 15:09**
Client ID: Run ID: **HG03_402203** SeqNo: **6501878** PrepDate: **14-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00477		0.000200	0.005	0	95.4	75 - 125	0.00497	4.11	20	

The following samples were analyzed in this batch: HS22020425-04 HS22020425-05 HS22020425-06 HS22020425-07

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175574 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-175574** Units: **mg/L** Analysis Date: **22-Feb-2022 15:03**
Client ID: Run ID: **ICPMS06_402757** SeqNo: **6514340** PrepDate: **21-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175574 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-175574** Units: **mg/L** Analysis Date: **22-Feb-2022 15:05**
Client ID: Run ID: **ICPMS06_402757** SeqNo: **6514341** PrepDate: **21-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04777	0.00200	0.05	0	95.5	80 - 120				
Arsenic	0.0479	0.00200	0.05	0	95.8	80 - 120				
Beryllium	0.04618	0.00200	0.05	0	92.4	80 - 120				
Cadmium	0.04841	0.00200	0.05	0	96.8	80 - 120				
Chromium	0.04772	0.00400	0.05	0	95.4	80 - 120				
Cobalt	0.04735	0.00500	0.05	0	94.7	80 - 120				
Copper	0.04987	0.00200	0.05	0	99.7	80 - 120				
Lead	0.04591	0.00200	0.05	0	91.8	80 - 120				
Molybdenum	0.04626	0.00500	0.05	0	92.5	80 - 120				
Nickel	0.04884	0.00200	0.05	0	97.7	80 - 120				
Selenium	0.05052	0.00200	0.05	0	101	80 - 120				
Silver	0.04732	0.00200	0.05	0	94.6	80 - 120				
Thallium	0.04627	0.00200	0.05	0	92.5	80 - 120				
Vanadium	0.04628	0.00500	0.05	0	92.6	80 - 120				
Zinc	0.052	0.00400	0.05	0	104	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175574 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22020880-17MS** Units: **mg/L** Analysis Date: **22-Feb-2022 15:29**
Client ID: Run ID: **ICPMS06_402757** SeqNo: **6514346** PrepDate: **21-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04812	0.00200	0.05	0.000006	96.2	80 - 120				
Arsenic	0.04797	0.00200	0.05	0	95.9	80 - 120				
Beryllium	0.04597	0.00200	0.05	0.000004	91.9	80 - 120				
Cadmium	0.0499	0.00200	0.05	0.000015	99.8	80 - 120				
Chromium	0.04763	0.00400	0.05	-0.000191	95.6	80 - 120				
Cobalt	0.04734	0.00500	0.05	0.000039	94.6	80 - 120				
Copper	3.503	0.00200	0.05	3.527	-47.6	80 - 120				SEO
Lead	0.04838	0.00200	0.05	0.000032	96.7	80 - 120				
Molybdenum	0.04727	0.00500	0.05	0.000058	94.4	80 - 120				
Nickel	0.04916	0.00200	0.05	0.000308	97.7	80 - 120				
Selenium	0.04924	0.00200	0.05	0.000131	98.2	80 - 120				
Silver	0.04809	0.00200	0.05	0.000001	96.2	80 - 120				
Thallium	0.04931	0.00200	0.05	0.000013	98.6	80 - 120				
Vanadium	0.04638	0.00500	0.05	-0.000141	93.0	80 - 120				
Zinc	0.0521	0.00400	0.05	0.002084	100	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175574 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22020880-17MSD** Units: **mg/L** Analysis Date: **22-Feb-2022 15:31**
Client ID: Run ID: **ICPMS06_402757** SeqNo: **6514347** PrepDate: **21-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.04956	0.00200	0.05	0.000006	99.1	80 - 120	0.04812	2.96	20	
Arsenic	0.04923	0.00200	0.05	0	98.5	80 - 120	0.04797	2.59	20	
Beryllium	0.04714	0.00200	0.05	0.000004	94.3	80 - 120	0.04597	2.51	20	
Cadmium	0.0507	0.00200	0.05	0.000015	101	80 - 120	0.0499	1.6	20	
Chromium	0.04862	0.00400	0.05	-0.000191	97.6	80 - 120	0.04763	2.05	20	
Cobalt	0.04854	0.00500	0.05	0.000039	97.0	80 - 120	0.04734	2.5	20	
Copper	3.575	0.00200	0.05	3.527	96.4	80 - 120	3.503	2.03	20	EO
Lead	0.04894	0.00200	0.05	0.000032	97.8	80 - 120	0.04838	1.14	20	
Molybdenum	0.04821	0.00500	0.05	0.000058	96.3	80 - 120	0.04727	1.98	20	
Nickel	0.04954	0.00200	0.05	0.000308	98.5	80 - 120	0.04916	0.778	20	
Selenium	0.05067	0.00200	0.05	0.000131	101	80 - 120	0.04924	2.88	20	
Silver	0.04905	0.00200	0.05	0.000001	98.1	80 - 120	0.04809	1.97	20	
Thallium	0.05058	0.00200	0.05	0.000013	101	80 - 120	0.04931	2.54	20	
Vanadium	0.04723	0.00500	0.05	-0.000141	94.8	80 - 120	0.04638	1.83	20	
Zinc	0.05311	0.00400	0.05	0.002084	102	80 - 120	0.0521	1.93	20	

PDS Sample ID: **HS22020880-17PDS** Units: **mg/L** Analysis Date: **22-Feb-2022 15:33**
Client ID: Run ID: **ICPMS06_402757** SeqNo: **6514348** PrepDate: **21-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09326	0.00200	0.1	0.000006	93.3	75 - 125				
Arsenic	0.09787	0.00200	0.1	0	97.9	75 - 125				
Beryllium	0.09608	0.00200	0.1	0.000004	96.1	75 - 125				
Cadmium	0.09986	0.00200	0.1	0.000015	99.8	75 - 125				
Chromium	0.09856	0.00400	0.1	-0.000191	98.8	75 - 125				
Cobalt	0.0971	0.00500	0.1	0.000039	97.1	75 - 125				
Lead	0.09899	0.00200	0.1	0.000032	99.0	75 - 125				
Molybdenum	0.09617	0.00500	0.1	0.000058	96.1	75 - 125				
Nickel	0.09954	0.00200	0.1	0.000308	99.2	75 - 125				
Selenium	0.1007	0.00200	0.1	0.000131	101	75 - 125				
Silver	0.09699	0.00200	0.1	0.000001	97.0	75 - 125				
Thallium	0.1005	0.00200	0.1	0.000013	100	75 - 125				
Vanadium	0.09583	0.00500	0.1	-0.000141	96.0	75 - 125				
Zinc	0.1051	0.00400	0.1	0.002084	103	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175574 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

PDS Sample ID: **HS22020880-17PDS** Units: **mg/L** Analysis Date: **22-Feb-2022 16:44**
Client ID: Run ID: **ICPMS06_402757** SeqNo: **6514501** PrepDate: **21-Feb-2022** DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Copper	4.79	0.0400	1	3.683	111	75 - 125				

SD Sample ID: **HS22020880-17SD** Units: **mg/L** Analysis Date: **22-Feb-2022 15:27**
Client ID: Run ID: **ICPMS06_402757** SeqNo: **6514345** PrepDate: **21-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000006	0	10	
Arsenic	U	0.0100					0	0	10	
Beryllium	U	0.0100					0.000004	0	10	
Cadmium	U	0.0100					0.000015	0	10	
Chromium	U	0.0200					-0.000191	0	10	
Cobalt	U	0.0250					0.000039	0	10	
Lead	U	0.0100					0.000032	0	10	
Molybdenum	U	0.0250					0.000058	0	10	
Nickel	U	0.0100					0.000308	0	10	
Selenium	U	0.0100					0.000131	0	10	
Silver	U	0.0100					0.000001	0	10	
Thallium	U	0.0100					0.000013	0	10	
Vanadium	U	0.0250					-0.000141	0	10	
Zinc	U	0.0200					0.002084	0	10	

SD Sample ID: **HS22020880-17SD** Units: **mg/L** Analysis Date: **22-Feb-2022 16:42**
Client ID: Run ID: **ICPMS06_402757** SeqNo: **6514500** PrepDate: **21-Feb-2022** DF: **100**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Copper	3.667	0.200					3.683	0.448	10	

The following samples were analyzed in this batch: HS22020425-01 HS22020425-02 HS22020425-03 HS22020425-04 HS22020425-05 HS22020425-06 HS22020425-07

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175230 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-175230** Units: **ug/L** Analysis Date: **11-Feb-2022 15:46**
Client ID: Run ID: **SV-6_402091** SeqNo: **6516502** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.06461*	*0*	*0.08*	*0*	*80.8*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.1081*	*0*	*0.08*	*0*	*135*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.06135*	*0*	*0.08*	*0*	*76.7*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175230 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-175230** Units: **ug/L** Analysis Date: **11-Feb-2022 16:07**
Client ID: Run ID: **SV-6_402091** SeqNo: **6516503** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.07194	0.010	0.08	0	89.9	40 - 140				
2-Methylnaphthalene	0.05785	0.010	0.08	0	72.3	40 - 140				
Acenaphthene	0.04005	0.010	0.08	0	50.1	40 - 140				
Acenaphthylene	0.05731	0.010	0.08	0	71.6	40 - 140				
Anthracene	0.07555	0.010	0.08	0	94.4	40 - 140				
Benz(a)anthracene	0.0456	0.010	0.08	0	57.0	40 - 140				
Benzo(a)pyrene	0.07701	0.010	0.08	0	96.3	40 - 140				
Benzo(b)fluoranthene	0.05649	0.010	0.08	0	70.6	40 - 140				
Benzo(g,h,i)perylene	0.07293	0.010	0.08	0	91.2	40 - 140				
Benzo(k)fluoranthene	0.07805	0.010	0.08	0	97.6	40 - 140				
Chrysene	0.05649	0.010	0.08	0	70.6	40 - 140				
Dibenz(a,h)anthracene	0.06499	0.010	0.08	0	81.2	40 - 140				
Dibenzofuran	0.05975	0.010	0.08	0	74.7	40 - 140				
Fluoranthene	0.07636	0.010	0.08	0	95.4	40 - 140				
Fluorene	0.05558	0.010	0.08	0	69.5	40 - 140				
Indeno(1,2,3-cd)pyrene	0.08768	0.010	0.08	0	110	40 - 140				
Naphthalene	0.08814	0.010	0.08	0	110	40 - 140				
Phenanthrene	0.04426	0.010	0.08	0	55.3	40 - 140				
Pyrene	0.05469	0.010	0.08	0	68.4	40 - 140				
Surr: 2-Fluorobiphenyl	*0.05592*	*0*	*0.08*	*0*	*69.9*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.1007*	*0*	*0.08*	*0*	*126*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.0728*	*0*	*0.08*	*0*	*91.0*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175230 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-175230** Units: **ug/L** Analysis Date: **11-Feb-2022 16:27**
Client ID: Run ID: **SV-6_402091** SeqNo: **6516504** PrepDate: **10-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.07139	0.010	0.08	0	89.2	40 - 140	0.07194	0.776	20	
2-Methylnaphthalene	0.0428	0.010	0.08	0	53.5	40 - 140	0.05785	29.9	20	R
Acenaphthene	0.04166	0.010	0.08	0	52.1	40 - 140	0.04005	3.95	20	
Acenaphthylene	0.06352	0.010	0.08	0	79.4	40 - 140	0.05731	10.3	20	
Anthracene	0.0826	0.010	0.08	0	103	40 - 140	0.07555	8.91	20	
Benz(a)anthracene	0.06535	0.010	0.08	0	81.7	40 - 140	0.0456	35.6	20	R
Benzo(a)pyrene	0.07117	0.010	0.08	0	89.0	40 - 140	0.07701	7.88	20	
Benzo(b)fluoranthene	0.09453	0.010	0.08	0	118	40 - 140	0.05649	50.4	20	R
Benzo(g,h,i)perylene	0.07101	0.010	0.08	0	88.8	40 - 140	0.07293	2.67	20	
Benzo(k)fluoranthene	0.0851	0.010	0.08	0	106	40 - 140	0.07805	8.64	20	
Chrysene	0.06505	0.010	0.08	0	81.3	40 - 140	0.05649	14.1	20	
Dibenz(a,h)anthracene	0.06257	0.010	0.08	0	78.2	40 - 140	0.06499	3.79	20	
Dibenzofuran	0.05865	0.010	0.08	0	73.3	40 - 140	0.05975	1.87	20	
Fluoranthene	0.09092	0.010	0.08	0	114	40 - 140	0.07636	17.4	20	
Fluorene	0.06261	0.010	0.08	0	78.3	40 - 140	0.05558	11.9	20	
Indeno(1,2,3-cd)pyrene	0.0885	0.010	0.08	0	111	40 - 140	0.08768	0.935	20	
Naphthalene	0.08669	0.010	0.08	0	108	40 - 140	0.08814	1.67	20	
Phenanthrene	0.05991	0.010	0.08	0	74.9	40 - 140	0.04426	30	20	R
Pyrene	0.05764	0.010	0.08	0	72.1	40 - 140	0.05469	5.26	20	
Surr: 2-Fluorobiphenyl	*0.07336*	*0*	*0.08*	*0*	*91.7*	*40 - 140*	*0.05592*	*27*	*20*	R
Surr: 4-Terphenyl-d14	*0.1002*	*0*	*0.08*	*0*	*125*	*40 - 140*	*0.1007*	*0.522*	*20*	
Surr: Nitrobenzene-d5	*0.07174*	*0*	*0.08*	*0*	*89.7*	*40 - 140*	*0.0728*	*1.47*	*20*	

The following samples were analyzed in this batch: HS22020425-01 HS22020425-02 HS22020425-03 HS22020425-04 HS22020425-05 HS22020425-06 HS22020425-07

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175533 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-175533** Units: **mg/L** Analysis Date: **18-Feb-2022 15:30**
Client ID: Run ID: **WetChem_HS_402570** SeqNo: **6509903** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-175533** Units: **mg/L** Analysis Date: **18-Feb-2022 15:30**
Client ID: Run ID: **WetChem_HS_402570** SeqNo: **6509902** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	22.57	0.50	20	0	113	85 - 115				

MS Sample ID: **HS22020425-02MS** Units: **mg/L** Analysis Date: **18-Feb-2022 15:30**
Client ID: **SW-2** Run ID: **WetChem_HS_402570** SeqNo: **6509900** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.34	0.50	20	0.32	95.1	75 - 125				

MSD Sample ID: **HS22020425-02MSD** Units: **mg/L** Analysis Date: **18-Feb-2022 15:30**
Client ID: **SW-2** Run ID: **WetChem_HS_402570** SeqNo: **6509901** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	18.86	0.50	20	0.32	92.7	75 - 125	19.34	2.51	20	

The following samples were analyzed in this batch:

HS22020425-01	HS22020425-02	HS22020425-03	HS22020425-04
HS22020425-05	HS22020425-06	HS22020425-07	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: 175697 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-175697** Units: **mg/L** Analysis Date: **23-Feb-2022 15:30**
Client ID: Run ID: **UV-2450_402873** SeqNo: **6516890** PrepDate: **23-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-175697** Units: **mg/L** Analysis Date: **23-Feb-2022 15:30**
Client ID: Run ID: **UV-2450_402873** SeqNo: **6516889** PrepDate: **23-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.219	0.0500	0.25	0	87.6	80 - 120				

MS Sample ID: **HS22020873-01MS** Units: **mg/L** Analysis Date: **23-Feb-2022 15:30**
Client ID: Run ID: **UV-2450_402873** SeqNo: **6516887** PrepDate: **23-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.278	0.0500	0.25	0.03	99.2	80 - 120				

MSD Sample ID: **HS22020873-01MSD** Units: **mg/L** Analysis Date: **23-Feb-2022 15:30**
Client ID: Run ID: **UV-2450_402873** SeqNo: **6516888** PrepDate: **23-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.259	0.0500	0.25	0.03	91.6	80 - 120	0.278	7.08	20	

The following samples were analyzed in this batch:

HS22020425-01	HS22020425-02	HS22020425-03	HS22020425-04
HS22020425-05	HS22020425-06	HS22020425-07	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: **R402027 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS22020425-01DUP** Units: **pH Units** Analysis Date: **10-Feb-2022 16:58**
Client ID: **SW-9** Run ID: **WetChem_HS_402027** SeqNo: **6498112** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	3.82	0.100					3.92	2.58	10	
Temp Deg C @pH	22.3	0					22.3	0	10	

The following samples were analyzed in this batch: HS22020425-01 HS22020425-02 HS22020425-03 HS22020425-04 HS22020425-05 HS22020425-06 HS22020425-07

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: R402032 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-021022** Units: **mg/L** Analysis Date: **10-Feb-2022 17:44**
Client ID: Run ID: **Balance1_402032** SeqNo: **6498171** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-021022** Units: **mg/L** Analysis Date: **10-Feb-2022 17:44**
Client ID: Run ID: **Balance1_402032** SeqNo: **6498172** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	88	2.50	100	0	88.0	85 - 115				

DUP Sample ID: **HS22020276-01DUP** Units: **mg/L** Analysis Date: **10-Feb-2022 17:44**
Client ID: Run ID: **Balance1_402032** SeqNo: **6498163** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	42.94	2.50					41.76	2.78	5	

DUP Sample ID: **HS22020251-01DUP** Units: **mg/L** Analysis Date: **10-Feb-2022 17:44**
Client ID: Run ID: **Balance1_402032** SeqNo: **6498156** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	22.5	2.50					21.5	4.55	5	

The following samples were analyzed in this batch:

HS22020425-01	HS22020425-02	HS22020425-03	HS22020425-04
HS22020425-05	HS22020425-06	HS22020425-07	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: R402085 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-021022** Units: **mg/L** Analysis Date: **10-Feb-2022 14:22**
Client ID: Run ID: **Balance1_402085** SeqNo: **6499477** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-021022** Units: **mg/L** Analysis Date: **10-Feb-2022 14:22**
Client ID: Run ID: **Balance1_402085** SeqNo: **6499478** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1086	10.0	1000	0	109	85 - 115				

DUP Sample ID: **HS22020425-01DUP** Units: **mg/L** Analysis Date: **10-Feb-2022 14:22**
Client ID: **SW-9** Run ID: **Balance1_402085** SeqNo: **6499476** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	28	10.0					28	0	5	

The following samples were analyzed in this batch: HS22020425-01

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: R402127 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-021122** Units: **mg/L** Analysis Date: **11-Feb-2022 14:14**
Client ID: Run ID: **Balance1_402127** SeqNo: **6500417** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-021122** Units: **mg/L** Analysis Date: **11-Feb-2022 14:14**
Client ID: Run ID: **Balance1_402127** SeqNo: **6500418** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1062	10.0	1000	0	106	85 - 115				

DUP Sample ID: **HS22020425-07DUP** Units: **mg/L** Analysis Date: **11-Feb-2022 14:14**
Client ID: **SW-8** Run ID: **Balance1_402127** SeqNo: **6500416** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	104	10.0					104	0	5	

The following samples were analyzed in this batch: HS22020425-02 HS22020425-03 HS22020425-04 HS22020425-05 HS22020425-06 HS22020425-07

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: **R402435 (0)** **Instrument:** **ManTech01** **Method:** **DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS22020287-02DUP** Units: **mg/L** Analysis Date: **17-Feb-2022 11:55**
Client ID: Run ID: **ManTech01_402435** SeqNo: **6507254** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.12	1.00					11.1	0.18	20	

The following samples were analyzed in this batch: HS22020425-01 HS22020425-02 HS22020425-03 HS22020425-04 HS22020425-05 HS22020425-06 HS22020425-07

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: R402458 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R402458** Units: **mg/L** Analysis Date: **11-Feb-2022 14:00**
Client ID: Run ID: **Balance1_402458** SeqNo: **6507662** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R402458** Units: **mg/L** Analysis Date: **11-Feb-2022 14:00**
Client ID: Run ID: **Balance1_402458** SeqNo: **6507661** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	1064	10.0	1000	0	106	85 - 115				

DUP Sample ID: **HS22020425-01DUP** Units: **mg/L** Analysis Date: **11-Feb-2022 14:00**
Client ID: **SW-9** Run ID: **Balance1_402458** SeqNo: **6507663** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	48	10.0					46	4.26	20	

The following samples were analyzed in this batch: HS22020425-01 HS22020425-02 HS22020425-03 HS22020425-04 HS22020425-05 HS22020425-06 HS22020425-07

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: R402654 (0) **Instrument: WetChem_HS** **Method: SALINITY**

DUP Sample ID: **HS22020287-03DUP** Units: **ppt** Analysis Date: **21-Feb-2022 13:28**
Client ID: Run ID: **WetChem_HS_402654** SeqNo: **6511813** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22020425-01 HS22020425-02 HS22020425-03 HS22020425-04 HS22020425-05 HS22020425-06 HS22020425-07

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: R402659 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-022122** Units: **mg/L** Analysis Date: **21-Feb-2022 13:25**
Client ID: Run ID: **Balance1_402659** SeqNo: **6511886** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-022122** Units: **mg/L** Analysis Date: **21-Feb-2022 13:25**
Client ID: Run ID: **Balance1_402659** SeqNo: **6511888** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37.5	2.00	40	0	93.8	78 - 114				

LCSD Sample ID: **WLCSDW-022122** Units: **mg/L** Analysis Date: **21-Feb-2022 13:25**
Client ID: Run ID: **Balance1_402659** SeqNo: **6511887** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	39.5	2.00	40	0	98.8	78 - 114	37.5	5.19	18	

MS Sample ID: **HS22020761-01MS** Units: **mg/L** Analysis Date: **21-Feb-2022 13:25**
Client ID: Run ID: **Balance1_402659** SeqNo: **6511876** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	37.9	2.00	40	3.614	85.7	78 - 114				

The following samples were analyzed in this batch: HS22020425-01 HS22020425-02 HS22020425-03 HS22020425-04 HS22020425-05 HS22020425-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: R402799 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY E300.0, REV 2.1, 1993**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **22-Feb-2022 18:35**
Client ID: Run ID: **ICS-Integrion_402799** SeqNo: **6515457** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **22-Feb-2022 18:40**
Client ID: Run ID: **ICS-Integrion_402799** SeqNo: **6515458** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	7.765	0.200	8	0	97.1	90 - 110				

MS Sample ID: **HS22020425-01MS** Units: **mg/L** Analysis Date: **22-Feb-2022 19:33**
Client ID: **SW-9** Run ID: **ICS-Integrion_402799** SeqNo: **6515462** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	18.36	1.00	20	0.1855	90.9	80 - 120				

MSD Sample ID: **HS22020425-01MSD** Units: **mg/L** Analysis Date: **22-Feb-2022 19:38**
Client ID: **SW-9** Run ID: **ICS-Integrion_402799** SeqNo: **6515463** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	18.46	1.00	20	0.1855	91.4	80 - 120	18.36	0.551	20	

The following samples were analyzed in this batch:

HS22020425-01	HS22020425-02	HS22020425-03	HS22020425-04
HS22020425-05	HS22020425-06	HS22020425-07	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: HS22020425

QC BATCH REPORT

Batch ID: R402867 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-022322** Units: **mg/L** Analysis Date: **23-Feb-2022 13:50**
Client ID: Run ID: **Balance1_402867** SeqNo: **6516775** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-022322** Units: **mg/L** Analysis Date: **23-Feb-2022 13:50**
Client ID: Run ID: **Balance1_402867** SeqNo: **6516777** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	35.9	2.00	40	0	89.8	78 - 114				

LCSD Sample ID: **WLCSDW-022322** Units: **mg/L** Analysis Date: **23-Feb-2022 13:50**
Client ID: Run ID: **Balance1_402867** SeqNo: **6516776** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.4	2.00	40	0	91.0	78 - 114	35.9	1.38	18	

MS Sample ID: **HS22020800-01MS** Units: **mg/L** Analysis Date: **23-Feb-2022 13:50**
Client ID: Run ID: **Balance1_402867** SeqNo: **6516767** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.5	2.00	40	2.917	84.0	78 - 114				

The following samples were analyzed in this batch: HS22020425-07

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: SW-9,SW2,SW3,SW4,SW6,SW7,SW8
WorkOrder: **HS22020425**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

RIGHT SOLUTIONS | RIGHT PARTNER

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-34	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS22020425 **Date/Time Received:** **09-Feb-2022 10:40**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By: */S/ Paresh M. Giga* (eSignature) 09-Feb-2022 12:53 (Date/Time) **Reviewed by:** */S/ Corey Grandits* (eSignature) 11-Feb-2022 10:01 (Date/Time)

Matrices: Carrier name: **FedEx International Priority**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	2 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:259247/252584
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☐	No ☑	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	

Temperature(s)/Thermometer(s): 12.6C/13.1C ,14.1c/14.6c,14.5c/15.0c,15.0c/15.5c U/c IR31

Cooler(s)/Kit(s): 46306/48071/48075/47511

Date/Time sample(s) sent to storage: 2/9/2022 13:05

Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐

pH adjusted by:

Login Notes: COC blank. Logged in ID/Date/times from labels.
1 x O&G jar received broken SW-9

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

RIGHT SOLUTIONS | RIGHT PARTNER

Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 259247

HS22020425

ERM Inc

SW-9.SW2.SW3.SW4.SW6.SW7.SW8

WV

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	
Work Order		Project Number	
Company Name	ERM	Bill To Company	ERM
Send Report To	Selina Pradhan	Invoice Attn	AP
Address	300 West Summit Avenue	Address	300 West Summit Avenue
City/State/Zip	Charlotte, NC 28203	City/State/Zip	Charlotte, NC 28203
Phone	(507) 304-2187	Phone	(507) 304-2187
Fax		Fax	
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	selina.pradhan@erm.com

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	SW9	2/4/22	6:56	W													
2	SW2	2/4/22	12:33														
3	SW3	2/4/22	11:37														
4	SW 4	2/4/22	10:48														
5	SW 6	2/4/22	9:26														
6	SW 7	2/4/22	~~12:53~~ INV 10:15														
7	SW 5	2.4.22	10:00														
8																	
9																	
10																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date:	Time:	Received by:	
Relinquished by:	Date:	Time:	Received by (Laboratory):	
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

2/9/2022 10:40

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
CF636	12.6
	-0.1
	CF-5

QC Package: (Check One Box Below)

☒ Level I Std QC
☐ Level III Std QC/Raw Data
☐ Level IV SW846/CLP
☐ TRRP Checklist
☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 252584

HS22020425

ERM Inc

SW-9.SW2.SW3.SW4.SW6.SW7.SW8

ALS Project Manager:

Customer Information		Project Information	
Purchase Order		Project Name	
Work Order		Project Number	
Company Name	ERM	Bill To Company	ERM
Send Report To	Selina Pradhan	Invoice Attn	AP
Address	300 West Summit Avenue	Address	300 West Summit Avenue
City/State/Zip	Charlotte I NC I 28203	City/State/Zip	Charlotte I NC I 28203
Phone		Phone	
Fax		Fax	
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] STD (6 Wk Days) [ ] 5 Wk Days [ ] 3 Wk Days [ ] 24 Hour [ ] Other: ____

Results Due Date:

Relinquished by: Date: 2-Jul 22 Time: 10:49 Received by:

Relinquished by: Date: Time: Received by (Laboratory):

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
48071	14.1
45078	14.5
48511	15.0

QC Package: (Check One Box Below)

[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SW846/CLP
[ ] Other
[ ] TRRP Checklist
[ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
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ORIGIN ID:GEOA 5922252017

GUYANA LOGISTICS & SUPPORT SERVICES
110 DUKE & BARRACK STREETS
KINGSTON
GEORGETOWN,
GUYANA GY

SHIP DATE: 04FEB22
ACTWGT: 38.00 LB
CAD: 2450080/FXSF0107
DIMS: 23x13x14 IN

BILL SENDER

TO ALS ENVIRONMENTAL
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656 REF:
INV:
PO: DEPT:

(US)

560J2027GFE4A

FedEx Express

4 of 4

10:30A

MPS# 0441 2894 8279 2240

INTL PRIORITY

Mstr# 2894 8278 8237 0430

XA SGRA

77099
TX-US IAH

After printing this label.
CONSIGNEE COPY - PLEASE PLACE IN FRONT OF POUCH
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FedEx 4 pcs
MPS# 0441 2894 8279 2240
Mstr# 2894 8278 8237 0430

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CLR
77099
TX-US IAH

XA SGRA

4120266 MEM 02/08 547G2/027C/53C1

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ORIGIN ID:GEOA 5922252017

GUYANA LOGISTICS & SUPPORT SERVICES
110 DUKE & BARRACK STREETS
KINGSTON
GEORGETOWN,
GUYANA GY

SHIP DATE: 04FEB22
ACTWGT: 39.00 LB
CAD: 2450080/FXSF0107
DIMS: 24x14x15 IN

BILL SENDER

TO ALS ENVIRONMENTAL
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656 REF.
INV:
PO: DEPT.

(US)

56DJ2027C/FE4A

FedEx Express

3 of 4

MPS# 0441 2894 8279 1440

Mstr# 2894 8278 8237 0430

10:30A
INTL PRIORITY

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FedEx 4 pcs
MPS# 0441 2894 8279 1440
Mstr# 2894 8278 8237 0430

XA SGRA

AA
INTL PRIORITY CLR
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ORIGIN ID:GEOA 5922252017

GUYANA LOGISTICS & SUPPORT SERVICES
110 DUKE & BARRACK STREETS
KINGSTON
GEORGETOWN,
GUYANA GY

SHIP DATE: 04FEB22
ACTWGT: 39.00 LB
CAD: 2450080/FXSF0107
DIMS: 24x13x14 IN

BILL SENDER

TO ALS ENVIRONMENTAL
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656 REF.
INV:
PO. DEPT.

(US) 560J2027CFE4A

FedEx Express

2 of 4

10:30A

MPS# 2894 8279 0421
0441

INTL PRIORITY

Mstr# 2894 8278 8237 0430

XA SGRA

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TX-US IAH

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PIECE 2 OF 4

IP

2894 8278 8237

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130507 REV 9/08 RRD

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ORIGIN ID:GEOA 5922252017

GUYANA LOGISTICS & SUPPORT SERVICES
110 DUKE & BARRACK STREETS
KINGSTON
GEORGETOWN
GUYANA GY

SHIP DATE: 04FEB22
TOTWGT: 139.00 LB
CAD: 24500B0FXSF0107
DIMS: 24x 13x14 IN

BILL SENDER

TO ALS ENVIRONMENTAL
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656
W.
PO

RET

DEPT

(US)

560J2027CIFE4A

1 of 4

TRK# 2894 8278 8237
0430

10:30A
INTL PRIORITY

MASTER
XA SGRA

77099
IAH
TX-US

Rev by: JF 2/9/2022. 10:16.
4130 E 12-6 451 etch 0.5

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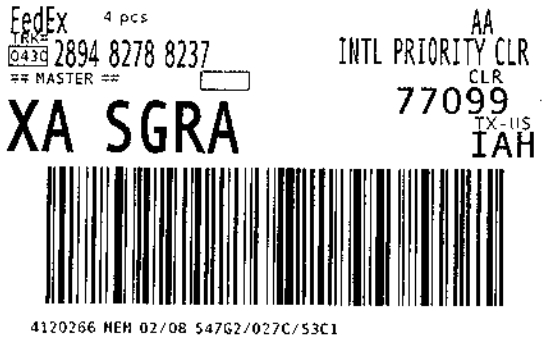

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10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

February 28, 2022

Selina Pradhan
ERM, Inc
300 West Summit Avenue
Suite 330
Charlotte, NC 28203

Work Order: **HS22020695**

Laboratory Results for: **C1, R4, R13, R14, SW10, & R2**

Dear Selina Pradhan,

ALS Environmental received 6 sample(s) on Feb 12, 2022 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: DAYNA.FISHER
Corey Grandits
Project Manager

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Work Order: HS22020695

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS22020695-01	C1	Water		02-Feb-2022 06:45	12-Feb-2022 11:25	☐
HS22020695-02	R4	Water		02-Feb-2022 07:54	12-Feb-2022 11:25	☐
HS22020695-03	R13	Water		02-Feb-2022 11:05	12-Feb-2022 11:25	☐
HS22020695-04	R14	Water		02-Feb-2022 11:16	12-Feb-2022 11:25	☐
HS22020695-05	SW10	Water		02-Feb-2022 10:17	12-Feb-2022 11:25	☐
HS22020695-06	R2	Water		02-Feb-2022 11:28	12-Feb-2022 11:25	☐

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Client: ERM, Inc **CASE NARRATIVE**
Project: C1, R4, R13, R14, SW10, & R2
Work Order: HS22020695

Work Order Comments

- Sample received outside method holding time for pH. pH is an immediate test. Sample results are flagged with an "H" qualifier.

  The temperature at the time of pH is reported. Please note that all pH results are already normalized to a temperature of 25 °C.

Work Order Comments

- Sample received outside method holding time for Dissolved Oxygen. Dissolved Oxygen is an immediate test. Sample results are flagged with an "H" qualifier.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 175416

Sample ID: All Samples

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: LCSD-175416

- The RPD between the LCS and LCSD was outside of the control limit.

Metals by Method SW6020A

Batch ID: 175771

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW7470A

Batch ID: 175584

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM, Inc **CASE NARRATIVE**
Project: C1, R4, R13, R14, SW10, & R2
Work Order: HS22020695

WetChemistry by Method M2540B

Batch ID: R402576

Sample ID: C1 (HS22020695-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R13 (HS22020695-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R14 (HS22020695-04)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R2 (HS22020695-06)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R4 (HS22020695-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW10 (HS22020695-05)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method E1664A

Batch ID: R402955

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method Calculation

Batch ID: R403216

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E300

Batch ID: R403176

Sample ID: MBLK

- The reporting limit(s) is/are elevated due to dilution for high concentrations of non-targeted analyte/s for samples

WetChemistry by Method SM2520

Batch ID: R402654

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM, Inc **CASE NARRATIVE**
Project: C1, R4, R13, R14, SW10, & R2
Work Order: HS22020695

WetChemistry by Method M2540D

Batch ID: R402571

Sample ID: C1 (HS22020695-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R13 (HS22020695-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R14 (HS22020695-04)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R2 (HS22020695-06)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R4 (HS22020695-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW10 (HS22020695-05)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

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Client: ERM, Inc **CASE NARRATIVE**
Project: C1, R4, R13, R14, SW10, & R2
Work Order: HS22020695

WetChemistry by Method M2540C

Batch ID: R402569

Sample ID: C1 (HS22020695-01)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R4 (HS22020695-02)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Batch ID: R402288

Sample ID: R13 (HS22020695-03)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R14 (HS22020695-04)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: R2 (HS22020695-06)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

Sample ID: SW10 (HS22020695-05)

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.

WetChemistry by Method M4500-O G

Batch ID: R402435

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9040C

Batch ID: R402308

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 175737

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M4500 NH3 D

Batch ID: 175533

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

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Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: C1
Collection Date: 02-Feb-2022 06:45

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 16-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Acenaphthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Acenaphthylene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Chrysene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Dibenzofuran	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Fluorene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Naphthalene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Phenanthrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:19
Surr: 2-Fluorobiphenyl	*66.7*			*40-140*	*%REC*	*1*	*24-Feb-2022 15:19*
Surr: 4-Terphenyl-d14	*107*			*40-140*	*%REC*	*1*	*24-Feb-2022 15:19*
Surr: Nitrobenzene-d5	*69.2*			*40-140*	*%REC*	*1*	*24-Feb-2022 15:19*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 25-Feb-2022		Analyst: JHD
Antimony	U		0.00400	0.0200	mg/L	10	28-Feb-2022 13:20
Arsenic	U		0.00400	0.0200	mg/L	10	28-Feb-2022 13:20
Beryllium	U		0.00200	0.0200	mg/L	10	28-Feb-2022 13:20
Cadmium	U		0.00200	0.0200	mg/L	10	28-Feb-2022 13:20
Chromium	**0.00586**	J	**0.00400**	**0.0400**	**mg/L**	10	28-Feb-2022 13:20
Cobalt	U		0.00200	0.0500	mg/L	10	28-Feb-2022 13:20
Copper	U		0.0100	0.0200	mg/L	10	28-Feb-2022 13:20
Lead	U		0.00600	0.0200	mg/L	10	28-Feb-2022 13:20
Molybdenum	U		0.00600	0.0500	mg/L	10	28-Feb-2022 13:20
Nickel	U		0.00600	0.0200	mg/L	10	28-Feb-2022 13:20
Selenium	U		0.0110	0.0200	mg/L	10	28-Feb-2022 13:20
Silver	U		0.00200	0.0200	mg/L	10	28-Feb-2022 13:20
Thallium	U		0.00200	0.0200	mg/L	10	28-Feb-2022 13:20
Vanadium	**0.00868**	J	**0.00600**	**0.0500**	**mg/L**	10	28-Feb-2022 13:20
Zinc	U		0.0200	0.0400	mg/L	10	28-Feb-2022 13:20

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: C1
Collection Date: 02-Feb-2022 06:45

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-01
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Feb-2022 17:13
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.72**		**0.10**	**0.50**	**mg/L**	1	28-Feb-2022 16:35
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**2.09**		**0.610**	**2.00**	**mg/L**	1	24-Feb-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.336**	J	**0.150**	**1.00**	**mg/L**	5	25-Feb-2022 13:43
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 24-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0440**	J	**0.0200**	**0.0500**	**mg/L**	1	24-Feb-2022 14:40
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**18,000**	H	**5.00**	**10.0**	**mg/L**	1	18-Feb-2022 16:47
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**16,900**	H	**5.00**	**10.0**	**mg/L**	1	17-Feb-2022 16:03
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**83.6**	H	**2.50**	**2.50**	**mg/L**	1	18-Feb-2022 16:20
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.38**	J	**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**9.71**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**23.0**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**7.64**	H	**0.100**	**0.100**	**pH Units**	1	15-Feb-2022 18:23
Temp Deg C @pH	**22.2**	H	**0**	**0**	**DEG C**	1	15-Feb-2022 18:23

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: R4
Collection Date: 02-Feb-2022 07:54

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 16-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Acenaphthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Acenaphthylene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Chrysene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Dibenzofuran	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Fluorene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Naphthalene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Phenanthrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:39
Surr: 2-Fluorobiphenyl	*58.0*			*40-140*	*%REC*	*1*	*24-Feb-2022 15:39*
Surr: 4-Terphenyl-d14	*107*			*40-140*	*%REC*	*1*	*24-Feb-2022 15:39*
Surr: Nitrobenzene-d5	*81.4*			*40-140*	*%REC*	*1*	*24-Feb-2022 15:39*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 25-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	25-Feb-2022 23:35
Arsenic	**0.00123**	J	**0.000400**	**0.00200**	**mg/L**	1	25-Feb-2022 23:35
Beryllium	U		0.000200	0.00200	mg/L	1	25-Feb-2022 23:35
Cadmium	U		0.000200	0.00200	mg/L	1	25-Feb-2022 23:35
Chromium	**0.00331**	J	**0.000400**	**0.00400**	**mg/L**	1	25-Feb-2022 23:35
Cobalt	**0.00116**	J	**0.000200**	**0.00500**	**mg/L**	1	25-Feb-2022 23:35
Copper	**0.00240**		**0.00100**	**0.00200**	**mg/L**	1	25-Feb-2022 23:35
Lead	**0.00173**	J	**0.000600**	**0.00200**	**mg/L**	1	25-Feb-2022 23:35
Molybdenum	U		0.000600	0.00500	mg/L	1	25-Feb-2022 23:35
Nickel	**0.00212**		**0.000600**	**0.00200**	**mg/L**	1	25-Feb-2022 23:35
Selenium	U		0.00110	0.00200	mg/L	1	25-Feb-2022 23:35
Silver	U		0.000200	0.00200	mg/L	1	25-Feb-2022 23:35
Thallium	U		0.000200	0.00200	mg/L	1	25-Feb-2022 23:35
Vanadium	**0.00807**		**0.000600**	**0.00500**	**mg/L**	1	25-Feb-2022 23:35
Zinc	**0.0118**		**0.00200**	**0.00400**	**mg/L**	1	25-Feb-2022 23:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: R4
Collection Date: 02-Feb-2022 07:54

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-02
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Feb-2022 17:15
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.76**		**0.10**	**0.50**	**mg/L**	1	28-Feb-2022 16:35
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.67**	J	**0.610**	**2.00**	**mg/L**	1	24-Feb-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.300**	J	**0.150**	**1.00**	**mg/L**	5	25-Feb-2022 13:59
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 24-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.0970**		**0.0200**	**0.0500**	**mg/L**	1	24-Feb-2022 14:40
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**84.0**	H	**5.00**	**10.0**	**mg/L**	1	18-Feb-2022 16:47
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**36.0**	H	**5.00**	**10.0**	**mg/L**	1	17-Feb-2022 16:03
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**78.9**	H	**2.50**	**2.50**	**mg/L**	1	18-Feb-2022 16:20
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.46**	J	**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**9.88**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**6.35**	H	**0.100**	**0.100**	**pH Units**	1	15-Feb-2022 18:23
Temp Deg C @pH	**22.0**	H	**0**	**0**	**DEG C**	1	15-Feb-2022 18:23

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: R13
Collection Date: 02-Feb-2022 11:05

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM		**Method:SW8270SIM**			Prep:SW3510 / 16-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
2-Methylnaphthalene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Acenaphthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Acenaphthylene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Chrysene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Dibenzofuran	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Fluorene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Naphthalene	**0.010**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 15:59
Phenanthrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 15:59
Surr: 2-Fluorobiphenyl	*76.5*			*40-140*	*%REC*	*1*	*24-Feb-2022 15:59*
Surr: 4-Terphenyl-d14	*110*			*40-140*	*%REC*	*1*	*24-Feb-2022 15:59*
Surr: Nitrobenzene-d5	*71.4*			*40-140*	*%REC*	*1*	*24-Feb-2022 15:59*
ICP-MS METALS BY SW6020A		**Method:SW6020A**			Prep:SW3010A / 25-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	26-Feb-2022 00:13
Arsenic	**0.00364**		**0.000400**	**0.00200**	**mg/L**	1	26-Feb-2022 00:13
Beryllium	**0.000288**	J	**0.000200**	**0.00200**	**mg/L**	1	26-Feb-2022 00:13
Cadmium	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:13
Chromium	**0.00606**		**0.000400**	**0.00400**	**mg/L**	1	26-Feb-2022 00:13
Cobalt	**0.00332**	J	**0.000200**	**0.00500**	**mg/L**	1	26-Feb-2022 00:13
Copper	**0.00337**		**0.00100**	**0.00200**	**mg/L**	1	26-Feb-2022 00:13
Lead	**0.00462**		**0.000600**	**0.00200**	**mg/L**	1	26-Feb-2022 00:13
Molybdenum	U		0.000600	0.00500	mg/L	1	26-Feb-2022 00:13
Nickel	**0.00513**		**0.000600**	**0.00200**	**mg/L**	1	26-Feb-2022 00:13
Selenium	U		0.00110	0.00200	mg/L	1	26-Feb-2022 00:13
Silver	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:13
Thallium	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:13
Vanadium	**0.0108**		**0.000600**	**0.00500**	**mg/L**	1	26-Feb-2022 00:13
Zinc	**0.0296**		**0.00200**	**0.00400**	**mg/L**	1	26-Feb-2022 00:13

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: R13
Collection Date: 02-Feb-2022 11:05

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-03
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Feb-2022 17:17
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.43**	J	**0.10**	**0.50**	**mg/L**	1	28-Feb-2022 16:35
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**1.61**	J	**0.610**	**2.00**	**mg/L**	1	24-Feb-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.270**	J	**0.150**	**1.00**	**mg/L**	5	25-Feb-2022 14:04
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 24-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.159**		**0.0200**	**0.0500**	**mg/L**	1	24-Feb-2022 14:40
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**212**	H	**5.00**	**10.0**	**mg/L**	1	18-Feb-2022 16:47
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**48.0**	H	**5.00**	**10.0**	**mg/L**	1	14-Feb-2022 14:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**201**	H	**2.50**	**2.50**	**mg/L**	1	18-Feb-2022 16:20
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.16**	J	**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**9.25**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**5.44**	H	**0.100**	**0.100**	**pH Units**	1	15-Feb-2022 18:23
Temp Deg C @pH	**21.8**	H	**0**	**0**	**DEG C**	1	15-Feb-2022 18:23

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: R14
Collection Date: 02-Feb-2022 11:16

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 16-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	**0.014**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:19
2-Methylnaphthalene	**0.014**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:19
Acenaphthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Acenaphthylene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Benzo(a)pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Benzo(b)fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Benzo(g,h,i)perylene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Chrysene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Dibenzofuran	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Fluorene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Indeno(1,2,3-cd)pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Naphthalene	**0.034**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:19
Phenanthrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:19
Surr: 2-Fluorobiphenyl	*79.1*			*40-140*	*%REC*	*1*	*24-Feb-2022 16:19*
Surr: 4-Terphenyl-d14	*119*			*40-140*	*%REC*	*1*	*24-Feb-2022 16:19*
Surr: Nitrobenzene-d5	*76.6*			*40-140*	*%REC*	*1*	*24-Feb-2022 16:19*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 25-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	26-Feb-2022 00:14
Arsenic	**0.00330**		**0.000400**	**0.00200**	**mg/L**	1	26-Feb-2022 00:14
Beryllium	**0.000212**	J	**0.000200**	**0.00200**	**mg/L**	1	26-Feb-2022 00:14
Cadmium	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:14
Chromium	**0.00356**	J	**0.000400**	**0.00400**	**mg/L**	1	26-Feb-2022 00:14
Cobalt	**0.00228**	J	**0.000200**	**0.00500**	**mg/L**	1	26-Feb-2022 00:14
Copper	**0.00236**		**0.00100**	**0.00200**	**mg/L**	1	26-Feb-2022 00:14
Lead	**0.00571**		**0.000600**	**0.00200**	**mg/L**	1	26-Feb-2022 00:14
Molybdenum	U		0.000600	0.00500	mg/L	1	26-Feb-2022 00:14
Nickel	**0.00345**		**0.000600**	**0.00200**	**mg/L**	1	26-Feb-2022 00:14
Selenium	U		0.00110	0.00200	mg/L	1	26-Feb-2022 00:14
Silver	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:14
Thallium	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:14
Vanadium	**0.00741**		**0.000600**	**0.00500**	**mg/L**	1	26-Feb-2022 00:14
Zinc	**0.0190**		**0.00200**	**0.00400**	**mg/L**	1	26-Feb-2022 00:14

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: R14
Collection Date: 02-Feb-2022 11:16

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-04
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Feb-2022 17:18
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.37**	J	**0.10**	**0.50**	**mg/L**	1	28-Feb-2022 16:35
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**2.02**		**0.610**	**2.00**	**mg/L**	1	24-Feb-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.234**	J	**0.150**	**1.00**	**mg/L**	5	25-Feb-2022 14:10
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 24-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.208**		**0.0200**	**0.0500**	**mg/L**	1	24-Feb-2022 14:40
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**214**	H	**5.00**	**10.0**	**mg/L**	1	18-Feb-2022 16:47
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**10.0**	H	**5.00**	**10.0**	**mg/L**	1	14-Feb-2022 14:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**184**	H	**2.50**	**2.50**	**mg/L**	1	18-Feb-2022 16:20
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.14**	J	**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**8.40**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**6.17**	H	**0.100**	**0.100**	**pH Units**	1	15-Feb-2022 18:23
Temp Deg C @pH	**21.9**	H	**0**	**0**	**DEG C**	1	15-Feb-2022 18:23

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: SW10
Collection Date: 02-Feb-2022 10:17

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 16-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	**0.028**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
2-Methylnaphthalene	**0.043**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Acenaphthene	**0.015**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Acenaphthylene	**0.010**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Anthracene	**0.018**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Benz(a)anthracene	**0.011**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Benzo(a)pyrene	**0.016**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Benzo(b)fluoranthene	**0.022**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Benzo(g,h,i)perylene	**0.019**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Benzo(k)fluoranthene	**0.012**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Chrysene	**0.015**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Dibenz(a,h)anthracene	**0.015**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Dibenzofuran	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:39
Fluoranthene	**0.018**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Fluorene	**0.015**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Indeno(1,2,3-cd)pyrene	**0.019**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Naphthalene	**0.097**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Phenanthrene	**0.016**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Pyrene	**0.012**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:39
Surr: 2-Fluorobiphenyl	*105*			*40-140*	*%REC*	*1*	*24-Feb-2022 16:39*
Surr: 4-Terphenyl-d14	*127*			*40-140*	*%REC*	*1*	*24-Feb-2022 16:39*
Surr: Nitrobenzene-d5	*87.6*			*40-140*	*%REC*	*1*	*24-Feb-2022 16:39*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 25-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	26-Feb-2022 00:16
Arsenic	**0.000830**	J	**0.000400**	**0.00200**	**mg/L**	1	26-Feb-2022 00:16
Beryllium	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:16
Cadmium	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:16
Chromium	**0.00178**	J	**0.000400**	**0.00400**	**mg/L**	1	26-Feb-2022 00:16
Cobalt	**0.000242**	J	**0.000200**	**0.00500**	**mg/L**	1	26-Feb-2022 00:16
Copper	U		0.00100	0.00200	mg/L	1	26-Feb-2022 00:16
Lead	U		0.000600	0.00200	mg/L	1	26-Feb-2022 00:16
Molybdenum	U		0.000600	0.00500	mg/L	1	26-Feb-2022 00:16
Nickel	**0.000706**	J	**0.000600**	**0.00200**	**mg/L**	1	26-Feb-2022 00:16
Selenium	U		0.00110	0.00200	mg/L	1	26-Feb-2022 00:16
Silver	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:16
Thallium	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:16
Vanadium	**0.00274**	J	**0.000600**	**0.00500**	**mg/L**	1	26-Feb-2022 00:16
Zinc	**0.00395**	J	**0.00200**	**0.00400**	**mg/L**	1	26-Feb-2022 00:16

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: SW10
Collection Date: 02-Feb-2022 10:17

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-05
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Feb-2022 17:29
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.43**	J	**0.10**	**0.50**	**mg/L**	1	28-Feb-2022 16:35
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**6.64**		**0.610**	**2.00**	**mg/L**	1	24-Feb-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.206**	J	**0.150**	**1.00**	**mg/L**	5	25-Feb-2022 14:15
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 24-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	U		0.0200	0.0500	mg/L	1	24-Feb-2022 14:40
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**60.0**	H	**5.00**	**10.0**	**mg/L**	1	18-Feb-2022 16:47
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**48.0**	H	**5.00**	**10.0**	**mg/L**	1	14-Feb-2022 14:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**38.0**	H	**2.50**	**2.50**	**mg/L**	1	18-Feb-2022 16:20
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.22**	J	**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**8.81**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**4.57**	H	**0.100**	**0.100**	**pH Units**	1	15-Feb-2022 18:23
Temp Deg C @pH	**21.6**	H	**0**	**0**	**DEG C**	1	15-Feb-2022 18:23

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: R2
Collection Date: 02-Feb-2022 11:28

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-06
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
SEMIVOLATILES SIM	**Method:SW8270SIM**				Prep:SW3510 / 16-Feb-2022		Analyst: JLJ
1-Methylnaphthalene	**0.020**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
2-Methylnaphthalene	**0.032**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Acenaphthene	**0.012**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Acenaphthylene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:59
Anthracene	**0.012**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Benz(a)anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:59
Benzo(a)pyrene	**0.011**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Benzo(b)fluoranthene	**0.013**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Benzo(g,h,i)perylene	**0.013**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Benzo(k)fluoranthene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:59
Chrysene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:59
Dibenz(a,h)anthracene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:59
Dibenzofuran	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:59
Fluoranthene	**0.013**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Fluorene	**0.012**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Indeno(1,2,3-cd)pyrene	**0.013**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Naphthalene	**0.068**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Phenanthrene	**0.012**	H	**0.010**	**0.010**	**ug/L**	1	24-Feb-2022 16:59
Pyrene	U	H	0.010	0.010	ug/L	1	24-Feb-2022 16:59
Surr: 2-Fluorobiphenyl	*106*			*40-140*	*%REC*	*1*	*24-Feb-2022 16:59*
Surr: 4-Terphenyl-d14	*130*			*40-140*	*%REC*	*1*	*24-Feb-2022 16:59*
Surr: Nitrobenzene-d5	*76.3*			*40-140*	*%REC*	*1*	*24-Feb-2022 16:59*
ICP-MS METALS BY SW6020A	**Method:SW6020A**				Prep:SW3010A / 25-Feb-2022		Analyst: JHD
Antimony	U		0.000400	0.00200	mg/L	1	26-Feb-2022 00:18
Arsenic	**0.00370**		**0.000400**	**0.00200**	**mg/L**	1	26-Feb-2022 00:18
Beryllium	**0.000252**	J	**0.000200**	**0.00200**	**mg/L**	1	26-Feb-2022 00:18
Cadmium	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:18
Chromium	**0.00522**		**0.000400**	**0.00400**	**mg/L**	1	26-Feb-2022 00:18
Cobalt	**0.00322**	J	**0.000200**	**0.00500**	**mg/L**	1	26-Feb-2022 00:18
Copper	**0.00292**		**0.00100**	**0.00200**	**mg/L**	1	26-Feb-2022 00:18
Lead	**0.00466**		**0.000600**	**0.00200**	**mg/L**	1	26-Feb-2022 00:18
Molybdenum	U		0.000600	0.00500	mg/L	1	26-Feb-2022 00:18
Nickel	**0.00429**		**0.000600**	**0.00200**	**mg/L**	1	26-Feb-2022 00:18
Selenium	U		0.00110	0.00200	mg/L	1	26-Feb-2022 00:18
Silver	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:18
Thallium	U		0.000200	0.00200	mg/L	1	26-Feb-2022 00:18
Vanadium	**0.0110**		**0.000600**	**0.00500**	**mg/L**	1	26-Feb-2022 00:18
Zinc	**0.0248**		**0.00200**	**0.00400**	**mg/L**	1	26-Feb-2022 00:18

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
Sample ID: R2
Collection Date: 02-Feb-2022 11:28

ANALYTICAL REPORT
WorkOrder:HS22020695
Lab ID:HS22020695-06
Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
MERCURY BY SW7470A		**Method:SW7470A**			Prep:SW7470A / 21-Feb-2022		Analyst: MSC
Mercury	U		0.0000300	0.000200	mg/L	1	21-Feb-2022 17:30
TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)		**Method:Calculation**					Analyst: YP
Nitrogen, Total	**0.45**	J	**0.10**	**0.50**	**mg/L**	1	28-Feb-2022 16:35
OIL & GREASE (HEM) BY E1664A		**Method:E1664A**					Analyst: KAH
Oil and Grease	**2.02**		**0.610**	**2.00**	**mg/L**	1	24-Feb-2022 13:00
NITRATE/NITRITE BY E300.0, REV 2.1, 1993		**Method:E300**					Analyst: YP
Nitrate/Nitrite (as N)	**0.273**	J	**0.150**	**1.00**	**mg/L**	5	25-Feb-2022 14:20
PHOSPHORUS BY E365.3-1978		**Method:E365.3**			Prep:E365.3 / 24-Feb-2022		Analyst: MZD
Phosphorus, Total (As P)	**0.102**		**0.0200**	**0.0500**	**mg/L**	1	24-Feb-2022 14:40
TOTAL SOLIDS BY SM2540B-2011		**Method:M2540B**					Analyst: CWG
Residue, Total	**228**	H	**5.00**	**10.0**	**mg/L**	1	18-Feb-2022 16:47
TOTAL DISSOLVED SOLIDS BY SM2540C -2011		**Method:M2540C**					Analyst: CWG
Total Dissolved Solids (Residue, Filterable)	**74.0**	H	**5.00**	**10.0**	**mg/L**	1	14-Feb-2022 14:13
TOTAL SUSPENDED SOLIDS BY SM 2540D-2011		**Method:M2540D**					Analyst: CWG
Suspended Solids (Residue, Non -Filterable)	**232**	H	**2.50**	**2.50**	**mg/L**	1	18-Feb-2022 16:20
TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011		**Method:M4500 NH3 D**			Prep:M4500-N C / 17-Feb-2022		Analyst: MZD
Nitrogen, Total Kjeldahl	**0.18**	J	**0.10**	**0.50**	**mg/L**	1	18-Feb-2022 15:30
DISSOLVED OXYGEN BY SM4500-O G		**Method:M4500-O G**					Analyst: TH
Oxygen, Dissolved	**9.58**	H	**1.00**	**1.00**	**mg/L**	1	17-Feb-2022 11:55
SALINITY		**Method:SM2520**					Analyst: MZD
Salinity	**<2**		**2.00**	**2.00**	**ppt**	1	21-Feb-2022 13:28
PH BY SW9040C		**Method:SW9040C**					Analyst: CWG
pH	**5.21**	H	**0.100**	**0.100**	**pH Units**	1	15-Feb-2022 18:23
Temp Deg C @pH	**21.7**	H	**0**	**0**	**DEG C**	1	15-Feb-2022 18:23

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

Batch ID: 175416 **Start Date:** 16 Feb 2022 07:00 **End Date:** 16 Feb 2022 12:30
Method: SV AQ SEP FUN EXTRACT-LOWLEV - 3510C **Prep Code:** 3510_B_SIM

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020695-01	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020695-02	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020695-03	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020695-04	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020695-05	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat
HS22020695-06	1	1000 (mL)	1 (mL)	0.001	1-liter amber glass, Neat

Batch ID: 175533 **Start Date:** 17 Feb 2022 10:30 **End Date:** 17 Feb 2022 14:00
Method: TKN WATER - PREP **Prep Code:** TKN_W_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020695-01		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020695-02		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020695-03		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020695-04		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020695-05		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2
HS22020695-06		25 (mL)	50 (mL)	2	500 mL plastic, H2SO4 to pH <2

Batch ID: 175584 **Start Date:** 21 Feb 2022 11:00 **End Date:** 21 Feb 2022 14:00
Method: MERCURY PREP BY 7470A- WATER **Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020695-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020695-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020695-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020695-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020695-05		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020695-06		10 (mL)	10 (mL)	1	120 plastic HNO3

RIGHT SOLUTIONS | RIGHT PARTNER

Weight / Prep Log

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

Batch ID: 175737 **Start Date:** 24 Feb 2022 10:30 **End Date:** 24 Feb 2022 12:30
Method: PHOSPHOROUS **Prep Code:** P_TW_PR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020695-01		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020695-02		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020695-03		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020695-04		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020695-05		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2
HS22020695-06		50 (mg/L)	50 (mL)	1	500 mL plastic, H2SO4 to pH <2

Batch ID: 175771 **Start Date:** 25 Feb 2022 09:00 **End Date:** 25 Feb 2022 13:00
Method: WATER - SW3010A **Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS22020695-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020695-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020695-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020695-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020695-05		10 (mL)	10 (mL)	1	120 plastic HNO3
HS22020695-06		10 (mL)	10 (mL)	1	120 plastic HNO3

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 175416 (0)	**Test Name :** SEMIVOLATILES SIM				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45		16 Feb 2022 12:50	24 Feb 2022 15:19	1
HS22020695-02	R4	02 Feb 2022 07:54		16 Feb 2022 12:50	24 Feb 2022 15:39	1
HS22020695-03	R13	02 Feb 2022 11:05		16 Feb 2022 12:50	24 Feb 2022 15:59	1
HS22020695-04	R14	02 Feb 2022 11:16		16 Feb 2022 12:50	24 Feb 2022 16:19	1
HS22020695-05	SW10	02 Feb 2022 10:17		16 Feb 2022 12:50	24 Feb 2022 16:39	1
HS22020695-06	R2	02 Feb 2022 11:28		16 Feb 2022 12:50	24 Feb 2022 16:59	1
Batch ID: 175533 (0)	**Test Name :** TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020695-02	R4	02 Feb 2022 07:54		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020695-03	R13	02 Feb 2022 11:05		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020695-04	R14	02 Feb 2022 11:16		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020695-05	SW10	02 Feb 2022 10:17		17 Feb 2022 10:30	18 Feb 2022 15:30	1
HS22020695-06	R2	02 Feb 2022 11:28		17 Feb 2022 10:30	18 Feb 2022 15:30	1
Batch ID: 175584 (0)	**Test Name :** MERCURY BY SW7470A				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45		21 Feb 2022 11:00	21 Feb 2022 17:13	1
HS22020695-02	R4	02 Feb 2022 07:54		21 Feb 2022 11:00	21 Feb 2022 17:15	1
HS22020695-03	R13	02 Feb 2022 11:05		21 Feb 2022 11:00	21 Feb 2022 17:17	1
HS22020695-04	R14	02 Feb 2022 11:16		21 Feb 2022 11:00	21 Feb 2022 17:18	1
HS22020695-05	SW10	02 Feb 2022 10:17		21 Feb 2022 11:00	21 Feb 2022 17:29	1
HS22020695-06	R2	02 Feb 2022 11:28		21 Feb 2022 11:00	21 Feb 2022 17:30	1
Batch ID: 175737 (0)	**Test Name :** PHOSPHORUS BY E365.3-1978				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45		24 Feb 2022 10:30	24 Feb 2022 14:40	1
HS22020695-02	R4	02 Feb 2022 07:54		24 Feb 2022 10:30	24 Feb 2022 14:40	1
HS22020695-03	R13	02 Feb 2022 11:05		24 Feb 2022 10:30	24 Feb 2022 14:40	1
HS22020695-04	R14	02 Feb 2022 11:16		24 Feb 2022 10:30	24 Feb 2022 14:40	1
HS22020695-05	SW10	02 Feb 2022 10:17		24 Feb 2022 10:30	24 Feb 2022 14:40	1
HS22020695-06	R2	02 Feb 2022 11:28		24 Feb 2022 10:30	24 Feb 2022 14:40	1
Batch ID: 175771 (0)	**Test Name :** ICP-MS METALS BY SW6020A				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45		25 Feb 2022 13:00	28 Feb 2022 13:20	10
HS22020695-02	R4	02 Feb 2022 07:54		25 Feb 2022 13:00	25 Feb 2022 23:35	1
HS22020695-03	R13	02 Feb 2022 11:05		25 Feb 2022 13:00	26 Feb 2022 00:13	1
HS22020695-04	R14	02 Feb 2022 11:16		25 Feb 2022 13:00	26 Feb 2022 00:14	1
HS22020695-05	SW10	02 Feb 2022 10:17		25 Feb 2022 13:00	26 Feb 2022 00:16	1
HS22020695-06	R2	02 Feb 2022 11:28		25 Feb 2022 13:00	26 Feb 2022 00:18	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R402288 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22020695-03	R13	02 Feb 2022 11:05			14 Feb 2022 14:13	1
HS22020695-04	R14	02 Feb 2022 11:16			14 Feb 2022 14:13	1
HS22020695-05	SW10	02 Feb 2022 10:17			14 Feb 2022 14:13	1
HS22020695-06	R2	02 Feb 2022 11:28			14 Feb 2022 14:13	1
Batch ID: R402308 (0)	**Test Name :** PH BY SW9040C				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45			15 Feb 2022 18:23	1
HS22020695-02	R4	02 Feb 2022 07:54			15 Feb 2022 18:23	1
HS22020695-03	R13	02 Feb 2022 11:05			15 Feb 2022 18:23	1
HS22020695-04	R14	02 Feb 2022 11:16			15 Feb 2022 18:23	1
HS22020695-05	SW10	02 Feb 2022 10:17			15 Feb 2022 18:23	1
HS22020695-06	R2	02 Feb 2022 11:28			15 Feb 2022 18:23	1
Batch ID: R402435 (0)	**Test Name :** DISSOLVED OXYGEN BY SM4500-O G				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45			17 Feb 2022 11:55	1
HS22020695-02	R4	02 Feb 2022 07:54			17 Feb 2022 11:55	1
HS22020695-03	R13	02 Feb 2022 11:05			17 Feb 2022 11:55	1
HS22020695-04	R14	02 Feb 2022 11:16			17 Feb 2022 11:55	1
HS22020695-05	SW10	02 Feb 2022 10:17			17 Feb 2022 11:55	1
HS22020695-06	R2	02 Feb 2022 11:28			17 Feb 2022 11:55	1
Batch ID: R402569 (0)	**Test Name :** TOTAL DISSOLVED SOLIDS BY SM2540C-2011				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45			17 Feb 2022 16:03	1
HS22020695-02	R4	02 Feb 2022 07:54			17 Feb 2022 16:03	1
Batch ID: R402571 (0)	**Test Name :** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45			18 Feb 2022 16:20	1
HS22020695-02	R4	02 Feb 2022 07:54			18 Feb 2022 16:20	1
HS22020695-03	R13	02 Feb 2022 11:05			18 Feb 2022 16:20	1
HS22020695-04	R14	02 Feb 2022 11:16			18 Feb 2022 16:20	1
HS22020695-05	SW10	02 Feb 2022 10:17			18 Feb 2022 16:20	1
HS22020695-06	R2	02 Feb 2022 11:28			18 Feb 2022 16:20	1
Batch ID: R402576 (0)	**Test Name :** TOTAL SOLIDS BY SM2540B-2011				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45			18 Feb 2022 16:47	1
HS22020695-02	R4	02 Feb 2022 07:54			18 Feb 2022 16:47	1
HS22020695-03	R13	02 Feb 2022 11:05			18 Feb 2022 16:47	1
HS22020695-04	R14	02 Feb 2022 11:16			18 Feb 2022 16:47	1
HS22020695-05	SW10	02 Feb 2022 10:17			18 Feb 2022 16:47	1
HS22020695-06	R2	02 Feb 2022 11:28			18 Feb 2022 16:47	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R402654 (0)	**Test Name :** SALINITY				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45			21 Feb 2022 13:28	1
HS22020695-02	R4	02 Feb 2022 07:54			21 Feb 2022 13:28	1
HS22020695-03	R13	02 Feb 2022 11:05			21 Feb 2022 13:28	1
HS22020695-04	R14	02 Feb 2022 11:16			21 Feb 2022 13:28	1
HS22020695-05	SW10	02 Feb 2022 10:17			21 Feb 2022 13:28	1
HS22020695-06	R2	02 Feb 2022 11:28			21 Feb 2022 13:28	1
Batch ID: R402955 (0)	**Test Name :** OIL & GREASE (HEM) BY E1664A				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45			24 Feb 2022 13:00	1
HS22020695-02	R4	02 Feb 2022 07:54			24 Feb 2022 13:00	1
HS22020695-03	R13	02 Feb 2022 11:05			24 Feb 2022 13:00	1
HS22020695-04	R14	02 Feb 2022 11:16			24 Feb 2022 13:00	1
HS22020695-05	SW10	02 Feb 2022 10:17			24 Feb 2022 13:00	1
HS22020695-06	R2	02 Feb 2022 11:28			24 Feb 2022 13:00	1
Batch ID: R403176 (0)	**Test Name :** NITRATE/NITRITE BY E300.0, REV 2.1, 1993				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45			25 Feb 2022 13:43	5
HS22020695-02	R4	02 Feb 2022 07:54			25 Feb 2022 13:59	5
HS22020695-03	R13	02 Feb 2022 11:05			25 Feb 2022 14:04	5
HS22020695-04	R14	02 Feb 2022 11:16			25 Feb 2022 14:10	5
HS22020695-05	SW10	02 Feb 2022 10:17			25 Feb 2022 14:15	5
HS22020695-06	R2	02 Feb 2022 11:28			25 Feb 2022 14:20	5
Batch ID: R403216 (0)	**Test Name :** TOTAL NITROGEN CALCULATION (TKN+NITRATE/NITRITE)				**Matrix:** Water	
HS22020695-01	C1	02 Feb 2022 06:45			28 Feb 2022 16:35	1
HS22020695-02	R4	02 Feb 2022 07:54			28 Feb 2022 16:35	1
HS22020695-03	R13	02 Feb 2022 11:05			28 Feb 2022 16:35	1
HS22020695-04	R14	02 Feb 2022 11:16			28 Feb 2022 16:35	1
HS22020695-05	SW10	02 Feb 2022 10:17			28 Feb 2022 16:35	1
HS22020695-06	R2	02 Feb 2022 11:28			28 Feb 2022 16:35	1

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175584 (0) **Instrument: HG03** **Method: MERCURY BY SW7470A**

MBLK Sample ID: **MBLK-175584** Units: **mg/L** Analysis Date: **21-Feb-2022 17:05**
Client ID: Run ID: **HG03_402674** SeqNo: **6512359** PrepDate: **21-Feb-2022** DF: **1**

Analyte	Result		PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury		U	0.000200								

LCS Sample ID: **LCS-175584** Units: **mg/L** Analysis Date: **21-Feb-2022 17:06**
Client ID: Run ID: **HG03_402674** SeqNo: **6512360** PrepDate: **21-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00451	0.000200	0.005	0	90.2	80 - 120				

MS Sample ID: **HS22021012-01MS** Units: **mg/L** Analysis Date: **21-Feb-2022 17:10**
Client ID: Run ID: **HG03_402674** SeqNo: **6512362** PrepDate: **21-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00571	0.000200	0.005	-0.000018	115	75 - 125				

MSD Sample ID: **HS22021012-01MSD** Units: **mg/L** Analysis Date: **21-Feb-2022 17:11**
Client ID: Run ID: **HG03_402674** SeqNo: **6512363** PrepDate: **21-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00581	0.000200	0.005	-0.000018	117	75 - 125	0.00571	1.74	20	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175771 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MBLK Sample ID: **MBLK-175771** Units: **mg/L** Analysis Date: **25-Feb-2022 23:09**
Client ID: Run ID: **ICPMS06_403079** SeqNo: **6522291** PrepDate: **25-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	U	0.00200								
Arsenic	U	0.00200								
Beryllium	U	0.00200								
Cadmium	U	0.00200								
Chromium	U	0.00400								
Cobalt	U	0.00500								
Copper	U	0.00200								
Lead	U	0.00200								
Molybdenum	U	0.00500								
Nickel	U	0.00200								
Selenium	U	0.00200								
Silver	U	0.00200								
Thallium	U	0.00200								
Vanadium	U	0.00500								
Zinc	U	0.00400								

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175771 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

LCS Sample ID: **LCS-175771** Units: **mg/L** Analysis Date: **25-Feb-2022 23:11**
Client ID: Run ID: **ICPMS06_403079** SeqNo: **6522292** PrepDate: **25-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05152	0.00200	0.05	0	103	80 - 120				
Arsenic	0.05323	0.00200	0.05	0	106	80 - 120				
Beryllium	0.05129	0.00200	0.05	0	103	80 - 120				
Cadmium	0.05305	0.00200	0.05	0	106	80 - 120				
Chromium	0.05098	0.00400	0.05	0	102	80 - 120				
Cobalt	0.05253	0.00500	0.05	0	105	80 - 120				
Copper	0.05561	0.00200	0.05	0	111	80 - 120				
Lead	0.05122	0.00200	0.05	0	102	80 - 120				
Molybdenum	0.05139	0.00500	0.05	0	103	80 - 120				
Nickel	0.05449	0.00200	0.05	0	109	80 - 120				
Selenium	0.05485	0.00200	0.05	0	110	80 - 120				
Silver	0.05242	0.00200	0.05	0	105	80 - 120				
Thallium	0.05038	0.00200	0.05	0	101	80 - 120				
Vanadium	0.05157	0.00500	0.05	0	103	80 - 120				
Zinc	0.0558	0.00400	0.05	0	112	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175771 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MS Sample ID: **HS22020718-02MS** Units: **mg/L** Analysis Date: **25-Feb-2022 23:17**
Client ID: Run ID: **ICPMS06_403079** SeqNo: **6522295** PrepDate: **25-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05051	0.00200	0.05	0.000172	101	80 - 120				
Arsenic	0.0601	0.00200	0.05	0.008379	103	80 - 120				
Beryllium	0.05177	0.00200	0.05	0.000157	103	80 - 120				
Cadmium	0.05196	0.00200	0.05	0.000139	104	80 - 120				
Chromium	0.04973	0.00400	0.05	-0.000006	99.5	80 - 120				
Cobalt	0.06199	0.00500	0.05	0.011	102	80 - 120				
Copper	0.05334	0.00200	0.05	0.000198	106	80 - 120				
Lead	0.05299	0.00200	0.05	0.00199	102	80 - 120				
Molybdenum	0.05068	0.00500	0.05	0.000703	100.0	80 - 120				
Nickel	0.05446	0.00200	0.05	0.002708	104	80 - 120				
Selenium	0.05355	0.00200	0.05	0.000124	107	80 - 120				
Silver	0.05059	0.00200	0.05	0.000018	101	80 - 120				
Thallium	0.05038	0.00200	0.05	0.000116	101	80 - 120				
Vanadium	0.05236	0.00500	0.05	0.001021	103	80 - 120				
Zinc	0.06869	0.00400	0.05	0.01517	107	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175771 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

MSD Sample ID: **HS22020718-02MSD** Units: **mg/L** Analysis Date: **25-Feb-2022 23:19**
Client ID: Run ID: **ICPMS06_403079** SeqNo: **6522296** PrepDate: **25-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.05279	0.00200	0.05	0.000172	105	80 - 120	0.05051	4.41	20	
Arsenic	0.06179	0.00200	0.05	0.008379	107	80 - 120	0.0601	2.78	20	
Beryllium	0.05322	0.00200	0.05	0.000157	106	80 - 120	0.05177	2.76	20	
Cadmium	0.05421	0.00200	0.05	0.000139	108	80 - 120	0.05196	4.24	20	
Chromium	0.05164	0.00400	0.05	-0.000006	103	80 - 120	0.04973	3.77	20	
Cobalt	0.06343	0.00500	0.05	0.011	105	80 - 120	0.06199	2.3	20	
Copper	0.05418	0.00200	0.05	0.000198	108	80 - 120	0.05334	1.55	20	
Lead	0.05364	0.00200	0.05	0.00199	103	80 - 120	0.05299	1.21	20	
Molybdenum	0.05353	0.00500	0.05	0.000703	106	80 - 120	0.05068	5.46	20	
Nickel	0.05601	0.00200	0.05	0.002708	107	80 - 120	0.05446	2.8	20	
Selenium	0.05606	0.00200	0.05	0.000124	112	80 - 120	0.05355	4.58	20	
Silver	0.05366	0.00200	0.05	0.000018	107	80 - 120	0.05059	5.88	20	
Thallium	0.0516	0.00200	0.05	0.000116	103	80 - 120	0.05038	2.39	20	
Vanadium	0.05442	0.00500	0.05	0.001021	107	80 - 120	0.05236	3.86	20	
Zinc	0.06971	0.00400	0.05	0.01517	109	80 - 120	0.06869	1.48	20	

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175771 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

PDS Sample ID: **HS22020718-02PDS** Units: **mg/L** Analysis Date: **25-Feb-2022 23:21**
Client ID: Run ID: **ICPMS06_403079** SeqNo: **6522297** PrepDate: **25-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1001	0.00200	0.1	0.000172	99.9	75 - 125				
Arsenic	0.1134	0.00200	0.1	0.008379	105	75 - 125				
Beryllium	0.1022	0.00200	0.1	0.000157	102	75 - 125				
Cadmium	0.1054	0.00200	0.1	0.000139	105	75 - 125				
Chromium	0.1018	0.00400	0.1	-0.000006	102	75 - 125				
Cobalt	0.1131	0.00500	0.1	0.011	102	75 - 125				
Copper	0.1054	0.00200	0.1	0.000198	105	75 - 125				
Lead	0.1047	0.00200	0.1	0.00199	103	75 - 125				
Molybdenum	0.1027	0.00500	0.1	0.000703	102	75 - 125				
Nickel	0.1066	0.00200	0.1	0.002708	104	75 - 125				
Selenium	0.1078	0.00200	0.1	0.000124	108	75 - 125				
Silver	0.1044	0.00200	0.1	0.000018	104	75 - 125				
Thallium	0.1009	0.00200	0.1	0.000116	101	75 - 125				
Vanadium	0.1049	0.00500	0.1	0.001021	104	75 - 125				
Zinc	0.1219	0.00400	0.1	0.01517	107	75 - 125				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175771 (0) **Instrument: ICPMS06** **Method: ICP-MS METALS BY SW6020A**

SD Sample ID: **HS22020718-02SD** Units: **mg/L** Analysis Date: **25-Feb-2022 23:15**
Client ID: Run ID: **ICPMS06_403079** SeqNo: **6522294** PrepDate: **25-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Antimony	U	0.0100					0.000172	0	10	
Arsenic	0.009156	0.0100					0.008379	0	10	J
Beryllium	U	0.0100					0.000157	0	10	
Cadmium	U	0.0100					0.000139	0	10	
Chromium	U	0.0200					-0.000006	0	10	
Cobalt	0.01079	0.0250					0.011	0	10	J
Copper	U	0.0100					0.000198	0	10	
Lead	U	0.0100					0.00199	0	10	
Molybdenum	U	0.0250					0.000703	0	10	
Nickel	U	0.0100					0.002708	0	10	
Selenium	U	0.0100					0.000124	0	10	
Silver	U	0.0100					0.000018	0	10	
Thallium	U	0.0100					0.000116	0	10	
Vanadium	0.005065	0.0250					0.001021	0	10	J
Zinc	0.01472	0.0200					0.01517	0	10	J

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175416 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

MBLK Sample ID: **MBLK-175416** Units: **ug/L** Analysis Date: **22-Feb-2022 14:29**
Client ID: Run ID: **SV-6_402856** SeqNo: **6521759** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	0.010								
2-Methylnaphthalene	U	0.010								
Acenaphthene	U	0.010								
Acenaphthylene	U	0.010								
Anthracene	U	0.010								
Benz(a)anthracene	U	0.010								
Benzo(a)pyrene	U	0.010								
Benzo(b)fluoranthene	U	0.010								
Benzo(g,h,i)perylene	U	0.010								
Benzo(k)fluoranthene	U	0.010								
Chrysene	U	0.010								
Dibenz(a,h)anthracene	U	0.010								
Dibenzofuran	U	0.010								
Fluoranthene	U	0.010								
Fluorene	U	0.010								
Indeno(1,2,3-cd)pyrene	U	0.010								
Naphthalene	U	0.010								
Phenanthrene	U	0.010								
Pyrene	U	0.010								
Surr: 2-Fluorobiphenyl	*0.08942*	*0*	*0.08*	*0*	*112*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.09614*	*0*	*0.08*	*0*	*120*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.07278*	*0*	*0.08*	*0*	*91.0*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175416 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCS Sample ID: **LCS-175416** Units: **ug/L** Analysis Date: **22-Feb-2022 14:49**
Client ID: Run ID: **SV-6_402856** SeqNo: **6521760** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	0.06511	0.010	0.08	0	81.4	40 - 140				
2-Methylnaphthalene	0.05028	0.010	0.08	0	62.8	40 - 140				
Acenaphthene	0.04484	0.010	0.08	0	56.1	40 - 140				
Acenaphthylene	0.04425	0.010	0.08	0	55.3	40 - 140				
Anthracene	0.04685	0.010	0.08	0	58.6	40 - 140				
Benz(a)anthracene	0.04142	0.010	0.08	0	51.8	40 - 140				
Benzo(a)pyrene	0.0779	0.010	0.08	0	97.4	40 - 140				
Benzo(b)fluoranthene	0.05846	0.010	0.08	0	73.1	40 - 140				
Benzo(g,h,i)perylene	0.07832	0.010	0.08	0	97.9	40 - 140				
Benzo(k)fluoranthene	0.0884	0.010	0.08	0	110	40 - 140				
Chrysene	0.05551	0.010	0.08	0	69.4	40 - 140				
Dibenz(a,h)anthracene	0.05055	0.010	0.08	0	63.2	40 - 140				
Dibenzofuran	0.04508	0.010	0.08	0	56.3	40 - 140				
Fluoranthene	0.04682	0.010	0.08	0	58.5	40 - 140				
Fluorene	0.04388	0.010	0.08	0	54.9	40 - 140				
Indeno(1,2,3-cd)pyrene	0.072	0.010	0.08	0	90.0	40 - 140				
Naphthalene	0.07726	0.010	0.08	0	96.6	40 - 140				
Phenanthrene	0.04595	0.010	0.08	0	57.4	40 - 140				
Pyrene	0.05323	0.010	0.08	0	66.5	40 - 140				
Surr: 2-Fluorobiphenyl	*0.05789*	*0*	*0.08*	*0*	*72.4*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.07554*	*0*	*0.08*	*0*	*94.4*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.06248*	*0*	*0.08*	*0*	*78.1*	*40 - 140*				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175416 (0) **Instrument: SV-6** **Method: SEMIVOLATILES SIM**

LCSD Sample ID: **LCSD-175416** Units: **ug/L** Analysis Date: **22-Feb-2022 15:09**
Client ID: Run ID: **SV-6_402856** SeqNo: **6521761** PrepDate: **16-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1-Methylnaphthalene	0.07229	0.010	0.08	0	90.4	40 - 140	0.06511	10.5	20	
2-Methylnaphthalene	0.05862	0.010	0.08	0	73.3	40 - 140	0.05028	15.3	20	
Acenaphthene	0.0504	0.010	0.08	0	63.0	40 - 140	0.04484	11.7	20	
Acenaphthylene	0.04323	0.010	0.08	0	54.0	40 - 140	0.04425	2.34	20	
Anthracene	0.07392	0.010	0.08	0	92.4	40 - 140	0.04685	44.8	20	R
Benz(a)anthracene	0.0404	0.010	0.08	0	50.5	40 - 140	0.04142	2.48	20	
Benzo(a)pyrene	0.07638	0.010	0.08	0	95.5	40 - 140	0.0779	1.96	20	
Benzo(b)fluoranthene	0.05637	0.010	0.08	0	70.5	40 - 140	0.05846	3.64	20	
Benzo(g,h,i)perylene	0.07139	0.010	0.08	0	89.2	40 - 140	0.07832	9.25	20	
Benzo(k)fluoranthene	0.07129	0.010	0.08	0	89.1	40 - 140	0.0884	21.4	20	R
Chrysene	0.06202	0.010	0.08	0	77.5	40 - 140	0.05551	11.1	20	
Dibenz(a,h)anthracene	0.04553	0.010	0.08	0	56.9	40 - 140	0.05055	10.5	20	
Dibenzofuran	0.0502	0.010	0.08	0	62.8	40 - 140	0.04508	10.8	20	
Fluoranthene	0.07684	0.010	0.08	0	96.1	40 - 140	0.04682	48.6	20	R
Fluorene	0.05042	0.010	0.08	0	63.0	40 - 140	0.04388	13.9	20	
Indeno(1,2,3-cd)pyrene	0.06714	0.010	0.08	0	83.9	40 - 140	0.072	6.99	20	
Naphthalene	0.07589	0.010	0.08	0	94.9	40 - 140	0.07726	1.79	20	
Phenanthrene	0.07538	0.010	0.08	0	94.2	40 - 140	0.04595	48.5	20	R
Pyrene	0.0603	0.010	0.08	0	75.4	40 - 140	0.05323	12.5	20	
Surr: 2-Fluorobiphenyl	*0.06553*	*0*	*0.08*	*0*	*81.9*	*40 - 140*	*0.05789*	*12.4*	*20*	
Surr: 4-Terphenyl-d14	*0.08951*	*0*	*0.08*	*0*	*112*	*40 - 140*	*0.07554*	*16.9*	*20*	
Surr: Nitrobenzene-d5	*0.07164*	*0*	*0.08*	*0*	*89.6*	*40 - 140*	*0.06248*	*13.7*	*20*	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175533 (0) **Instrument: WetChem_HS** **Method: TOTAL KJELDAHL NITROGEN BY SM4500 NH3 D-2011**

MBLK Sample ID: **MBLK-175533** Units: **mg/L** Analysis Date: **18-Feb-2022 15:30**
Client ID: Run ID: **WetChem_HS_402570** SeqNo: **6509903** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	U	0.50								

LCS Sample ID: **LCS-175533** Units: **mg/L** Analysis Date: **18-Feb-2022 15:30**
Client ID: Run ID: **WetChem_HS_402570** SeqNo: **6509902** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	22.57	0.50	20	0	113	85 - 115				

MS Sample ID: **HS22020425-02MS** Units: **mg/L** Analysis Date: **18-Feb-2022 15:30**
Client ID: Run ID: **WetChem_HS_402570** SeqNo: **6509900** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	19.34	0.50	20	0.32	95.1	75 - 125				

MSD Sample ID: **HS22020425-02MSD** Units: **mg/L** Analysis Date: **18-Feb-2022 15:30**
Client ID: Run ID: **WetChem_HS_402570** SeqNo: **6509901** PrepDate: **17-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Total Kjeldahl	18.86	0.50	20	0.32	92.7	75 - 125	19.34	2.51	20	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175737 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MBLK Sample ID: **MBLK-175737** Units: **mg/L** Analysis Date: **24-Feb-2022 14:40**
Client ID: Run ID: **UV-2450_402965** SeqNo: **6519071** PrepDate: **24-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	U	0.0500								

LCS Sample ID: **LCS-175737** Units: **mg/L** Analysis Date: **24-Feb-2022 14:40**
Client ID: Run ID: **UV-2450_402965** SeqNo: **6519069** PrepDate: **24-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.25	0.0500	0.25	0	100	80 - 120				

LCSD Sample ID: **LCSD-175737** Units: **mg/L** Analysis Date: **24-Feb-2022 14:40**
Client ID: Run ID: **UV-2450_402965** SeqNo: **6519070** PrepDate: **24-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.248	0.0500	0.25	0	99.2	80 - 120	0.25	0.803	20	

MS Sample ID: **HS22020668-02MS** Units: **mg/L** Analysis Date: **24-Feb-2022 14:40**
Client ID: Run ID: **UV-2450_402965** SeqNo: **6519068** PrepDate: **24-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.25	0.0500	0.25	0.016	93.6	80 - 120				

MS Sample ID: **HS22020668-01MS** Units: **mg/L** Analysis Date: **24-Feb-2022 14:40**
Client ID: Run ID: **UV-2450_402965** SeqNo: **6519067** PrepDate: **24-Feb-2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	0.258	0.0500	0.25	0.013	98.0	80 - 120				

MS Sample ID: **HS22020650-02MS** Units: **mg/L** Analysis Date: **24-Feb-2022 14:40**
Client ID: Run ID: **UV-2450_402965** SeqNo: **6519065** PrepDate: **24-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	3.75	0.250	1.25	2.68	85.6	80 - 120				

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: 175737 (0) **Instrument: UV-2450** **Method: PHOSPHORUS BY E365.3-1978**

MSD Sample ID: **HS22020650-02MSD** Units: **mg/L** Analysis Date: **24-Feb-2022 14:40**
Client ID: Run ID: **UV-2450_402965** SeqNo: **6519066** PrepDate: **24-Feb-2022** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total (As P)	3.75	0.250	1.25	2.68	85.6	80 - 120	3.75	0	20	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: R402288 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-021422** Units: **mg/L** Analysis Date: **14-Feb-2022 14:13**
Client ID: Run ID: **Balance1_402288** SeqNo: **6504394** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-021422** Units: **mg/L** Analysis Date: **14-Feb-2022 14:13**
Client ID: Run ID: **Balance1_402288** SeqNo: **6504395** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1068	10.0	1000	0	107	85 - 115				

DUP Sample ID: **HS22020431-03DUP** Units: **mg/L** Analysis Date: **14-Feb-2022 14:13**
Client ID: Run ID: **Balance1_402288** SeqNo: **6504389** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	594	10.0					570	4.12	5	

The following samples were analyzed in this batch: HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: **R402308 (0)** **Instrument:** **WetChem_HS** **Method:** **PH BY SW9040C**

DUP Sample ID: **HS22020695-01DUP** Units: **pH Units** Analysis Date: **15-Feb-2022 18:23**
Client ID: **C1** Run ID: **WetChem_HS_402308** SeqNo: **6504769** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	7.63	0.100					7.64	0.131	10	
Temp Deg C @pH	22.1	0					22.2	0.451	10	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: R402435 (0) **Instrument: ManTech01** **Method: DISSOLVED OXYGEN BY SM4500-O G**

DUP Sample ID: **HS22020287-02DUP** Units: **mg/L** Analysis Date: **17-Feb-2022 11:55**
Client ID: Run ID: **ManTech01_402435** SeqNo: **6507254** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oxygen, Dissolved	11.12	1.00					11.1	0.18	20	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: R402569 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK Sample ID: **WBLK-021722** Units: **mg/L** Analysis Date: **17-Feb-2022 16:03**
Client ID: Run ID: **Balance1_402569** SeqNo: **6509878** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	U	10.0								

LCS Sample ID: **WLCS-021722** Units: **mg/L** Analysis Date: **17-Feb-2022 16:03**
Client ID: Run ID: **Balance1_402569** SeqNo: **6509879** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1076	10.0	1000	0	108	85 - 115				

DUP Sample ID: **HS22020668-02DUP** Units: **mg/L** Analysis Date: **17-Feb-2022 16:03**
Client ID: Run ID: **Balance1_402569** SeqNo: **6509870** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1832	10.0					1824	0.438	5	

DUP Sample ID: **HS22020668-01DUP** Units: **mg/L** Analysis Date: **17-Feb-2022 16:03**
Client ID: Run ID: **Balance1_402569** SeqNo: **6509868** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids (Residue, Filterable)	1264	10.0					1308	3.42	5	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: R402571 (0) **Instrument:** Balance1 **Method:** TOTAL SUSPENDED SOLIDS BY SM 2540D-2011

MBLK Sample ID: **WBLKW1-021822** Units: **mg/L** Analysis Date: **18-Feb-2022 16:20**
Client ID: Run ID: **Balance1_402571** SeqNo: **6509960** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	U	2.50								

LCS Sample ID: **WLCSW1-021822** Units: **mg/L** Analysis Date: **18-Feb-2022 16:20**
Client ID: Run ID: **Balance1_402571** SeqNo: **6509961** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	85	2.50	100	0	85.0	85 - 115				

DUP Sample ID: **HS22020879-03DUP** Units: **mg/L** Analysis Date: **18-Feb-2022 16:20**
Client ID: Run ID: **Balance1_402571** SeqNo: **6509959** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	31.33	2.50					31.33	0	5	

DUP Sample ID: **HS22020709-02DUP** Units: **mg/L** Analysis Date: **18-Feb-2022 16:20**
Client ID: Run ID: **Balance1_402571** SeqNo: **6509954** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Suspended Solids (Residue, Non-Filterable)	15.43	2.50					15.14	1.87	5	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: R402576 (0) **Instrument: Balance1** **Method: TOTAL SOLIDS BY SM2540B-2011**

MBLK Sample ID: **MBLK-R402576** Units: **mg/L** Analysis Date: **18-Feb-2022 16:47**
Client ID: Run ID: **Balance1_402576** SeqNo: **6510019** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0								

LCS Sample ID: **LCS-R402576** Units: **mg/L** Analysis Date: **18-Feb-2022 16:47**
Client ID: Run ID: **Balance1_402576** SeqNo: **6510018** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	1040	10.0	1000	0	104	85 - 115				

DUP Sample ID: **HS22020771-01DUP** Units: **mg/L** Analysis Date: **18-Feb-2022 16:47**
Client ID: Run ID: **Balance1_402576** SeqNo: **6510020** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Residue, Total	U	10.0					0	0	20	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: R402654 (0) **Instrument: WetChem_HS** **Method: SALINITY**

DUP Sample ID: **HS22020287-03DUP** Units: **ppt** Analysis Date: **21-Feb-2022 13:28**
Client ID: Run ID: **WetChem_HS_402654** SeqNo: **6511813** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Salinity	<2	2.00					0	0	20	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: R402955 (0) **Instrument: Balance1** **Method: OIL & GREASE (HEM) BY E1664A**

MBLK Sample ID: **WBLKW-022422** Units: **mg/L** Analysis Date: **24-Feb-2022 13:00**
Client ID: Run ID: **Balance1_402955** SeqNo: **6518857** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	U	2.00								

LCS Sample ID: **WLCSW-022422** Units: **mg/L** Analysis Date: **24-Feb-2022 13:00**
Client ID: Run ID: **Balance1_402955** SeqNo: **6518859** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	36.7	2.00	40	0	91.8	78 - 114				

LCSD Sample ID: **WLCSDW-022422** Units: **mg/L** Analysis Date: **24-Feb-2022 13:00**
Client ID: Run ID: **Balance1_402955** SeqNo: **6518858** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.9	2.00	40	0	97.2	78 - 114	36.7	5.82	18	

MS Sample ID: **HS22020897-02MS** Units: **mg/L** Analysis Date: **24-Feb-2022 13:00**
Client ID: Run ID: **Balance1_402955** SeqNo: **6518847** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Oil and Grease	38.1	2.00	40	2.869	88.1	78 - 114				

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: HS22020695

QC BATCH REPORT

Batch ID: R403176 (0) **Instrument: ICS-Integrion** **Method: NITRATE/NITRITE BY E300.0, REV 2.1, 1993**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **25-Feb-2022 13:33**
Client ID: Run ID: **ICS-Integrion_403176** SeqNo: **6523743** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	U	0.200								

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **25-Feb-2022 13:38**
Client ID: Run ID: **ICS-Integrion_403176** SeqNo: **6523744** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	7.686	0.200	8	0	96.1	90 - 110				

MS Sample ID: **HS22020695-01MS** Units: **mg/L** Analysis Date: **25-Feb-2022 13:49**
Client ID: **C1** Run ID: **ICS-Integrion_403176** SeqNo: **6523746** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	18.43	1.00	20	0.336	90.4	80 - 120				

MSD Sample ID: **HS22020695-01MSD** Units: **mg/L** Analysis Date: **25-Feb-2022 13:54**
Client ID: **C1** Run ID: **ICS-Integrion_403176** SeqNo: **6523747** PrepDate: DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrate/Nitrite (as N)	19.85	1.00	20	0.336	97.6	80 - 120	18.43	7.44	20	

The following samples were analyzed in this batch: HS22020695-01 HS22020695-02 HS22020695-03 HS22020695-04 HS22020695-05 HS22020695-06

RIGHT SOLUTIONS | RIGHT PARTNER

Client: ERM, Inc
Project: C1, R4, R13, R14, SW10, & R2
WorkOrder: **HS22020695**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	21-022-0	26-Mar-2022
Florida	E87611-34	30-Jun-2022
Illinois	2000322021-7	09-May-2022
Kansas	E-10352 2021-2022	31-Jul-2022
Kentucky	123043, 2021-2022	30-Apr-2022
Louisiana	03087, 2021-2022	30-Jun-2022
Texas	T104704231-21-28	30-Apr-2022

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS22020695 **Date/Time Received:** **12-Feb-2022 11:25**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By:	/S/ Pablo Marinez	16-Feb-2022 14:11	**Reviewed by:**	/S/ Corey Grandits	16-Feb-2022 14:20
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **WATER** Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:252582
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	15.8°C/16.3°C, 13.2°C/13.7°C UC/C	IR 31	
Cooler(s)/Kit(s):	48070, 46623		
Date/Time sample(s) sent to storage:	2/14/22 15:00		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: CoC missing ID & Collection Date/Time, logged per Sample Label
C1 2/2/22 06:45 R4 2/2/22 07:54 R13 2/2/22 11:05
R14 2/2/22 11:16

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

RIGHT SOLUTIONS | RIGHT PARTNER

Sample Receipt Checklist

Work Order ID: HS22020695 **Date/Time Received:** **12-Feb-2022 11:25**

Client Name: ERM NC **Received by:** **Paresh M. Giga**

Completed By:	/S/ Pablo Marinez	16-Feb-2022 14:13	**Reviewed by:**	/S/ Corey Grandits	16-Feb-2022 14:20
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **WATER** Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	COC IDs:252352
Samplers name present on COC?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Temperature(s)/Thermometer(s):	14.3°C/14.8°C UC/C	IR 31	
Cooler(s)/Kit(s):	48074		
Date/Time sample(s) sent to storage:	2/14/22 15:00		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes: CoC missing ID & Collection Date/Time, logged per Sample Label
SW10 2/2/22 10:17 R2 2/2/22 11:28
R2 - 2nd 1LAMBNeat of 2 received empty

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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Chain of Custody Form

Page ____ of ____

COC ID: 252582

HS22020695

WV

ERM, Inc

C1, R4, R13, R14, SW10, & R2

ALS Project Manager:

Customer Information		Project Information			
Purchase Order		Project Name		A	8270SIM_Water (PAHs)
Work Order		Project Number		B	DISS_O 4500-O G (Dissolved Oxygen)
Company Name	ERM	Bill To Company	ERM	C	ICP_TWater (6020/7470 Metals (16))
Send Report To	Selina Pradhan	Invoice Attn	AP	D	Nitrogen, Total_Water
Address	300 West Summit Avenue	Address	300 West Summit Avenue	E	O&G_1664_Water_HS (Oil & Grease)
				F	P_TWater (Phosphorous)
City/State/Zip	Charlotte I NC I 28203	City/State/Zip	Charlotte I NC I 28203	G	pH_Water_9040C
Phone		Phone		H	Salinity
Fax		Fax		I	TSS 2540D, TDS 2540C, & TS 2540G
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	ermnaaccountspayable@erm.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	C1	2/02/22	6:45														
2	R4	2/02/22	7:54														
3	R13	2/02/22	11:05														
4	R14	2/02/22	11:46														
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by: Date: Time: Received by:

Relinquished by: Date: Time: Received by (Laboratory): 2/12/2022 11:25

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
48070	13.8
4F6023	13.2

QC Package: (Check One Box Below)

- [X] Level II Std QC
- [ ] Level III Std QC/Raw Data
- [ ] Level IV SVM/CLP
- [ ] Other
- [ ] TRRP Checklist
- [ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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Chain of Custody Form

Page _____ of _____

COC ID: 252352

HS22020695 WV

ERM, Inc

C1, R4, R13, R14, SW10, & R2

Customer Information		Project Information		ALS Project Manager:
Purchase Order		Project Name		
Work Order		Project Number		
Company Name	ERM	Bill To Company	ERM	
Send Report To	Selina Pradhan	Invoice Attn	AP	
Address	300 West Summit Avenue	Address	300 West Summit Avenue	
City/State/Zip	Charlotte | NC | 28203	City/State/Zip	Charlotte | NC | 28203	
Phone		Phone		
Fax		Fax		
e-Mail Address	selina.pradhan@erm.com	e-Mail Address	emnaaccountspayable@erm.com	

A	8270SIM_Water (PAHs)
B	DISS_O 4500-O.G (Dissolved Oxygen)
C	ICP_TWater (6020/7470 Metals (16))
D	Nitrogen, Total_Water
E	O&G_1664_Water_HS (Oil & Grease)
F	P_TWater (Phosphorous)
G	pH_Water_9040C
H	Salinity
I	TSS 2540D, TDS 2540C, & TS 2540G
J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	SW10	2.2.22	10:57														
2	R2	2.2.22	11:28														
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign

Shipment Method

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other _____

Results Due Date:

Relinquished by: Date: Time: Received by:

Relinquished by: Date: 2.4.22 Time: 11:15 Received by (Laboratory):

Logged by (Laboratory): Date: 2/4/22 Time: 10:15 Checked by (Laboratory):

Notes: ERM - Guyana

Cooler ID	Cooler Temp.
1 Ecoff	4.3C
1 F3	4 Ices

QC Package: (Check One Box Below)

- [X] Level II Std QC
- [ ] Level III Std QC/Raw Data
- [ ] Level IV SW846/CLP
- [ ] Other
- [ ] TRRP Checklist
- [ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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ORIGIN ID:GEOA 5922252017

GUYANA LOGISTICS & SUPPORT SERVICES
110 DUKE & BARRACK STREETS
KINGSTON
GEORGETOWN,
GUYANA GY

SHIP DATE: 03FEB22
TOTWGT: 151.00 LB
CAD: 2450980/FXSF0107
DIMS: 24x13x14 IN

BILL SENDER

TO ALS ENVIRONMENTAL
COREY GRANDITS (PROJECT MANAGER)
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656

REF:
DEPT:

(US)

56DJ2027C/FE4A

FedEx Express

J221402816952uw

1 of 4

TRK# 2894 3455 4757
0430
MASTER

10:30A
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APPENDIX H

Ichthyofaunal Assessment of the Gas to Energy Project Sites

Resubmitted without changes

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UNIVERSITY of GUYANA

CENTER FOR THE STUDY OF BIOLOGICAL DIVERSITY

ICHTHYOFAUNAL ASSESSMENT OF THE GAS TO ENERGY PROJECT SITES

7 MARCH 2022

Report submitted by:

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Summary

A baseline study was conducted to describe the species composition and distribution of fish fauna, taxonomic changes, and abundance/biomass relations, evaluate fish habitat and environmental (water quality) conditions and determine the conservation status of each fish species for inland waters and direct area of the MOF (on the Demerara River) along the sites for the gas to energy project. Sampling was done during the dry season (November 11-22, 2021) and wet season (January-February 2022) using a combination of methods: drag seine, cast net, and gill nets for fishes and a multi-parameter water quality kit for measurement of water quality which included pH, temperature, turbidity, and Secchi depth. The survey yielded 4613 individuals weighing 91, 477.03 g (91.477 kg) and produced seventy-nine (79) fish species from the 13 sampling sites, belonging to 10 orders comprising 30 families and 72 genera. A total of 1376 individuals weighing 35,483.45 g (35.483 kg) which resulted in fifty-five (55) species being collected from the ten (10) sampling sites during the Dry Season, belonging to seven (7) orders comprising 26 families and 49 genera and the wet season produced 3237 individuals weighing approximately one-half times more biomass, i.e. total biomass of 55993.60 g (55.993 kg) and resulted in 68 species collected from the 13 sampling sites belonging to nine (9) orders comprising 26 families and 62 genera.

The most abundant orders were the characiformes (9 families, 31 species), Siluriformes (9 families, 19 species), Cichliformes (1 family, 12 species), Perciformes (3 families, 3 species), Cyprinodontifomres (2 families, 5 species), Gymnotiformes (2 families, 3 species) and Clupeiformes (1 family, 2 species), while the most abundant fish family for the combined (dry and wet seasons) survey was Cichlidae (12 species, 15.2%),

Characidae (11 species, 13.9 %), Serrasalmidae family (6 species,7.6 %), followed by Lebiasinidae (5 species, 6.3%). The most abundant species were *Pristella maxillaris* (N= 1444), Relative Abundance (RA) = 31.30 %) was the most abundant species, the second most prevalent species was *Roeboides thurni* (N=825, RA = 19.40%), followed by, *Krobia guianensis* (N=235, RA = 5.09%), *Rineloricaria fallax (*N=170, RA =3.69%) and *Astyanax bimaculatus* (N=142, RA =3.16%).

The highest species richness recorded was at ERM-21-08 (Wales #1) (S=32) species and ERM-21-09 (Wales #2) (S=26) species. The site with the highest relative abundance with regards to fish species was Site ERM-21-10 (Cogland dam) (N=1229) and accounted for 26.64% of the total species abundance. The second highest abundance was recorded at Site ERM-21-03 (Parfaite Harmony) (N=10811) which was 23.4.3 %, followed by Site ERM-21-08 /ERM-22-08 (Wales #1) (N=460) made up 9.97%. The highest biomass 13086.59 g was observed at site ERM-21-06 (Eastern Demerara Ref), then site ERM-21-07 (Western Demerara MoF) with 10,607.75 g and site ERM-21-05 (Canal #2) (10,0180.7g). The fish family with the highest relative biomass for the combined seasons was Cichlidae (15.2%), this was followed by the family Characidae accounting for 13.9xx%, then Serrasalmidae with (7.6%), Lebiasinidae (6.3%), and Rivulidae (5.1%). *Hoplerythrinus unitaeniatus* had the highest relative biomass (17.7 %), with individuals ranging in sizes from 17 to 32 cm (mean 19.08±10.41 cm), the second-highest was for *Curimata cyprinoides* with relative biomass of 15.2 % and individuals ranging in sizes between 4.0 and 24.6 cm (9.79±8.87 cm), followed by *Pygocentrus nattereri* with relative biomass 9.0 % and individuals with sizes from 14.5 to 23.0 cm (19.75±2.37 cm). The site that had the largest Margalef species richness index value for the combined seasons was Site ERM-21-08 (Wales #1) with 31.84, the next highest value was 25.83 for Site ERM-

21-09 (Wales #2), followed by a value of 23.86 for Site ERM-21-10 (Cogland dam). Shannon–Wiener diversity index (H') value was highest at Site ERM-21-08 8/ERM-22-08 (Wales #1) H'=2.69, for both dry and wet seasons. This was followed by Site ERM-21-09 (Wales #2) with H'=2.21, then ERM-21-06 (Eastern Demerara Ref) H'=2.15 and ERM-22-13 (Wale #3) was H'=2.15. The lowest H' value was recorded for ERM-21-03 (Parfaite Harmony) with 0.54. Pielou evenness index for combined seasons was highest at Site ERM-21-06 (Eastern Demerara Ref) with a value of 0.46, the second largest value 0.44 was at Site ERM-21-08 (Wales #1), then Site ERM-21-07 (Western Demerara MoF) with value 0.43, The smallest value was found at Site ERM-21-03 (Parfaite Harmony) with 0.08. Water quality parameters pH, temperature, turbidity, and Secchi depth. All had significant loadings in PCA analysis and are important drivers of fish assemblage. NMDS separated fish species in several assemblage structures that were significantly different among sites based on ANOSIM.

Habitat assessment scores for the survey showed that 36.4% of sites were evaluated as having sub-optimal conditions and includes sites ERM-21-03/PV-03 (Parfaite Harmony), ERM-21-08/DD-08 (Wales #1), ERM-21-09/WW-09 (Wales #2) and ERM-22-13/WW-13 (Wales #3), while 63.6% of sites sampled were categorized as having marginal conditions; these include sites ERM-21-01/MB-01 (Mary bar-Crane village), ERM-21-02/CV-02 (Crane turn), ERM-21-04/CVR-04 (Canal no.1), ERM-21-05/CVR-05 (Canal no.2), ERM-21-10/CD-10 (Cogland dam), ERM-22-11/CC-11 (Connecting channel #1) and ERM-22-12/CC-12 (Connecting channel #2).

ABC analyses showed heavy disturbed environmental conditions for sites ERM-21-10 (Cogland dam) with (negative W-statistic), partially or moderately disturbed environmental conditions were found at sites ERM-21-01 (Mary bar-Crane village), ERM-

21-04 (Canal no.1), ERM-21-05 (Canal no.2) and ERM-21-09 (Wales #2) which showed overlapping biomass and abundance curves but with (positive W-statistic) and undisturbed environmental conditions were found for sites ERM-21-02 (Crane turn), ERM-21- 03 (Parfaite Harmony), ERM-21-06 (Eastern Demerara Ref), ERM-21-07 (Western Demerara MoF) and ERM-21-08 (Wales #1) with (positive W-statistic). Many of the fish species recorded are tolerant to disturbance, while others were sensitive to habitat changes. One fish species recorded, the Tarpon/Cuffum (*Megalops atlanticus*) is listed as Vulnerable according to the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species, however, most species were listed as Least Concerned or Not Applicable and none were CITES appendix listed. Many of the fish species are used for subsistence and aquarium trade. Therefore, it is important to ensure that mitigation plans are implemented to monitor and safeguard the fish resources throughout the life of the GTE project.

Introduction

Guyana is the only English-speaking country in South America with a population of over 786,000 (World Bank, 2021). The country has a rich biodiversity with over 1815 known species of birds, fishes, mammals, reptiles, and amphibians, many of which are endemic to Guyana (EPA, 2010). Guyana's rich biodiversity can be attributed to its unique position within the neotropical region of north-eastern South America. The country is also a part of the Guiana Shield, which forms part of the Amazon biome that is home to at least 10% of the world's known biodiversity (EPA, 2014; WWF - Guianas, 2012). Guyana experiences wet tropical, hot and humid climates that are cooled by the North East trade winds (EPA, 2010). There are two distinct dry and wet seasons, however, these have been changing due to climate change. The country's biodiversity provides many ecosystem services to local populations including economic, social, and ecological benefits (EPA, 2005). Guyana has a rich aquatic biodiversity with many of the species understudied. This rich biodiversity is supported by the interconnected nature of the water bodies and drainages in Guyana. However, this characteristic also makes the aquatic species vulnerable as impacts on one water body can have impeding impacts on others.

Fish is the most diverse vertebrate group and are key elements in aquatic ecosystems. These organisms are the second most threatened species on earth (Hu et al., 2019). Their positions on the food chain and their sensitivity to a wide range of impacts make them good indicators of biological integrity (Hu et al., 2019; Alonso et al., 2011; Fausch et al.,1990). Fishes are a sensitive indicator of the relative health of aquatic ecosystems and surrounding watersheds and form the basis for biological monitoring of environmental degradation (Fausch et al.,1990). The primary agents of stress to fish communities are

anthropogenic disturbances. Because of the extended life span of fishes, their populations can show the effects of varied stress on reproduction, survival, and growth through monitoring (Karr, 1981).

The gas to energy project in Guyana is poised to reduce the electricity cost in the country significantly. The project will consist of an onshore processing plant which will be located in Wales on the West Bank of Demerara, an offshore 12-inch pipeline appropriately 220 km long, and an onshore 12-inch pipeline appropriately 24km long (Crowley, 2021; Oilnow, 2021). This pipeline will run along the demerara river and several freshwater canals to the processing plant. Therefore, an assessment of all risks including those posed to the environment and biodiversity needed to be assessed. Aquatic biodiversity, including fishes, is key to this assessment. This study examined the fish diversity and abundance at strategic sites along the pipeline to gather baseline data for biological monitoring during the wet and dry seasons.

Objectives

1. Describe the species composition and distribution of fish fauna for inland waters and direct area of the MOF (on the Demerara River) along the sites for the gas to energy project.
2. Characterize and evaluate fish habitat and environmental (water quality) conditions for inland waters and direct area of the MOF (on the Demerara River) along the sites for the gas to energy project.
3. Determine taxonomic changes and abundance/biomass relationships in disturbed fish communities for inland waters and direct area of the MOF (on the Demerara River) along the sites for the gas to energy project.
4. Determine the conservation status of each fish species for inland waters and the direct area of the MOF (on the Demerara River) along the sites for the gas to energy project.

Methods

Study sites

Figure 1: Sampling sites

Table 1: Site data

Site Number	Site Name	Site Codes	Date (Dry Season)	Date (Wet Season)	Latitude	Longitude
ERM-2201	Mary Bar- Crane Village	MB-01	11-Nov-2021	14-Jan-2022	6.82654	-58.20824
ERM-22-02	Crane Turn	CV-02	12-Nov-2021	15-Jan-2022	6.81187	-58.20950
ERM-22-03	Parfaite Harmony	PV-03	13-Nov-2021	11-Feb-2022	6.79059	-58.23930
ERM-22-04	Canal #1	CVR-04	16-Nov-2021	7-Feb-2022	6.76501	-58.24325
ERM-22-05	Canal #2	CV-05	17-Nov-2021	10-Feb-2022	6.72991	-58.24651
ERM-22-06	Eastern Demerara (Ref)	DRR-06	18-Nov-2021	12-Jan-2022	6.63208	-58.20500
ERM-22-07	Western Demerara (MoF)	DR-07	19-Nov-2021	12-Jan-2022	6.66053	-58.20183
ERM-22-08	Whales #1 Double Door	DD-08	20-Nov-2021	8-Feb-2022	6.66468	-58.23000

ERM-22-09	Whales #2 Double Door	WW-09	21-Nov-2021	9-Feb-2022	6.66562	-58.23773
ERM-22-10	Cogland dam	CD-10	22-Nov-2021	6-Feb-2022	6.81409	-58.23565
ERM-22-11	Connecting Channel #1	CC-11	-	12-Feb-2022	6.77837	-58.24071
ERM-22-12	Connecting Channel # 2	CC-12	-	13-Feb-2022	6.76189	-58.24276
ERM-22-13	Wales #3	WW-13	-	14-Feb-2022	6.68238	-58.19650

Site 1 (ERM-21-01) - Crane Village (Mary Bar)

Site 1 is located in Crane Village (latitude 6.827167 and longitude -58.20869), in the northern section on the West Bank Demerara close to the Rip Rap Sea Defence. The site is situated between two wooden bridges that are approximately 700-800 meters apart with a stream (channel ranging about 5-10m in width) running in an East to West direction, approximately south (away) from the parallel rocky rip-rap sea defense separated by a mud dam. The area was disturbed by anthropogenic activities with squatting along the eastern end of the site, while farming was Western sections, south of the site. There was also evidence of fishing nets in the channel used by residents. There was patchy secondary vegetation to the Eastern-southern banks dominated by *Montrichardia arborescens, Yautia madera* (moco-moco), *Xanthosoma spp.* (Wild Tannia) and (bundari bush). The northern bank is a mid-dam dominated by low-growing *Brachiaria mutica* (para grass) and *Neptunia oleracea* (water mimosa) at the edge of the channel. Aquatic vegetation is present in the western section of the channel, and this is dominated by *Pistia stratiotes* (Water Cabbage/ Water Lettuce). Other aquatic vegetation

observed included *Pontederia crassipes* (water hyacinth), *Brasenia schreberi* (Watershield), and *Nymphaea alba* (White water lily). In the eastern section of the channel, the water was greenish indicating *algal* bloom and possible fecal contamination through direct observation in the general area. Overall, in both the dry and wet seasons, this site had an average pH of 6.98, temperature 27.87 ^{o}C, and turbidity 103.5 NTU. The water was murky and had an odor. Garbage was present throughout this sampling site.

Site 2 (ERM-21-02) - Crane Village (Crane Turn)

This site is located south-southeast from site 1 on the Crane village (large turn) and separated by the Georgetown-Parika Public Road. The eastern half is on the right side of the public road and the western on the other side. They are connected via a culvert (tunnel) that passes under the road. The eastern section has some aquatic vegetation and grass and runs about 400-500 m to a bridge east of the road and eventually meets the estuary at the Demerara River. The western section is a disturbed site that runs through

a rice field for a few 1000 m bordered by dams used as access roads to farmlands. This section is about 8-12 m in width and is regularly cleaned by rice farmers with little to no riparian vegetation except for a few Cocos *nucifera* (coconut palms). This canal is influenced by estuarine and tidal activities with murky water and is a possible source of drainage and irrigation systems for farmers. The site is predominantly occupied by *Pistia stratiotes* (Water Cabbage, Water Lettuce) with about 70% cover, and other aquatic vegetation such as *Pontederia crassipes* (common water hyacinth), *Brasenia schreberi* (Common watershield), *Nymphaea alba* (white water lily), *Salvinia molesta* (Large Duck weed) and *Lemna minor* (Small Duck weed). The average pH is about 6.86, temperature 28.47 °C, and turbidity 129.5 NTU.

Site 3 (ERM-21-03) - Parfaite Village

This was an artificially dug stream with a channel approximately 10-12 m in width, water clear with visibility to bottom and moderate flow. There were several species of vegetation (submerged and floating macrophytes) that are suitable habitats for macroinvertebrates and fishes which includes predominantly *Brasenia schreberi* (Watershield), *Cabomba aquatica* and *Cabomba sp.* (Shrimp grasses). There is riparian vegetation with large trees and shrubs on both banks (>30 m continuous) and evidence of some agricultural activities along the banks. The site had an average pH of 3.20, temperature 29.14°C, and turbidity 33.14 NTU.

Site 4 (ERM-21-04) - Canal #1 Village

This site is another artificially dug stream with a channel approximately 12-15 m in width. The water is clear with some visibility to the bottom and moderate flow. The channel is dominated by submerged and floating macrophytes *Cabomba aquatica* and *Cabomba sp*. (Shrimp grasses) and some presence of *Brasenia schreberi* (Watershield), which are suitable habitats for macroinvertebrates and fishes. This channel serves as a major drainage and irrigation system in the Canal # 1 area. There is little to no riparian vegetation on either side of the channel. This disturbed site has garbage pollution (that includes many broken bottles, sharp metals, and rusted wires from burnt tyres) and an odour and hydrogen sulfide gas that was evident during the sampling periods. The site had an average pH of 3.49, temperature 27.52 °C and turbidity of 78.18 NTU.

Site 5 (ERM-21-05) - Canal #2 Village

This is another artificially dug canal with similar characteristics to Canal # 1. This channel is approximately 13-16 m wide with clear water and moderate flow. *Cabomba aquatica* and *Cabomba sp*. (Shrimp grasses) and some presence of *Brasenia schreberi* (Watershield) are the predominant aquatic vegetation in the channel. This channel serves as a major drainage and irrigation system in the Canal # 2 areas. There is little to no riparian vegetation on either side of the channel with evidence of garbage pollution throughout the channel. This site had an average pH of 3.49, temperature 27.64 °C, and turbidity 61.96 NTU.

Site 6 (ERM-21-06) - Demerara River (Eastern) (Reference Site)

This estuarine site was located on the eastern bank of the Demerara River a few kilometers (~15-20 km) upstream from the confluence with the Atlantic Ocean. The site is intertidal with evidence of significant levels of anthropogenic sources of pollution. The Demerara River was considered a commercial/industrial zone because of the shipping and socio-economic activities. The bank of the site was composed predominantly of red mangroves (*Rhizophora mangle*) and black mangroves *Avicennia germinans*. This site had an average pH of about 4.90, a temperature of 26.87 ^{o}C, and the turbidity was out of range on the turbidity meter (> 1000 NTU).

Site 7 (ERM-21-07) - Demerara River (MOF Alternative Site 2) Western Bank - Wales Estate

This site was located on the western side of the Demerara River. The riparian forest was approximately >10 m continuously inland with mostly red mangroves (*Rhizophora mangle*), black mangroves (*Avicennia germinans*), and thorny vegetation (bundary bush). Overall, the average pH is 5.36, temperature 27.26 °C, and the turbidity was out of range on the turbidity meter (> 1000 NTU).

Site 8 (ERM-21-08) - MoF Alternative Site 1 - Western Bank Wales Estate Double door Koker Site 1 (Wales #1)

This area is an artificially dug channel that is approximately 10-15 m wide that forms part of a network of channels for the Wales Sugar estate and movement of sugar punts. This channel is also a major drainage and irrigation system in the area that is connected to the double door Koker for the regulation of water levels in the canal. The water is tea-coloured from tannins from the leaves and roots of the riparian vegetation and surrounding soil source and has moderate flow with characteristics of black water creek conditions. There were several species of vegetation (submerged and floating macrophytes) predominantly *Brasenia schreberi* (Watershield), *Cabomba aquatica*, *Cabomba sp.,* and *Myriophyllum sp.* (Shrimp grasses) that are suitable habitats for macroinvertebrates and fishes. Riparian vegetation is present on the Demerara side of the sampling area, but no riparian cover exists for sampling points on the canal except closer to the source and head waters. The

area has sharp metals from abandoned sugar punts on the banks and throughout the channels at this sampling site, similar to the double-door Koker. This site's average water quality parameters were recorded as pH 3.78, temperature 27.08 °C, and turbidity 18.6 NTU.

Site 9 (ERM-21-09) - MoF Alternative Site 1 - Western Bank - Wales Estate Double Door Koker Site 2 (Wales #2)

This area is an artificially dug channel that is approximately 10-15 m wide and is similar in characteristics to and upstream from ERM-21-08. The water levels were low and tea-coloured with tannins from leaves with moderate flow. There were several species of vegetation (submerged and floating macrophytes) predominantly *Brasenia schreberi* (Watershield), *Cabomba aquatica*, *Cabomba sp.* and *Myriophyllum sp.* (Shrimp grasses) that are suitable habitats for macroinvertebrates and fishes. Riparian vegetation is present on the Demerara side of the sampling area, but no riparian cover exists for sampling points on the canal except closer to the source and head waters. This channel is

also a major drainage and irrigation system in the area that is connected to the double door Koker for the regulation of water levels in the canal. Sharp metals from abandoned sugar punts were present on the banks and throughout the channels. The site had an average pH of 3.74, temperature 26.78 °C and turbidity 9.96 NTU.

Site 10 (ERM-21-10) - Cogland Dam Canals

This site was located along the rice fields behind the Cogland village. Both sides of the banks had mostly shrubs and grass and is generally a disturbed site. The channel was

predominantly murky and was occupied with *Pontederia crassipes* (water hyacinth) and some *Brasenia schreberi* (Watershield) and *Cabomba aquatica* (Shrimp grass). The water was murky, opaque, and odorless. The site had an average pH of 5.52, temperature 27.01 °C, and turbidity 202.96 NTU.

Site 11 (ERM-22-11) - Connecting channel 1

This artificially dug canal site is located on the right-hand side, perpendicular to ERM-21-04 (Canal #1), and is a major drainage and irrigation canal surrounded by farmlands and rice fields. Both sides of the banks had mixed vegetation which include *Cecropia sp.*, *Heliconia sp*., Aunty desmond, *Yautia madera* (moco-moco), *Syzygium cumini* (Jamoon), and three species of Melastomataceae *sp*. The water was clear and had some odor with an average pH of 3.54, temperature 26.92 °C, and turbidity 14.88 NTU. The channel consisted of macrophytes such as *Brasenia schreberi* (Watershield), *Cabomba aquatica*, *Cabomba sp.,* and *Myriophyllum sp.* (Shrimp grasses).

Site 12 (ERM-22-12) - Connecting channel 2

This site was located on the left-hand side, perpendicular to ERM-21-04 (Canal #1). The water was black, clear, and was odorless and the water may have originated from a natural source. The right bank was heavily vegetated, and the left bank was a dam used as an access road to surrounding farmlands. Plant species such as *Brasenia schreberi* (Watershield), *Cabomba aquatica*, and *Cabomba sp.* (Shrimp grasses) occupy the channel. The site had an average pH of 3.59, a temperature of 26.20 °C, and a turbidity of 104.18 NTU.

Site 13 (ERM-22-13) - Wales #3

Wales #3 is located further inwards, but closer to the Demerara River (see map above). The water was clear, black, and odorless. The channel was predominantly occupied by *Brasenia schreberi* (Watershield), *Cabomba aquatica*, *Cabomba sp.* and *Myriophyllum sp.* (Shrimp grasses), *Pontederia crassipes* (water hyacinth), *Pistia stratiotes* (Water Cabbage/ Water Lettuce), *Salvinia molesta* (Large Duckweed), and *Lemna minor* (Small Duckweed). The bank had shrubs and small trees indicating primary and secondary succession. The site had an average pH of 4.69, a temperature of 26.1 °C, and a turbidity of 140.16 NTU. This site was cleared of pollution.

Water quality analysis

Water depth and clarity were measured in meters to the nearest one decimal place using a graduated rope and Secchi disk. The temperature was measured in degrees Celsius with a handheld thermometer probe to the nearest one decimal place. Electrical conductivity was recorded in micro siemens (µS/cm) using a digital electrical conductivity meter. pH was measured to one decimal place with a waterproof pH meter, and salinity was recorded in percentage using a refractometer. Turbidity was measured using a portable turbidimeter in NTU. All water quality parameters were taken at multiple points within the sampling area, and the averages were calculated for each site.

Fish sampling

Fish was sampled from 10 sites during the dry season (November 11-22, 2021) and 13 sites from the wet season (January-February 2022). Fish species diversity and abundance were sampled using a combination of drag seine (10 x3 m), cast nets (3.6x 4m), dip nets, and gill net with different dimensions (1) 200 m × 1.30 m—50 mm mesh; (2) 200 × 1.30 m—40 mm mesh; and (3) 200 m × 1.30 m—25 mm mesh. A drag seine was manually used to capture small fish using a plus five (+5) method where five additional drags were added for each new fish species caught until no new fish was captured after five consecutive drags. Gill nets were used to capture larger fish and were placed along shores, river banks, and open areas for 3 hours at each site. A cast net was thrown upstream (15 throws) and downstream (15 throws) at all sites. Dip nets were used to capture fish in shallow and transparent streams. All fishes caught were removed, identified to the lowest taxonomic

level using the appropriate taxonomic keys and guides such as Freshwater Fishes of Guyana (Gery, 1977; Vari et al., 2009). All specimens were stored in 10% formalin and 70% ethanol and deposited to the CSBD collection which is Guyana's sole national repository for floral and faunal reference collections.

Data analysis

The Shannon diversity index was used to measure the diversity of fish species across sites and seasons. The Margalef index was used to assess the dominance of each fish species between different sites and seasons. A Pielou's evenness index was used to measure the evenness (relative abundances of each species) across each season and site. A Principal Component Analysis (PCA) was done to visualize relationships between the physicochemical parameters of each site. Non-metric-multidimensional scaling (NMDS) was used to visualize the relationship among fish communities by site and Analysis of Similarity (ANOSIM) was used to test for differences in fish community structure. ABC analysis was used to determine whether sites were disturbed based on species biomass and abundance. All analyses were done using RStudio Version (2022.2.0.443), Microsoft Excel (2019), and SPSS Version (28.0.1.1[14]).

Results & Discussion

Species composition

Species composition for both combined seasons (dry and wet) yielded a total of 4613 individuals weighing 91, 477.03 g (91.477 kg) collected during the surveys, which resulted in seventy-nine (79) species from the 13 sampling sites, belonging to ten (10) orders comprising 30 families and 72 genera. The characiformes order (9 families, 31 species) was the most abundant, followed by the order Siluriformes (9 families, 19 species), Cichliformes (1 family, 12 species), Perciformes (3 families, 3 species), Cyprinodontifomres (2 families, 5 species), Gymnotiformes (2 families, 3 species), Clupeiformes (1 family, 2 species). The Myliobatiformes (1 family, 2 species), Pleuronectiformes (1 family, 1 species), and the Elopiformes (1 family, 1 species) were the least represented fish orders during the studies.

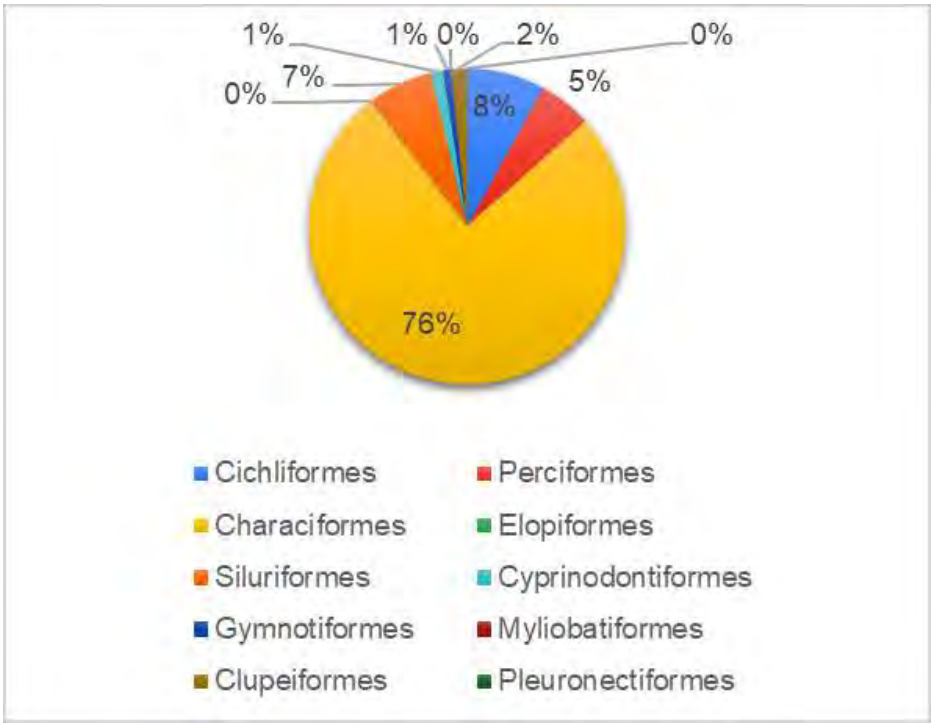

Figure 2: Combined fish order composition

A total of fifty-five (55) species were collected from the ten (10) sampling sites during the Dry Season, which included 1376 individuals weighing 35,483.45 g (35.483 kg), belonging to seven (7) orders comprising 26 families and 49 genera. The most abundant order was Characiformes (nine (9) families, 22 species), followed by Siluriformes (eight (8) families, 13 species), Cichliformes (one (1) family, 11 species), Perciformes (three (3) families, three (3) species), Cyprinodontiformes (two (2) families, three (3) species), and Gymnotiformes (two (2) families, two (2) species). Meanwhile, Pleuronectiformes were represented by only one (1) family and one (1) species.

On the other hand, the wet season produced 68 species collected from the 13 sampling sites (three sites were new additions for the wet season only, due to changes in project design, these are Connecting Channel #1/CC-11, Connecting Channel #2/CC-12, and Wales #3/WW-13). Wet season yielded more than twice the fish abundance of the dry

season studies using the same methods with a total of 3237 individuals weighing approximately one-half times more biomass, i.e., the total biomass of 55993.60 g (55.993 kg), belonging to nine (9) orders comprising 26 families and 62 genera. Similarly, the three most abundant order in the wet season was also Characiformes (8 families, 29 species), followed by Siluriformes (8 families, 17 species), and then Cichliformes (2 families, 14 species). Gymnotiformes had (2 families, 3 species), Cyprinodontiformes (2 families, 2 species), Perciformes (2 families, 2 species), Clupeiformes (1 family, 2 species), Myliobatiformes (1 family, 2 species) and Elopiformes (1 family, 1 species).

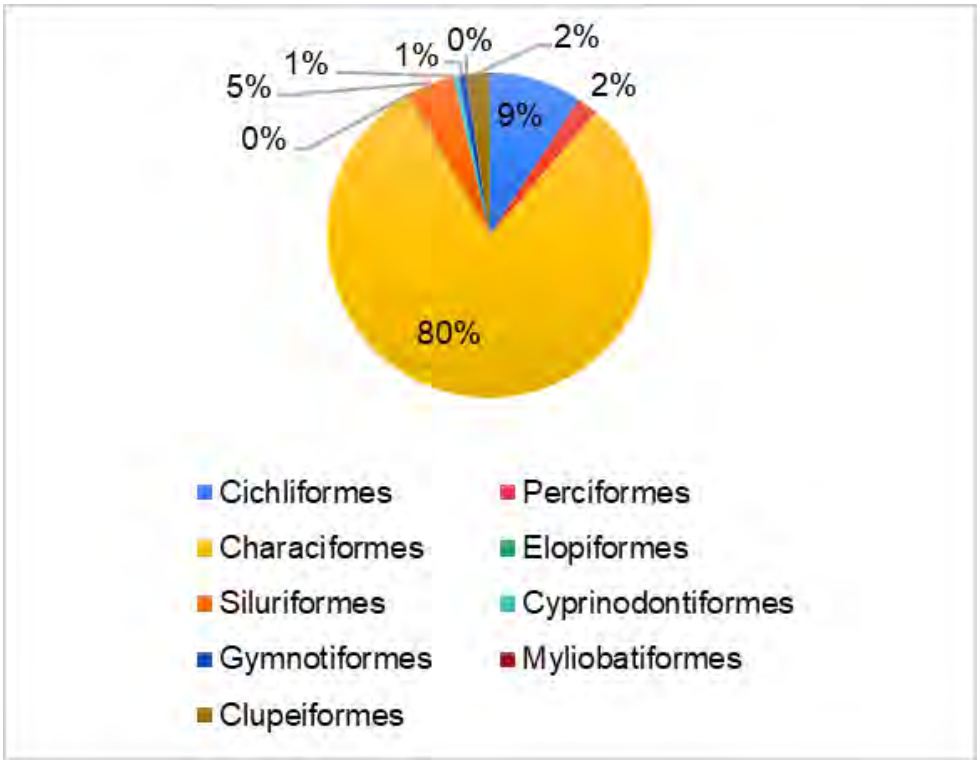

Figure 3: Wet season fish order composition

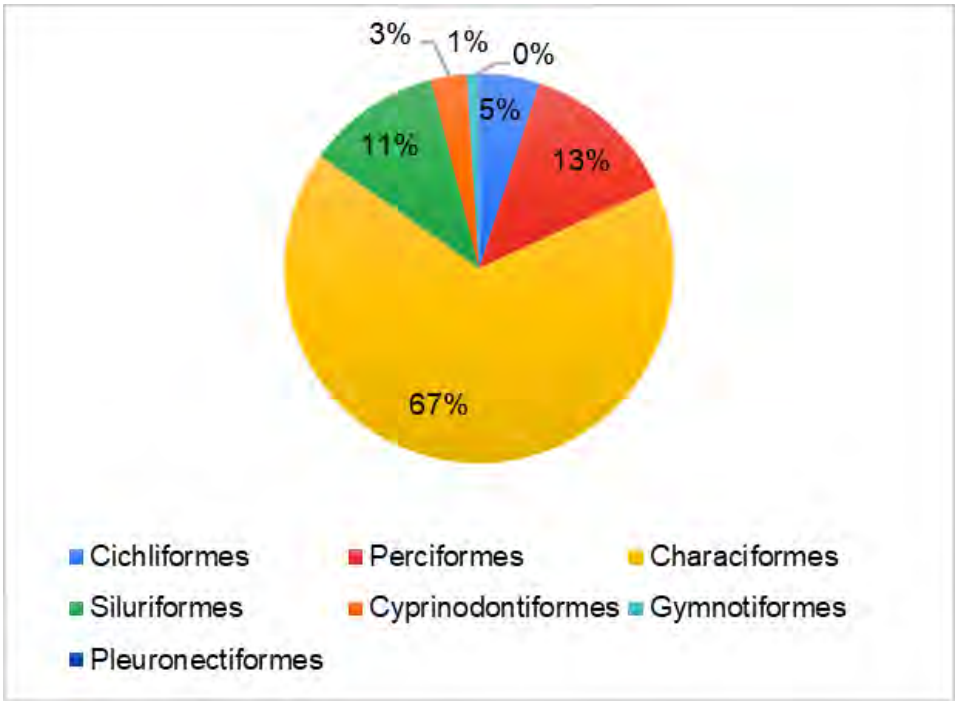

Figure 4: Dry season fish order composition

The most abundant fish family for the combined (dry and wet seasons) survey was Cichlidae (12 species, 15.2%), then Characidae (11 species, 13.9%), Serrasalmidae was the next abundant family (6 species,7.6 %), followed by Lebiasinidae (5 species, 6.3 %), Rivulidae was next with (4 species, 5.1%), the families Pimelodidae, Loricariidae, Crenuchidae, Auchenipteridae each had (3 species, accounting for 3.8%), Ariidae, Callichthyidae, Curimatidae, Doradidae, Engraulidae, Erythrinidae, Heptapteridae, Potamotrygonidae, and Sternopygidae each was represented by (2 species and making up 2.5% relative all other fish families. All other fish families were represented by one (1) species each and represented 1.3% of the fish families recorded from the surveys.

During the dry season surveys, the dominant family was Cichlidae (11 species, 20%) of the total species collected, followed by Characidae (eight species, 15%),

Serrasalmidae (4 species, 7%), Pimelodidae (three species, 5%), Curimatidae, Erythrinidae, Lebiasinidae, Poeciliidae, Doradidae, Heptapteridae and Loricariidae (2 species, 4% each respectively). Acestrorynchidae, Crenuchidae, Gasteropelecidae, Iguanodectidae, Rivulidae, Hypopomidae, Sternopygidae, Centropomidae, Sciaenidae, Polycentridae, Achiridae, Ariidae, Aspredinidae, Callichthyidae, and Cetopsidae were all represented by one species each, 2%, respectively.

For the wet season survey, similarly, the family Cichlidae was the most dominant with (12 species, 17.6%) of the total species collected, the second most dominant family was Characidae (10 species, 14.7%), this was followed by the family Lebiasinidae (5 species, 7.4%), Serrasalmidae (4 species, 5.9%), Auchenipteridae, Loricariidae, and Poeciliidae had three (3) species each and accounted for 4.4% respectively. Ariidae, Callichthyidae, Curimatidae, Doradidae, Engraulidae, Erythrinidae, Pimelodidae, Potamotrygonidae and Sternopygidae each contributed two (2) species and 2.9%, while all other fish families had one (1) species each (1.5%).

For the combined seasons of the fish survey, *Pristella maxillaris* (N= 1444), Relative Abundance (RA) = 31.30 %) was the most abundant species, the second most prevalent species was *Roeboides thurni* (N=825, RA = 19.40%), followed by , *Krobia guianensis* (N=235, RA = 5.09%), *Rineloricaria fallax* (N=170 , RA =3.69%), *Astyanax bimaculatus* (N=142, RA =3.16%), *Crenuchus spilurus* (N= 135, RA =2.93%), *Moenkhausia ceros* (N=123, RA= 2.67%), *Polycentrus schomburgkii* (N=120, RA=2.60%), *Curimata cyprinoides* (N=116, RA=2.51%), *Hoplerythrinus unitaeniatus* (N=80, RA=1.73%), *Nannacara anomala* (N=63, RA=1.37%), *Oreochromis niloticus*

(N=58, RA=1.26%). All other species each represented less than one percent (1%) of the total abundance of fishes from the wet season.

The most abundant species for the dry season survey were *Roeboides thurni* (N= 267, Relative Abundance (RA) = 19.40%), the second was *Pristella maxillaris* (N= 202, RA = 14.68%), followed by *Astyanax bimaculatus* (N= 121, RA = 8.79%), *Krobia guianensis* (N= 102, RA = 7.41%), *Rineloricaria fallax* (N= 94, RA = 6.83%), *Curimata cyprinoides* (N= 65, RA = 4.72%), *Polycentrus schomburgkii* (N= 40, RA = 2.91%), *Poecilia vivipara* (N= 38, RA = 2.76%), *Moenkhausia ceros* (N= 36, RA = 2.62%), *Oreochromis niloticus* (N= 31, RA = 2.25%), *Moenkhausia spp.* (N= 29, RA = 2.11%), *Bryconops melanurus* (N= 22, RA = 1.60 %), *Hoplerythrinus unitaeniatus* (N= 22, RA = 1.60 %), *Pygocentrus nattereri* (N= 22, RA = 1.60 %), *Pyrrhulina filamentosa* (N= 22, RA = 1.60 %), *Nannostomus marginatus* (N= 21, RA = 1.53 %), *Carnegiella strigata* (N= 16, RA = 1.16 %), *Cichlasoma bimaculatum* (N= 16, RA = 1.16 %) and *Amphiarius rugispinis* (N= 14, RA = 1.02%). All other species each represented less than one percent (1%) of the total abundance, respectively.

In the wet season fish survey, *Pristella maxillaris* (N= 1242, Relative Abundance (RA) = 38.37 %) was the most abundant species, the second most abundant species was *Roeboides thurni* (N=628, RA = 19.40 %), followed by *Hemigrammus micropterus* (N= 142, RA = 4.39 %), *Krobia guianensis* (N= 133, RA = 4.11 %), *Crenuchus spilurus* (N=126 , RA =3.89%), *Moenkhausia ceros* (N=87, RA =2.69 %), *Polycentrus schomburgkii* (N= 80, RA =2.42 %), *Rineloricaria fallax* (N=79, RA= 2.39%), *Hoplerythrinus unitaeniatus* (N=58, RA=1.79%), *Hemigrammus stictus, (*N=58, RA=1.79%), *Anchoviella lepidentostole* (N=54, RA=1.67%), *Curimata cyprinoides* (N=51, RA=1.58%). All other

species each represented less than one percent (1%) of the total abundance of fishes from the wet season.

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Table 2- Fish order, family, species, abundance and relative abundance

			Dry Season		Wet Season		Wet & Dry Season	
Order	Family	Species	Abundance	Relative Abundance	Abundance	Relative Abundance	Abundance	Relative abundance
Characiformes	Characidae	*Acanthocharax microlepis*	0	0.00	1	0.03	1	0.02
Characiformes	Acestrorynchidae	*Acestrorhynchus microlepis*	2	0.15	0	0.00	2	0.04
Characiformes	Characidae	*Astyanax bimaculatus*	121	8.79	25	0.77	146	3.16
Characiformes	Characidae	*Bryconops melanurus*	22	1.60	13	0.40	35	0.76
Characiformes	Gasteropelecidae	*Carnegiella strigata*	16	1.16	17	0.53	33	0.72
Characiformes	Characidae	*Charax gibbosus*	4	0.29	0	0.00	4	0.09
Characiformes	Lebiasinidae	*Copella arnoldi*	0	0.00	5	0.15	5	0.11
Characiformes	Crenuchidae	*Crenuchus spilurus*	9	0.65	126	3.89	135	2.93
Characiformes	Crenuchidae	*Ctenobrycon spilurus*	0	0.00	24	0.74	24	0.52
Characiformes	Curimatidae	*Curimata cyprinoides*	65	4.72	51	1.58	116	2.51
Characiformes	Curimatidae	*Cyphocharax spilurus*	1	0.07	0	0.00	1	0.02
Characiformes	Characidae	*Hemigrammus micropterus*	0	0.00	142	4.39	142	3.08
Characiformes	Characidae	*Hemigrammus stictus*	28	2.03	58	1.79	86	1.86
Characiformes	Characidae	*Heterocharax bellottii*	4	0.29	3	0.09	7	0.15

Characiformes	Erythrinidae	*Hoplerythrinus unitaeniatus*	22	1.60	58	1.79	80	1.73
Characiformes	Erythrinidae	*Hoplias malabaricus*	11	0.80	26	0.80	37	0.80
Characiformes	Anostomidae	*Leporinus frederici*	0	0.00	1	0.03	1	0.02
Characiformes	Serrasalmidae	*Metynnis argenteus*	0	0.00	2	0.06	2	0.04
Characiformes	Characidae	*Moenkhausia ceros*	36	2.62	87	2.69	123	2.67
Characiformes	Characidae	*Moenkhausia sp.*	29	2.11	0	0.00	29	0.63
Characiformes	Lebiasinidae	*Nannostomus beckfordi*	0	0.00	12	0.37	12	0.26
Characiformes	Lebiasinidae	*Nannostomus harrisoni*	0	0.00	3	0.09	3	0.07
Characiformes	Lebiasinidae	*Nannostomus marginatus*	21	1.53	7	0.22	28	0.61
Characiformes	Crenuchidae	*Poecilocharax bovaliorum*	0	0.00	4	0.12	4	0.09
Characiformes	Characidae	*Pristella maxillaris*	202	14.68	1242	38.37	1444	31.30
Characiformes	Serrasalmidae	*Pygocentrus nattereri*	22	1.60	22	0.68	44	0.95
Characiformes	Serrasalmidae	*Pygopristis denticulatus*	0	0.00	17	0.53	17	0.37
Characiformes	Lebiasinidae	*Pyrrhulina filamentosa*	22	1.60	9	0.28	31	0.67
Characiformes	Characidae	*Roeboides thurni*	267	19.40	628	19.40	895	19.40
Characiformes	Serrasalmidae	*Serrasalmus rhombeus*	8	0.58	10	0.31	18	0.39
Characiformes	Serrasalmidae	*Serrasalmus sp*	2	0.15	0	0.00	2	0.04

Characiformes	Serrasalmidae	*Serrasalmus sp 1*	4	0.29	0	0.00	4	0.09
Cichliformes	Cichlidae	*Acaronia nassa*	3	0.22	3	0.09	6	0.13
Cichliformes	Cichlidae	*Aequidens tetramerus*	0	0.00	6	0.19	6	0.13
Cichliformes	Cichlidae	*Apistogramma steindachneri*	6	0.44	5	0.15	11	0.24
Cichliformes	Cichlidae	*Cichla ocellaris*	2	0.15	1	0.03	3	0.07
Cichliformes	Cichlidae	*Cichlasoma bimaculatum*	16	1.16	25	0.77	41	0.89
Cichliformes	Cichlidae	*Crenicichla albopuntata*	2	0.15	4	0.12	6	0.13
Cichliformes	Cichlidae	*Crenicichla alta*	2	0.15	10	0.31	12	0.26
Cichliformes	Cichlidae	*Heros notatus*	9	0.65	11	0.34	20	0.43
Cichliformes	Cichlidae	*Krobia guianensis*	102	7.41	133	4.11	235	5.09
Cichliformes	Cichlidae	*Mesonauta guyanae*	12	0.87	7	0.22	19	0.41
Cichliformes	Cichlidae	*Nannacara anomala*	12	0.87	51	1.58	63	1.37
Cichliformes	Cichlidae	*Oreochromis niloticus*	31	2.25	27	0.83	58	1.26
Clupeiformes	Engraulidae	*Anchoa spinifer*	0	0.00	20	0.62	20	0.43
Clupeiformes	Engraulidae	*Anchoviella lepidentostole*	0	0.00	54	1.67	54	1.17
Cyprinodontiformes	Rivulidae	*Laimosemion agilae*	1	0.07	2	0.06	3	0.07
Cyprinodontiformes	Rivulidae	*Poecilia reticulata*	2	0.15	4	0.12	6	0.13

Cyprinodontiformes	Rivulidae	*Poecilia vivipara*	38	2.76	1	0.03	39	0.85
Cyprinodontiformes	Rivulidae	*Tomeurus sp.*	0	0.00	10	0.31	10	0.22
Elopiformes	Megalopidae	*Megalops atlanticus*	0	0.00	4	0.12	4	0.09
Gymnotiformes	Sternopygidae	*Eigenmannia nigra*	0	0.00	6	0.19	6	0.13
Gymnotiformes	Hypopomidae	*Steatogenys elegans*	9	0.65	16	0.49	25	0.54
Gymnotiformes	Sternopygidae	*Sternopygus macrurus*	4	0.29	4	0.12	8	0.17
Myliobatiformes	Potamotrygonidae	*Potamotrygon cf. orbignyi*	0	0.00	1	0.03	1	0.02
Myliobatiformes	Potamotrygonidae	*Potamotrygon sp*	0	0.00	1	0.03	1	0.02
Perciformes	Centropomidae	*Centropomus ensiferus*	10	0.73	0	0.00	10	0.22
Perciformes	Sciaenidae	*Plagioscion squamosissimus*	3	0.22	5	0.15	8	0.17
Perciformes	Polycentridae	*Polycentrus schomburgkii*	40	2.91	80	2.47	120	2.60
Pleuronectiformes	Achiridae	*Apionichthys dumerili*	1	0.07	0	0.00	1	0.02
Siluriformes	Auchenipteridae	*Ageneiosus inermis*	0	0.00	3	0.09	3	0.07
Siluriformes	Doradidae	*Amblydoras affinis*	3	0.22	1	0.03	4	0.09
Siluriformes	Doradidae	*Doras carinatus*	3	0.22	2	0.06	5	0.11
Siluriformes	Cetopsidae	*Helogenes marmoratus*	2	0.15	0	0.00	2	0.04
Siluriformes	Callichthyidae	*Hoplosternum littorale*	4	0.29	3	0.09	7	0.15

Siluriformes	Pimelodidae	*Hypopthylamus marginatus*	12	0.87	9	0.28	21	0.46
Siluriformes	Loricariidae	*Hypostomus plecostomus*	7	0.51	11	0.34	18	0.39
Siluriformes	Callichthyidae	*Megalechis thoracata*	0	0.00	1	0.03	1	0.02
Siluriformes	Loricariidae	*Parotocinclus britskii*	0	0.00	1	0.03	1	0.02
Siluriformes	Heptapteridae	*Pimelodella cristata*	4	0.29	7	0.22	11	0.24
Siluriformes	Pimelodidae	*Pimelodus blochii*	6	0.44	31	0.96	37	0.80
Siluriformes	Pimelodidae	*Psuedoplatystoma fasciatum*	1	0.07	0	0.00	1	0.02
Siluriformes	Heptapteridae	*Rhamdia sp.*	2	0.15	0	0.00	2	0.04
Siluriformes	Loricariidae	*Rineloricaria fallax*	94	6.83	76	2.35	170	3.69
Siluriformes	Auchenipteridae	*Tatia sp*	0	0.00	1	0.03	1	0.02
Siluriformes	Auchenipteridae	*Trachelyopterus galeatus*	0	0.00	3	0.09	3	0.07
Siluriformes	Ariidae	*Amphiarius rugispinis*	14	1.02	1	0.03	15	0.33
Siluriformes	Aspredinidae	*Aspredo aspredo*	1	0.07	1	0.03	2	0.04
Siluriformes	Ariidae	*Sciades couma*	0	0.00	2	0.06	2	0.04

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Species distribution

The highest species richness recorded for the combined surveys (dry and wet seasons) was at ERM-21-08 (Wales #1) (S=32) species, followed by ERM-21-09 (Wales #2) (S=26) species, ERM-21-10 (Cogland dam) (S=26) species and ERM-22-13 (Wales #3) has (S=21). ERM-21-01 (Mary Bar-Crane Village), ERM-21-02 (Crane turn),and ERM-21-06 (Eastern Demerara Ref) each had (S=16) species. ERM-21-04 and 05 had S=15 each, ERM-21-03 (Parfaite Harmony), ERM-21-07 (Western Demerara MoF), and ERM-22-11 (Connecting Channel #1) had S=13 each; and ERM-22-12 (Connecting channel #2) had the least number of species i.e. (S=6).

Site ERM-21-10 (Cogland dam) recorded the highest species richness (S=21) in the dry season, this was followed by Site ERM-21-09 (Wales #2) with (S=20) species, then Site ERM-21-08 (Wales #1) had (S=19) species, Site ERM-21-01 (Mary Bar-Crane Village) had (S=14) species, Site ERM-21-04 (canal no.1) with (S=12) species, Site ERM-21-02 (Crane turn) recorded (S=11) species, Site ERM-21-07 (Western Demerara MoF) (S=10) species, Site ERM-21-05 (Canal no. 2) (S=9) species, Site ERM-21-03 (Parfaite Harmony) had (S=6) species and the least number of species (S=4) was recorded at Site ERM-21-06 (Eastern Demerara Ref).

In the wet season, Site ERM-22-08 (Wales #1) recorded the highest species richness (S=23), followed by Site ERM-22-13 (Wales #3) (S=21) species, Site ERM-22-09 (Wales #2) (S=18) species, Site ERM-22-10 (Cogland dam) (S=16) species, Site ERM-22-03 (Parfaite Harmony), ERM-21-05 (Canal no. 2) and ERM-22-06 (Eastern Demerara Ref) each had (S=14) species; and the least number of species (S=6) was recorded at Site ERM-22-12 (Connecting channel #2).

Species richness increased for several sites during the wet season, these included ERM-21-02 (Crane turn), ERM-21-03 (Parfaite Harmony), ERM-21-05 (Canal no. 2), ERM-21-06 (Eastern Demerara Ref) and ERM-21-08 (Wales #1), while there was a decrease in richness for sites ERM-21-01 (Mary bar-Crane Village), ERM-21-04 (Canal no.1), ERM-21-07 (Western Demerara MoF), ERM-21-09 (Wales #2) and ERM-21-10 (Cogland dam) when compared to the dry season survey. These trends or patterns of species distribution and their presence or absence may be attributed to the structural and environmental variability, hydrology and disturbance levels in the streams; and fish behaviorial patterns, hence shaping the species assemblages among the two seasons (Gebrekiros 2016; Sanful et al.,2021).

When examining combined surveys, twenty-seven (27) fish species occurred in at one sample site, tweny-two (22) species occurred at two of the sites, eight (8) species occurred in at least three of the sample sites, six (6) species occurred at four of all sites, seven (7) species occurred at five of all sites, one (1) species occurred at six of all sites and two (2) species each occurred at seven, eight, nine and ten of all 13 sample sites during the survey. In general, no fish species were recorded as occurring at all of the sampling sites during the combined surveys.

In the dry season, only six (6) fish species occurred in five or more (up to seven sample sites) of all sites, three (3) species occurred in four sample sites of the sites, eleven (11) species occurred in three sample sites of the sample sites, sixteen (16) species occurred at two sample sites and twenty (20) species occurred in one sample site from among of all sites during the survey. No fish species were recorded as occurring at all

(100.0%) of the sampling sites.

In comparison, during the wet season, twenty-five (25) fish species occurred in at least one sample site, twenty (20) species occurred in two of the sites, four (4) species occurred in at least three of the sample sites, seven (7) species occurred at four of all sites, five (5) species occurred at five of all sites, one (1) species occurred in at least six of the sample sites, three (3) species occurred at seven sites, two (2) species t eight sites and at least one (1) species were found in at least nine out the 13 samples sites. Similarly, no fish species were recorded as occurring at all (100%) of the sampling sites during the wet season surveys.

The site with the highest abundance with regards to fish species for the combined surveys for both dry and wet seasons, was Site ERM-21-10 (Cogland dam) (N=1229) and accounted for 26.64% of the total species abundance. The second highest abundance was recorded at Site ERM-21-03 (Parfaite Harmony) (N=1081) which was 23.43 %, followed by Site ERM-21-08 (Wales #1) (N=460) made up 9.97%, while Site ERM-21-09 (Wales #2) (N=323) had 7.0%, ERM-21-01 (Crane village) (N=304) 6.59% and ERM-21-04 (Canal #1) had (N=242) or 5.25%; and ERM-21-02 (Crane turn) (N=226) and ERM-21-05 (Canal no.2) (N=209) which accounted for 4.90% and 4.53% respectively. The site with the lowest relative abundance values in chronological order were sites ERM-21-06 (Eastern Demerara Ref) (N=112) 2.43%, ERM-22-11 (Connecting channel #1) (N=106) 2.30%, and ERM-22-12 (Connecting channel #2) (N=55) or 1.19%, of the fish total abundance during the surveys.

The highest relative abundance in the dry season was found at Site ERM-21-10 (N=459) and accounted for 33.4% of the overall abundance from the survey followed by ERM-21-01 (Cogland dam) (N=232, 16.9%), ERM-21-08 (Wales #1) with (N=188, 13.7%) and ERM-21-02 (Crane turn) (N=142, 10.3%. The lowest relative abundance was at site ERM-21-06 (N=17), with only 1.2% of the abundance. The highest biomass (6818.56 g) was observed in site ERM-21-05, followed by site ERM-21-10 (Cogland dam) (4928.06 g) and site ERM-21-01 (Mary bar-Crane Village) (4491.44 g), while the lowest (672.18 g) was observed in site ERM-21-03 (Parfaite Harmony).

In contrast, the highest relative abundance in the wet season was found at Site ERM-22-03 (Parfaite Harmony) (N=1054), 32.56% of the overall abundance from the survey. This was followed by ERM-22-10 (Cogland dam) (N=810, 25.02%), ERM-22-08 (Wales #1) with (N=253, 7.82 %) and ERM-22-09 (Wales #2) (N=247, 7.63 %). The lowest relative abundance was at site ERM-22-12 (Connecting Channel #2) (N=55), with only 1.70% of the overall abundance.

With regards to fish biomass for combined seasons, the highest biomass 13086.59 g was observed at site ERM-21-06 (Eastern Demerara Ref), followed by site ERM-21-07 (Western Demerara MoF) with 10,607.75 g and site ERM-21-05 (Canal #2) (10,0180.7g). The lowest value recorded for biomass was 2067.80 g observed at site ERM-21-09 (Wales #2).

The highest biomass in the dry season was 6818.56 g observed in site ERM-21-05, followed by site ERM-21-10 (Cogland dam) (4928.06 g) and site ERM-21-01 (Mary bar-Crane Village) (4491.44 g), while the lowest (672.18 g) was observed in site ERM-21-03 (Parfaite Harmony). In the wet season, the highest recorded biomass was at Site ERM-21-06 (Eastern Demerara Ref) with 11,630.59 g. The site with the second-highest recorded

biomass was ERM-21-04 (Canal #1) 6,189.32 g, followed by ERM-21-01 (Crane village) which had 5,112.66 g. Site ERM-21-02 (Crane turn) had the lowest recorded fish biomass value of 1,796g relative to all the other sites.

The species diversity indices differed among the various sampling sites and by seasons. The site that had the largest Margalef species richness index value for the combined seasons was Site ERM-21-08 (Wales #1) with 31.84, the next highest value was 25.83 for site ERM-21-09 (Wales #2), followed by a value of 23.86 for Site ERM-21-10 (Cogland dam). The Site ERM-22-12 (Connecting Channel #1) had the lowest value (5 .75) compared to all sites.

During the dry season survey, the highest Margalef species richness index (22.84) was observed in site ERM-21-10 (Cogland dam), followed by ERM-21-09 (Wales #2)(19.77) and ERM-21-08 (17.81), while the lowest (5.71) was observed in site ERM-21-03 (Parfaite Harmony). In the wet, the highest value for the Margalef species richness index was 22.82 for Site ERM-21-08 (Wales #1), the second-highest value was 20.80 for Site ERM-22-13 (Wales #3), then ERM-21-09 (Wales #2) with 17.82 and ERM-21-10 (Cogland dam) had 15.85. The smallest Margalef species richness index value was 5.75 at Site ERM-22-12 (Connecting channel #2).

Shannon–Wiener diversity index (H') value was highest at Site ERM-21-08 (Wales #1) H'=2.69, for both dry and wet seasons. This was followed by Site ERM-21-09 (Wales #2) with H'=2.21, then ERM-21-06 (Eastern Demerara Ref) H'=2.15 and ERM-22-13 (Wale #3) was H'=2.15. The lowest H' value was recorded for ERM-21-03 (Parfaite Harmony) with 0.54.

The highest Shannon–Wiener diversity index H' (2.49) for the dry season was observed in site ERM-21-09 (Wales #2), while the second-highest value was (H'=2.31) at

site ERM-21-08 (Wales #1), followed by ERM-21-02 (Crane Turn) with (H'=1.99), while the lowest H' value was observed in site ERM-21-06 with (H'=1.05). For comparison, the wet season site with the largest Shannon–Wiener diversity index H' value was at Site ERM-21-08 (Wales #1) with H'= 2.25, followed by Site ERM-21-01 (Crane turn) with H'=2.19, ERM-22-13 (Wales #3) had H'=21.5 and ERM-22-11 (Connecting channel #1) H'=1.97. The smallest H' value (0.43) was recorded at Site ERM-21-03 (Parfaite Harmony).

Pielou evenness index for combined seasons (dry and wet), was highest at Site ERM-21-06 (Eastern Demerara Ref) with a value of 0.46, the second largest value 0.44 was at Site ERM-21-08 (Wales #1), then Site ERM-21-07 (Western Demerara MoF) with value 0.43, Site ERM-22-13 (Wales no.3) value of 0.43 and Site ERM-22-12 (Connecting Channel #2) with value 0.42. The smallest value was found at Site ERM-21-03 (Parfaite Harmony) with 0.08.

The highest Pielou evenness index of (0.83) for the dry season was observed at site ERM-21-09, the next highest value was at site ERM-21-05 with (0.82), followed by sites ERM-21-02 and ERM-21-03 each with (0.80), respectively. The lowest Pielou evenness index values for the dry season were observed in sites ERM-21-01 (0.61) and ERM-21-10, with (0.59). The wet season recorded the largest Pielou evenness index value of 0.51 at Site ERM-22-01 (Crane village), followed by ERM-22-06 (Eastern Demerara) with a value of 0.46, followed by ERM-22-02 (Crane turn) had a value of 0.44, ERM-22-13 (Wales #3) 0.43 and ERM-22-11 (Connecting Channel #1) with value 0.42. The lowest Pielou evenness index value was recorded at Sites ERM-22-03 (Partfaite Harmony) 0.06 and ERM-22-10 (Cogland dam) 0.14 (Table xxx).

Table 3: Biodiversity indices for Combined (dry and wet) seasons

Site	Species Richness	Abundance (N)	Biomass (g)	Margalef Species Richness index	Shannon-Weiner Diversity Index	Pielou's Evenness Index
ERM-21-01	16	304	9604.10	15.83	1.92	0.34
ERM-21-02	16	226	5312.38	15.82	2.06	0.38
ERM-21-03	13	1081	5577.96	12.86	0.54	0.08
ERM-21-04	15	242	9914.76	14.82	1.70	0.31
ERM-21-05	15	209	10018.07	14.81	1.90	0.36
ERM-21-06	16	112	13086.59	15.79	2.15	0.46
ERM-21-07	13	124	10607.75	12.79	2.07	0.43
ERM-21-08	32	460	6997.18	31.84	2.69	0.44
ERM-21-09	26	323	2067.80	25.83	2.21	0.38

ERM-21-10	24	1229	8437.59	23.86	1.46	0.21
ERM-21-11	13	106	2998.13	12.79	1.94	0.42
ERM-21-12	6	55	4014.19	5.75	1.54	0.38
ERM-21-13	21	142	2840.53	20.80	2.15	0.43

Table 4: Biodiversity indices for dry season

Site	Species Richness	Abundance (N)	Biomass (g)	Margalef species richness index	Shannon-Weiner Diversity Index	Pielou's Evenness Index
ERM-21-01	14.00	232.00	4491.44	13.82	1.62	0.61
ERM-21-02	11.00	142.00	3516.13	11.80	1.99	0.80
ERM-21-03	6.00	31.00	672.18	5.71	1.44	0.80
ERM-21-04	12.00	120.00	3725.44	10.79	1.21	0.50
ERM-21-05	9.00	58.00	6818.56	8.75	1.81	0.82
ERM-21-06	4.00	17.00	1456.00	3.65	1.05	0.76
ERM-21-07	10.00	48.00	7234.37	9.74	1.74	0.76
ERM-21-08	19.00	188.00	2583.25	17.81	2.31	0.78

ERM-21-09	20.00	81.00	58.00	19.77	2.49	0.83
ERM-21-10	21.00	459.00	4928.06	22.84	1.84	0.59

Table 5: Biodiversity indices for wet season

Site	Species Richness	Abundance (N)	Biomass (g)	Margalef Species Richness index	Shannon-Weiner Diversity Index	Pielou's Evenness Index
ERM-21-01	12	72	5112.66	11.77	2.19	0.51
ERM-21-02	12	88	1796.25	11.78	1.96	0.44
ERM-21-03	14	1054	4905.78	13.86	0.43	0.06
ERM-21-04	10	103	6189.32	9.78	1.61	0.35
ERM-21-05	14	159	3199.51	13.80	1.71	0.34

ERM-21-06	14	66	11630.59	13.76	1.92	0.46
ERM-21-07	8	81	3373.38	7.77	1.67	0.38
ERM-21-08	23	253	4413.93	22.82	2.25	0.41
ERM-21-09	18	247	2009.80	17.82	1.73	0.31
ERM-21-10	16	810	3509.53	15.85	0.92	0.14
ERM-21-11	14	107	2998.13	13.79	1.97	0.42
ERM-21-12	6	55	4014.19	5.75	1.54	0.38
ERM-21-13	21	142	2840.53	20.80	2.15	0.43

Habitat characterization

Temperature

Site ERM-22-13 (Wales #3) recorded temperature with the lowest value 26.1°C, while the highest temperature reading 29.14°C was recorded at Site ERM-21-03 (Parfaite Harmony) for the combined dry and wet seasons. The Average temperature was 28.54±0.22 °C for the combined seasons among all sample sites, while the lowest average temperature 25.72±0.04 °C was at Site ERM-21-09 (Wales #2) and the highest average temperature 30.02±0.01 °C was recorded at Site ERM-21-03 (Parfaite Harmony). The lowest temperature recorded in the dry season studies was 27.17°C ERM-21-10 (Cogland dam) and the highest temperature was 30.21°C ERM-21-03 (Parfaite Harmony), with an average overall temperature of 28.45±0.25°C among all sites. The lowest average temperature was recorded at site ERM-21-05 (Canal no. 2) 27.60±0.08 °C, and the highest average temperature at site ERM-21-03 (Parfaite Harmony) 30.2±0.01°C. In the wet season, the lowest temperature was found at Site ERM-21-10 (Cogland dam) with 25.3°C, and the highest temperature value 28.2°C was recorded at Site ERM-21-02 (Crane Turn) and ERM-21-03 (Parfaite Harmony). The overall average temperature for the wet seasons was 28.67±0.19 °C for all sites combined, while the lowest average temperature was recorded at site ERM-21-09 (Wales #2) 25.72±0.04 °C and the highest average temperature was at ERM-21-02 (Crane Turn) with 28.16±0.19 °C.

pH

For the combined wet and dry seasons, pH values ranged from 2.85 at site ERM-21-03 (Crane Turn) to 7.27 at ERM-21-02 (Crane Turn) with an overall average of 4.67±0.25 among all sample sites. The lowest average pH value was 3.20±0.03 recorded at site ERM-21-05 (Canal #2), and the highest average pH was 6.98±0.51 at site ERM-21-01 (Crane Village). The overall average pH value for the dry season was 4.96±0.218, while the lowest pH value was recorded at site ERM-21-04 (Canal no. 1) 3.36 and the lowest average value was at site ERM-21-03 (Parfaite Harmony) 3.48±0.02. The highest pH value recorded was 8.18 at site ERM-21-02 (Crane turn), and the highest average pH was 7.14±0.42 also at site ERM-21-02 (Crane turn), followed by site ERM-21-01 (Mary Bar-Crane Village) with 7.13±0.21 and site ERM-21-07 with 6.01±0.24, with all other sites having an average pH value of less than 6.00 each, respectively. In comparison, the lowest pH value was recorded at site ERM-21-03 (Parfaite Harmony) with 2.85 and the highest pH value 7.27 was at site ERM-21-01 (Mary bar-Crane Village), with an average pH of 4.37±0.28 among all sample sites during the wet season. The highest average pH value 6.83±0.18 was found at site ERM-21-02 (Crane turn), while the lowest average pH was 2.92±0.04 at site ERM-21-03 (Parfaite Harmony).

Turbidity

Turbidity values for the combined seasons ranged from 0.19 NTU at site ERM-21-04 (Canal no. 1) to 647 NTU at site ERM-21-05 (Canal no. 2). The average turbidity for all sites was 71.11±63.30 NTU, with the lowest average turbidity value of 9.97±13.09 NTU at site ERM-21-09 (Wales #2) and the highest average turbidity value of 202.96±141.28 NTU at site ERM-21-10 (Cogland dam). During the dry season surveys, turbidity values ranged from 2.38 NTU at site ERM-21-04 (Canal no. 1) to 217 NTU at site ERM-21-10

(Cogland dam) and (out of range for the Turbidity meter and were noted as too much to be detected (TMTBD) (>217 NTU) for sites ERM-21-06 and ERM-21-07 on the Demerara River. The highest average turbidity value was at site ERM-21-10 (Cogland dam) with 163±76.3 NTU, followed by 144±0 NTU at site ERM-21-02 (Crane turn) and 102±177 NTU at ERM-21-01 (Mary bar-Crane village), while the lowest average turbidity value was 3.65±1.43 NTU at site ERM-21-04 (Canal no. 1) and an overall average of 50.58±27.27 NTU. Wet season survey produced turbidity values that ranged from 647 NTU at site ERM-21-05 (Canal no. 2) to 0.19 NTU at site ERM-21-04 (Canal no. 1), with average turbidity of 80.99±88.50 NTU for all combined sites. The lowest average turbidity value was 9.69±16.11 NTU at site ERM-21-03 (Parfaite Harmony) and the highest average turbidity recorded was 242.92±206.25 NTU at site ERM-21-10 (Cogland dam).

Table 6: Physicochemical parameters for the Combined (dry and wet) seasons

	Temperature (°C)		pH		Turbidity (NTU)		TDS (ppm)	
Site	Range	Mean±SD	Range	Mean±SD	Range	Mean±SD	Range	Mean±SD
ERM-22-01	26.8-26.1	26.6 ± 0.23	7.26-6.71	6.83 ± 0.18	446-47.6	105.00 ± 128.5	-	-
ERM-22-02	28.2-27.9	28.16 ± 0.20	7.27-5.92	6.58 ± 0.51	125.6-112.1	115.93 ± 4.73	-	-
ERM-22-03	27.9-28.2	28.08 ± 0.11	2.98-2.85	2.92 ± 0.04	42.51-0.45	9.69 ± 16.11	-	-
ERM-22-04	26-25.9	25.96 ± 0.05	3.46-3.23	3.29 ± 0.07	604-0.19	152.71 ± 235.59	-	-
ERM-22-05	28-27.5	27.68 ± 0.19	3.92-3.26	3.37 ± 0.20	647-10.84	117.64 ± 210.04	-	-
ERM-22-06	26.24-26.03	26.11 ± 0.06	6.29-3.87	4.50 ± 0.83	12-10	12-10	-	-
ERM-22-07	26.35-26.22	26.29 ± 0.05	4.91-4.38	4.718 ± 0.15	13-11	11.88 ± 0.60	-	-
ERM-22-08	26-25.8	25.86 ± 0.1	3.68-3.5	3.59 ± 0.06	20.9-9.45	11.90 ± 3.97	-	-
ERM-22-09	25.8-25.7	25.72 ± 0.04	3.53-3.38	3.44 ± 0.05	82.5-3.67	14.96 ± 25.42	-	-
ERM-22-10	28-25.3	26.3 ± 1.09	7.03-4.13	5.82 ± 1.02	531-6.15	242.92 ± 206.25	-	-
ERM-22-11	27.4-26.7	26.96 ± 0.27	3.85-3.16	3.54 ± 0.21	21.69-	14.88 ± 3.39	-	-

					10.66			
ERM-22-12	26.4-26.1	26.2 ± 0.11	3.95-3.39	3.59 ± 0.17	376-5.38	104.18 ± 122	-	-
ERM-22-13	26.2-26	26.1 ± 0.07	5-4.1	4.69 ± 0.25	500-11	140.16 ± 185	-	-

Table 7: Physicochemical parameters for the dry season

	Temperature (°C)		pH		Turbidity (NTU)		TDS (ppm)	
Sites	Ranges	Mean±SD	Ranges	Mean±SD	Ranges	Mean±SD	Ranges	Mean±SD
ERM-21-01	28.7-30.1	29.15±0.49	6.85-7.4	7.13±0.21	38.6-177	102±177	335-348	341±4.97
ERM-21-02	28.64-28.94	28.79±0.10	6.74-8.18	7.14±0.42	144-144	144±0	132-159	142±12.23
ERM-21-03	30.19-30.21	30.2±0.01	3.46-3.50	3.48±0.02	56.6-56.6	56.6±0	176-206	193±15.39
ERM-21-04	28.19-29.42	29.08±0.50	3.36-3.77	3.69±0.12	2.38-5.12	3.65±1.43	73-135	94.44±24.58
ERM-21-05	27.48-27.70	27.60±0.08	3.53-3.84	3.61±0.15	4.33-9.66	6.28±2.93	68-71	70.1±1.16
ERM-21-06	27.63-27.64	27.63±0.005	5.17-5.44	5.30±0.13	TMTBD	0	27-30	29±1.73
ERM-21-07	28.2420-28.27	28.23±0.03	5.73-6.17	6.01±0.24	TMTBD	0	613-825	708±107.6
ERM-21-08	27.48-28.74	28.30±0.61	3.89-4.11	3.97±0.06	13.5-41.3	25.3±14.36	20-21	20.44±0.52
ERM-21-09	27.76-27.91	27.84±0.05	3.95-4.16	4.04±0.65	4.22-5.63	4.97±0.70	19-21	20.22±0.66

ERM-21-10	27.17-28.46	27.72±0.66	5.10-5.45	5.23±0.18	109-217	163±76.3	31-33	31.66±1.15

Table 8: Physicochemical parameters for the wet season

	Temperature (°C)		pH		Turbidity (NTU)		TDS (ppm	
Site ID	Range	Mean±SD	Range	Mean±SD	Range	Mean±SD	Range	Mean±SD
ERM-22-01	26.8-26.1	26.6 ± 0.23	7.26-6.71	6.83 ± 0.18	446-47.6	105.00 ± 128.5	-	-
ERM-22-02	28.2-27.9	28.16 ± 0.20	2.98-2.85	6.58 ± 0.51	125.6-112.1	115.93 ± 4.73	-	-
ERM-22-03	27.9-28.2	28.08 ± 0.11	2.98-2.85	2.92 ± 0.04	42.51-0.45	9.69 ± 16.11	-	-
ERM-22-04	26-25.9	25.96 ± 0.05	3.46-3.23	3.29 ± 0.07	604-0.19	152.71 ± 235.59	-	-
ERM-22-05	28-27.5	27.68 ± 0.19	3.92-3.26	3.37 ± 0.20	647-10.84	117.64 ± 210.04	-	-
ERM-22-06	26.24-26.03	26.11 ± 0.06	6.29-3.87	4.50 ± 0.83	12-10	12-10	-	-
ERM-22-07	26.35-26.22	26.29 ± 0.05	4.91-4.38	4.718 ± 0.15	13-11	11.88 ± 0.60	-	-
ERM-22-08	26-25.8	25.86 ± 0.1	3.68-3.5	3.59 ± 0.06	20.9-9.45	11.90 ± 3.97	-	-

ERM-22-09	25.8-25.7	25.72 ± 0.04	3.53-3.38	3.44 ± 0.05	82.5-3.67	14.96 ± 25.42	-	-
ERM-22-10	28-25.3	26.3 ± 1.09	7.03-4.13	5.82 ± 1.02	531-6.15	242.92 ± 206.25	-	-
ERM-22-11	27.4-26.7	26.96 ± 0.27	3.85-3.16	3.54 ± 0.21	21.69-10.66	14.88 ± 3.39	-	-
ERM-22-12	26.4-26.1	26.2 ± 0.11	3.95-3.39	3.59 ± 0.17	376-5.38	104.18 ± 122	-	-
ERM-22-13	26.2-26	26.1 ± 0.07	5-4.1	4.69 ± 0.25	500-11	140.16 ± 185	-	-

Secchi depth (Transparency)

The average Secchi depth value for both combined dry and wet seasons combined was 0.129±0.11 m, with the lowest Secchi depth value 0.01 m at site ERM-21-07 (Western Demerara MoF) and highest value 0.465 m at site ERM-21-09 (Wales #2) and an overall average of 0.13±0.15 m during the dry season. The highest Secchi depth was 0.46 m at site ERM-21-09 (Wales #2), while the lowest average Secchi depth was recorded at site ERM-21-06 (Eastern Demerara Ref) and ERM-21-07 (Western Demerara MoF) with a value of 0.04 m (Table x). In contrast, the wet season Secchi depth average across all sites was 0.12±0.07 m, with the lowest average Secchi depth value 0.01 m at site ERM-21-07 (Western Demerara MoF) and highest value 0.19 m at site ERM-21-01 (Mary bar-Crane village).

Correlation analysis showed weak positive relations (Pearson) with pH and species biomass (R= 0.27), temperature and species biomass (R=0.21), temperature and species abundance (R=0.39) and turbidity and species abundance (R=0.33), while Secchi depth showed negative relations with biomass (R=-0.46) and species richness (R=-0.38), however none of the relationships were statistically significant at alpha =0.05.

Principal component analysis (PCA) was used to explain most of the variability in a dataset with the environmental variables in the original dataset. The first three principal components (PC) axes explained about 96% of the observed variations in the fish community dataset using four variables pH, temperature, Turbidity and Secchi depth. The first principal component explains 45.4% of the total variance in the dataset, the second principal component explains 28.1% of the total variance, the third principal component explains 22.5% the fourth principal component explains 4% of the total variance in the dataset. The first PC1 positively associated with Secchi depth, PC2 was

positively associated with temperature, PC3 was negatively correlated with all variables and PC4 was associated with turbidity (Appendix III) for PCA plot and site scores with PCs

Table 9: Rapid bioassessment ratings for habitat parameters of canal Sites

Habitat Parameter	MB-01	CV-02	PV-03	CVR-04	CV-05	DD-08	WW-09	CD-10	CC-11	CC-12	WW-13
Epifaunal Substrate/Available Cover	11	10	11	11	10	16	16	15	16	16	16
Pool Substrate Characterization	13	11	15	15	15	15	15	11	16	16	16
Pool Variability	5	1	1	1	1	6	6	1	1	1	0
Sediment Deposition	10	10	10	10	10	10	10	10	10	10	10
Channel Flow Status	10	18	18	18	18	18	18	18	18	18	18
Channel Alteration	11	15	14	14	14	9	9	14	10	9	10
Channel Sinuosity	3	1	5	0	0	10	10	0	0	0	10
Bank Stability (Left Bank)	6	9	7	8	8	5	5	9	8	7	10
Bank Stability (Right Bank)	8	9	7	8	8	5	5	9	8	7	10
Vegetative Protection (Left Bank)	10	6	9	5	5	6	9	6	5	5	8

Vegetative Protection (Right bank)	6	6	10	4	4	6	8	6	5	5	8
Riparian Vegetative Zone Width (Left bank)	2	2	2	4	2	2	2	5	5	5	5
Riparian Vegetative Zone Width (Right bank)	0	1	2	2	3	2	2	5	5	5	5
Total Habitat Score	95	99	111	100	98	110	115	109	107	104	126
Qualitative Condition	Marginal	Marginal	Suboptimal	Marginal	Marginal	Suboptimal	Suboptimal	Marginal	Marginal	Marginal	Suboptimal

Key to Qualitative Condition Descriptions:

Optimal =exhibiting natural conditions (Total Habitat Score 200-160)

Suboptimal=exhibiting some alteration, but with natural conditions for most criteria (Total Habitat Score 159-110)

Marginal=exhibiting moderate levels of degradation, with severe degradation at frequent intervals throughout the evaluated reach (Total Habitat Score 109-60)

Poor=substantially altered; severely degraded conditions (Total Habitat Score 59-0)

Table 9 shows the rapid bioassessment scores for sampling sites according to protocols adapted from USEPA (1999). This method involves rating many different habitat conditions as optimal, suboptimal, marginal, or poor based upon various criteria. Overall habitat assessment scores for the survey, showed that 36.4% of sites were evaluated as having sub-optimal conditions and includes sites ERM-21-03/PV-03 (Parfaite Harmony), ERM-21-08/DD-08 (Wales #1), ERM-21-09/WW-09 (Wales #2) and ERM-22-13/WW-13 (Wales #3). Even though there was evidence of past alterations, these habitats had more structural and substrate heterogeneity available to the fisheries resources, while 63.6% of sites sampled were categorized as having marginal conditions; these include sites ERM-21-01/MB-01 (Mary bar-Crane village), ERM-21-02/CV-02 (Crane turn), ERM-21-04/CVR-04 (Canal no.1), ERM-21-05/CVR-05 (Canal no.2), ERM-21-10/CD-10 (Cogland dam), ERM-22-11/CC-11 (Connecting channel #1) and ERM-22-12/CC-12 (Connecting channel #2). These sites had less diversity in habitat types and substrate diversity and evidence of recent anthropogenic alterations or disturbances. There were no sites rated as being poor or optimal in terms of habitat conditions. According to the assessment ratings, the optimal category is a description of conditions that meet natural expectations; the suboptimal category includes descriptions of criteria that are less than desirable, but satisfies expectations under most circumstances; while the marginal category describes moderate levels of degradation with severity at frequent intervals throughout the reach; and the poor category outline descriptions of criteria for streams that have been substantially altered with severe degradation characteristics or conditions.

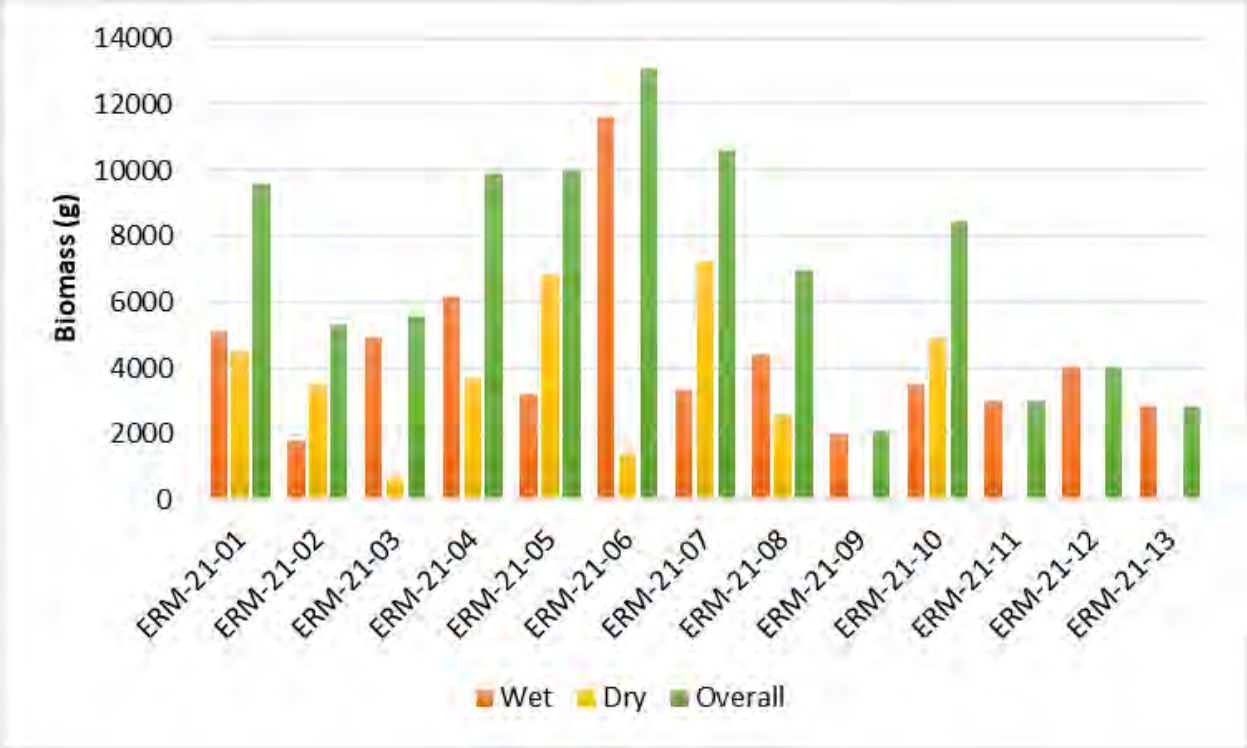


Figure 5: Relative biomass of fish species per site

The combined seasons showed that site ERM-21-06 (Eastern Demerara Ref) had the highest total biomass value of 13,086.59 (with relative biomass of 14.31%). The site with the second-highest value for total biomass was at site ERM-21-07 (Western Demerara MoF) with 10,607.75 (relative biomass of 11.60%), the next sites were ERM-21-05 (Canal no. 2) with 10,018.07 (relative biomass of 10.95%), ERM-21-04 (Canal no.1) 9, 914.76 (relative biomass of 10.84%), ERM-21-01 (Mary bar-Crane village) 9,604.10 (relative biomass of 10.50%) and ERM-21-10 (Cogland dam) had 8437.59 (relative biomass of 9.22%). The site with the lowest total biomass value was ERM-21-09 (Wales #2) with 2067.80 (relative biomass of 2.26%) compared to all other sites.

The highest fish species total biomass in the dry season survey was 7234.37g (relative biomass of 20%) at site ERM-21-07 (Western Demerara MoF). This was followed

by ERM-21-05 (Canal no. 2) with total fish biomass of 6818.56g (relative biomass of 19%), ERM-21-10 (Cogland dam) 4928.12 g (relative biomass of 14%), ERM-21-01 (Mary bar-Crane village) with 4491.44 g (relative biomass of 13%), and the least total biomass was 482.27 g (relative biomass 1%) at ERM-21-08 (Wales #1). In the wet season, the highest fish species total biomass was 11630.59 (relative biomass of 22.77%) at site ERM-21-06 (Eastern Demerara MoF), the second-highest value was 6189.32 g (relative biomass of 11.05%) at site ERM-21-04 (Canal no.1), followed by 5112.66 g (relative biomass of 9.13%) at site ERM-21-01 (Mary bar-Crane village). The lowest total biomass was found at ERM-21-02 (Crane turn), with 1796.25 g accounting for relative biomass of 3.21%.

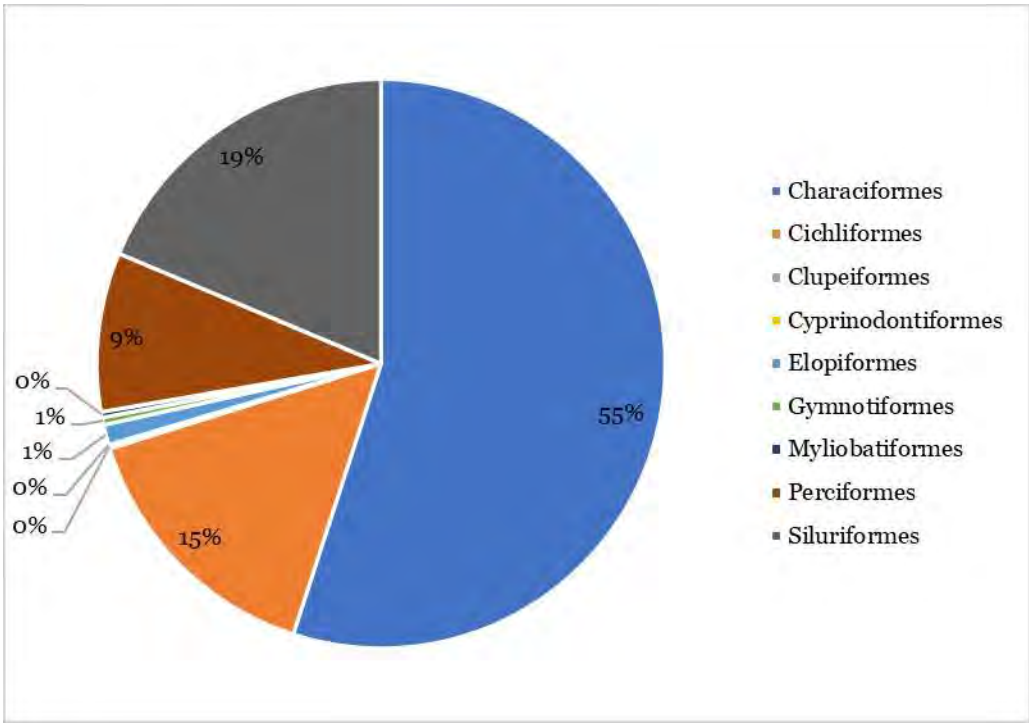


Figure 6: Relative biomass of fish species per order combined (Dry & Wet season)

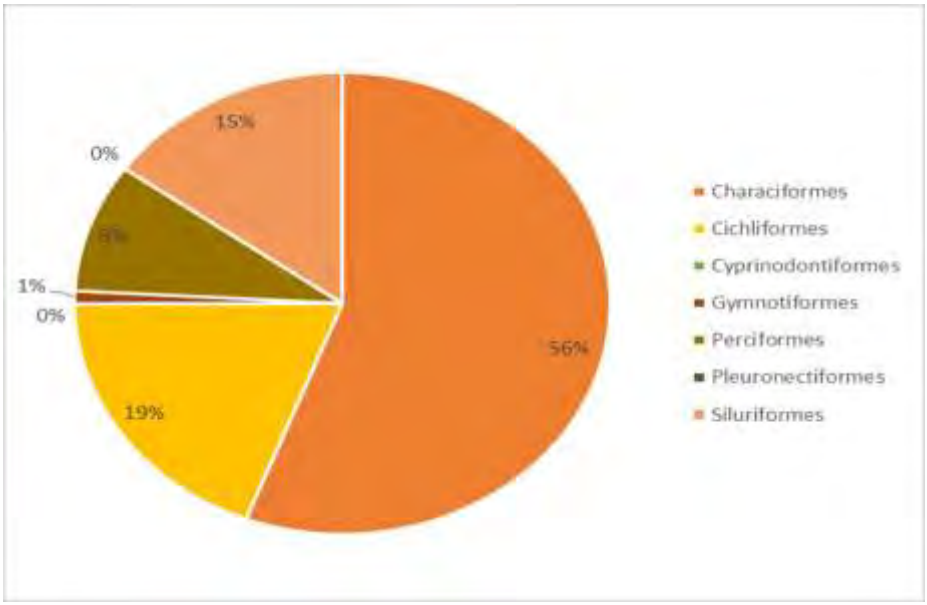


Figure 7: Dry season relative biomass of fish orders

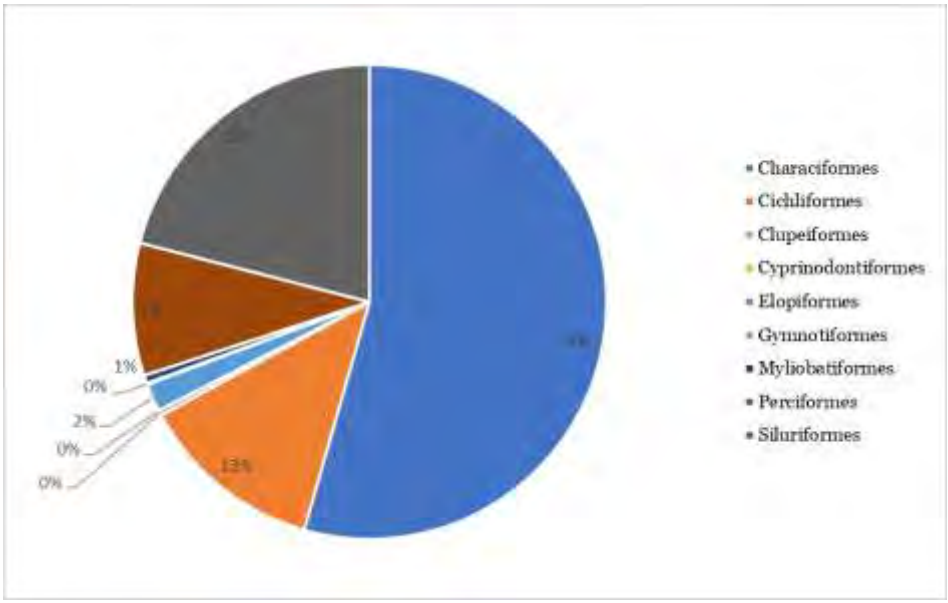


Figure 8: Wet season relative biomass of fish orders

The highest relative biomass for the combined (dry and wet seasons) survey was 55 % for the fish order Characiformes, the second-highest relative biomass was 19% in the order Siluriformes, the order Cichliformes had 15% and Perciformes 9%, all other fish orders each had 1% or less relative biomass.

The order Characiformes accounted for the highest relative biomass 56% for recorded fish species during the dry season survey, while the second-highest 19% was for the order Cichliformes, the catfishes in the order Siluriformes had the third-highest relative biomass of 15%, and the lowest relative biomass was among the Knife-fishes from the order Gymnotiformes with one percent (1%) and the Flatfishes order Pleuronectiformes with less than one percent (<1%). During the wet season, the Characiformes also had the highest relative biomass 54% among the fishes collected during the survey. The next highest recorded relative biomass was 21% from the order Siluriformes which is a 6% increase compared to the dry season, Cichliformes, followed by 13% (6% less when compared to the dry season) and similaly, Perciformes had 9% relative biomass in the wet season. The remaining fish orders each had one percent (1%) or less contributions to relative biomass, hence due to either low numbers in abundance or because these species are generally relatively small-sized specimens in nature.

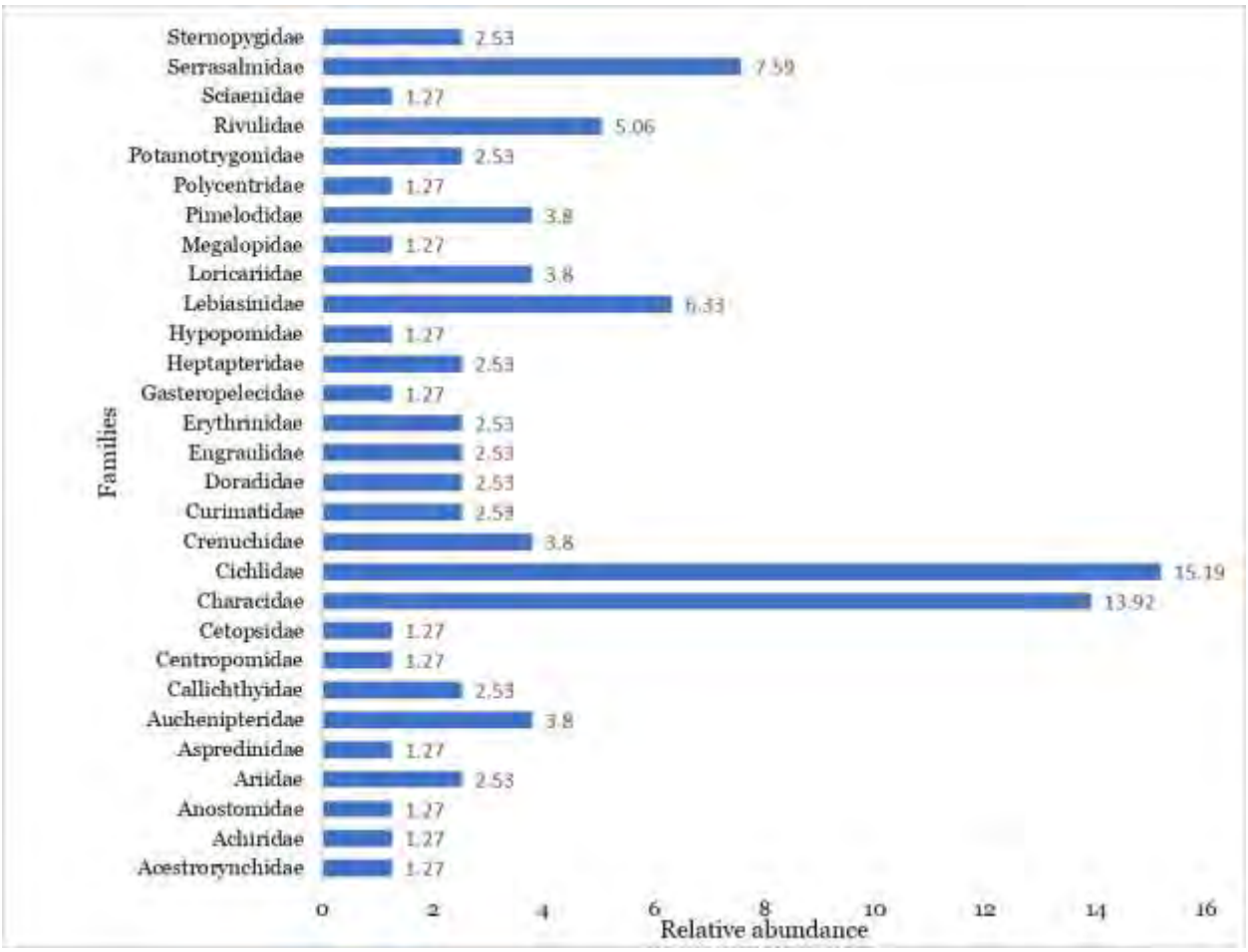


Figure 9: Relative biomass of fish families combined (Dry & Wet seasons) survey

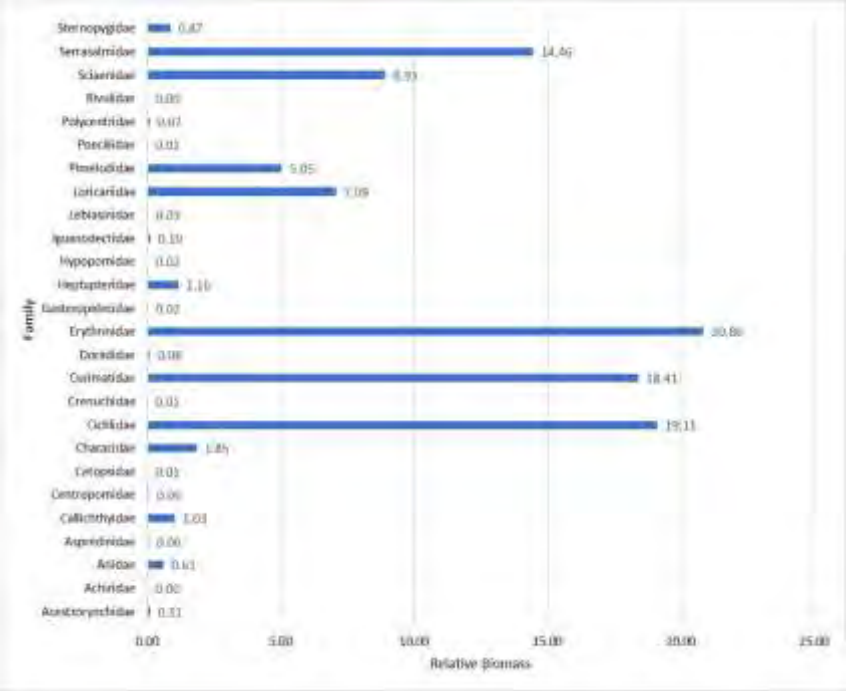


Figure 10: Dry season relative biomass of fish families

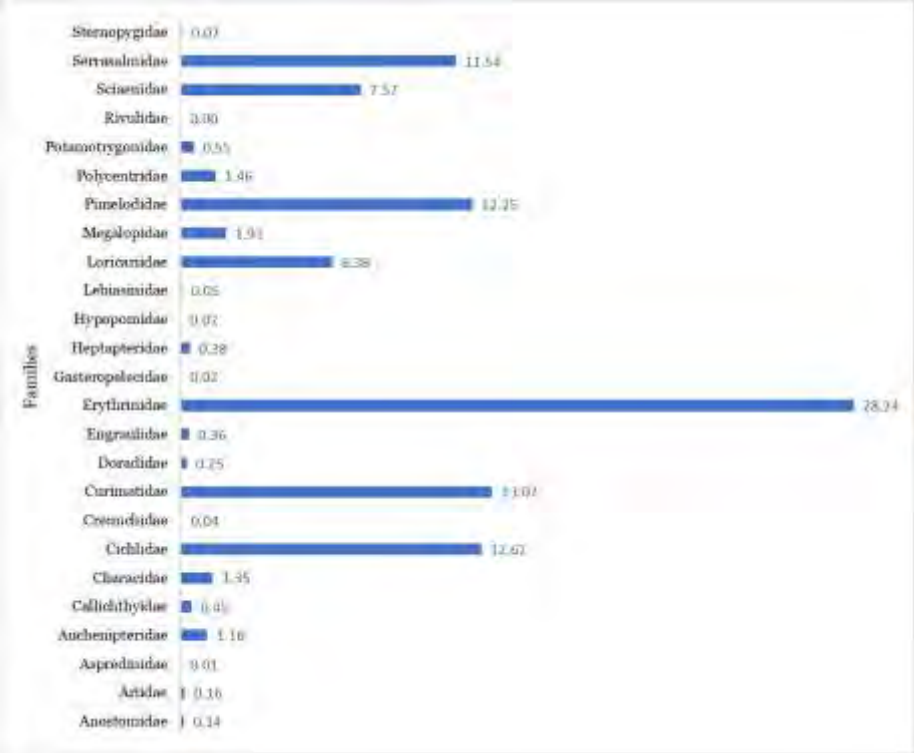


Figure 11: Wet Season relative biomass of fish families

The fish family with the highest relative biomass for the combined seasons was Cichlidae (15.2%), followed by the family Characidae, accounting for 13.9%, then Serrasalmidae with (7.6%), Lebiasinidae (6.3%), and Rivulidae (5.1%). The remaining fish family (families) each had less than 5% with respect to relative biomass.

In the dry season, the family Erythrinidae had the highest relative biomass (20.9 %), these are generally larger biomass species of fish such as the *Hoplias* and *Hoplerythrinus* species that were recorded in this survey. The Cichlidae had the second-highest relative biomass (19.1%) and included well-known species such as the *Cichla*, *Crenicichla*, *Oreochromis*, *Heros notatus,* and *Cichlasoma* which are generally larger with higher biomasses. The Curimatidae was the third most abundant in terms of relative biomass (18.4%) and included large specimens of the species *Curimata.* This was followed by Serrasalmidae (14.5%) which included the larger species of the black piranha-*Serrasalmus* and red piranha-*Pygocentrus*, while the Sciaenidae had 8.9% with large species such as *Plagioscion*. The families of Rivulidae and Achiridae had the least relative biomass for fish families recorded during the dry season survey with each having less than (<1%) respectively and were generally represented by smaller species and individual specimens. During the wet season survey, the family Erythrinidae had the highest relative biomass (28.2%), this is similar to what was observed in the dry season, though with an 8% increase, the Curimatidae family had the second-highest relative biomass (13.1%) and included similar species to the dry season. The Cichlidae and Pimelodidae had relative biomasses of 12.6% and 12.3% respectively, and was followed by the family Serrasalmidae with 11.5%), Scianidae 7.6% and Loricariidae which had 6.4% relative biomass. All other fish families each had a relative biomass of less than 2% each compared to all other fish families.

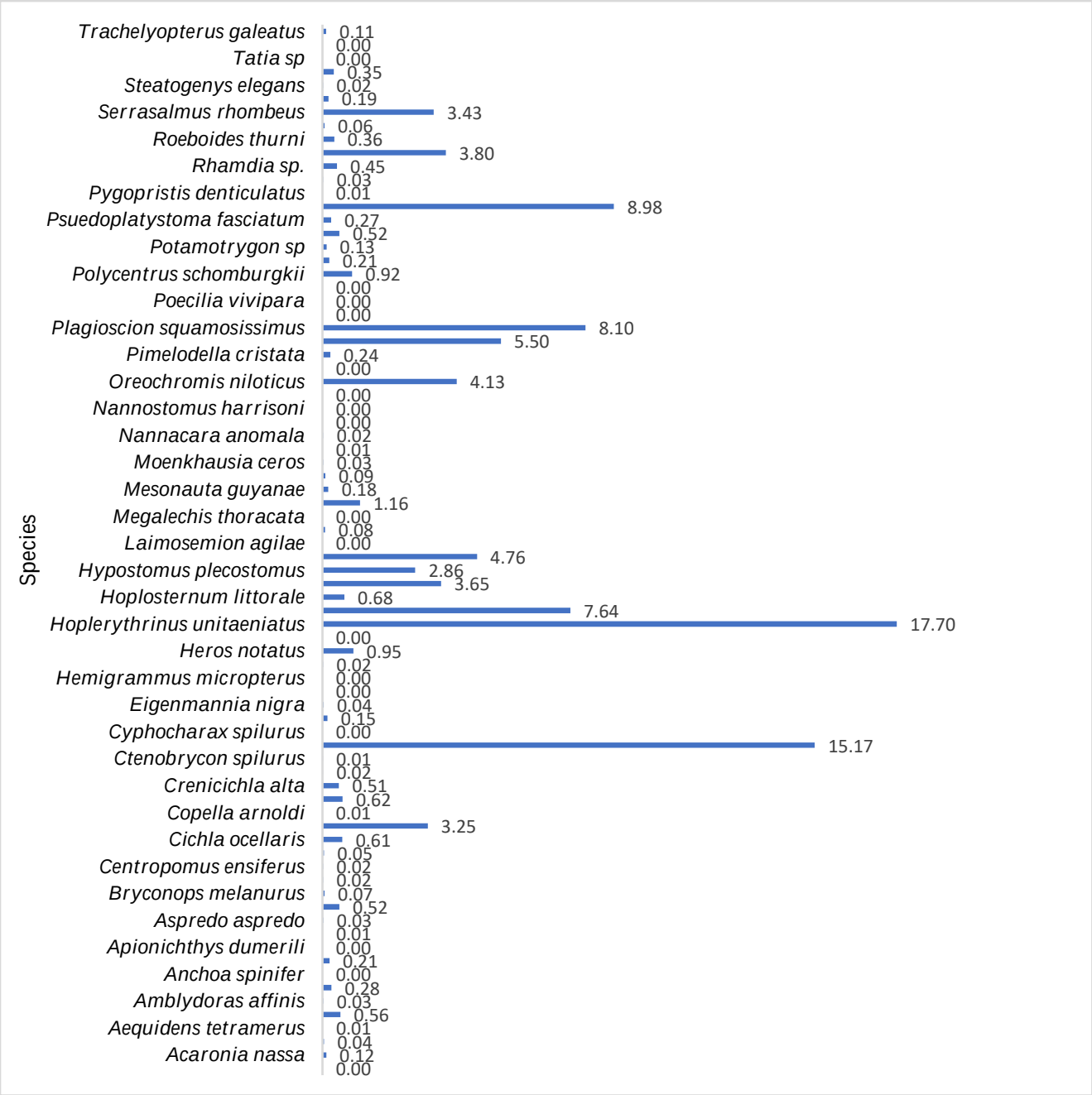


Figure 12: Combined relative biomass per fish species

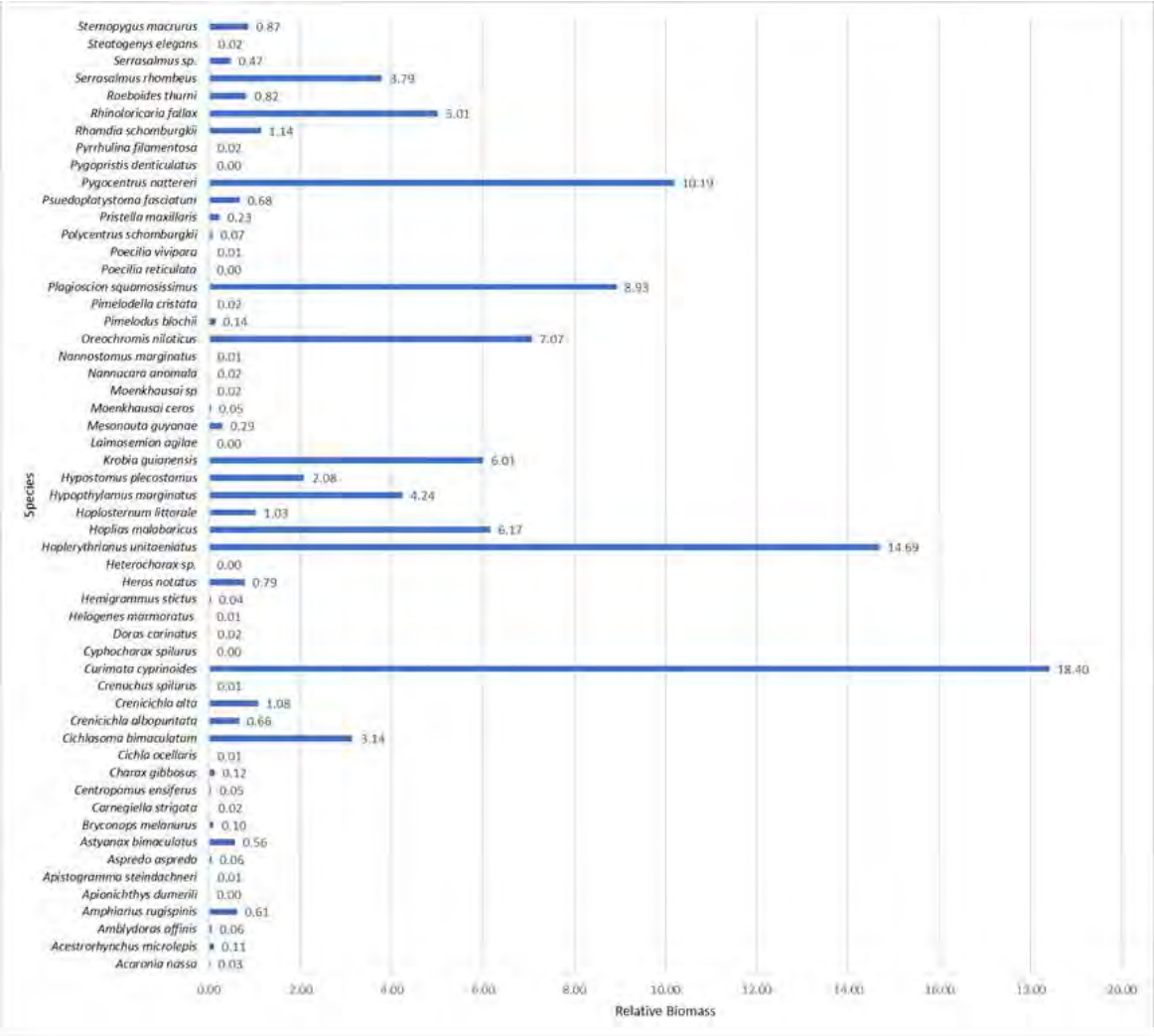


Figure 13: Dry season relative biomass per fish species

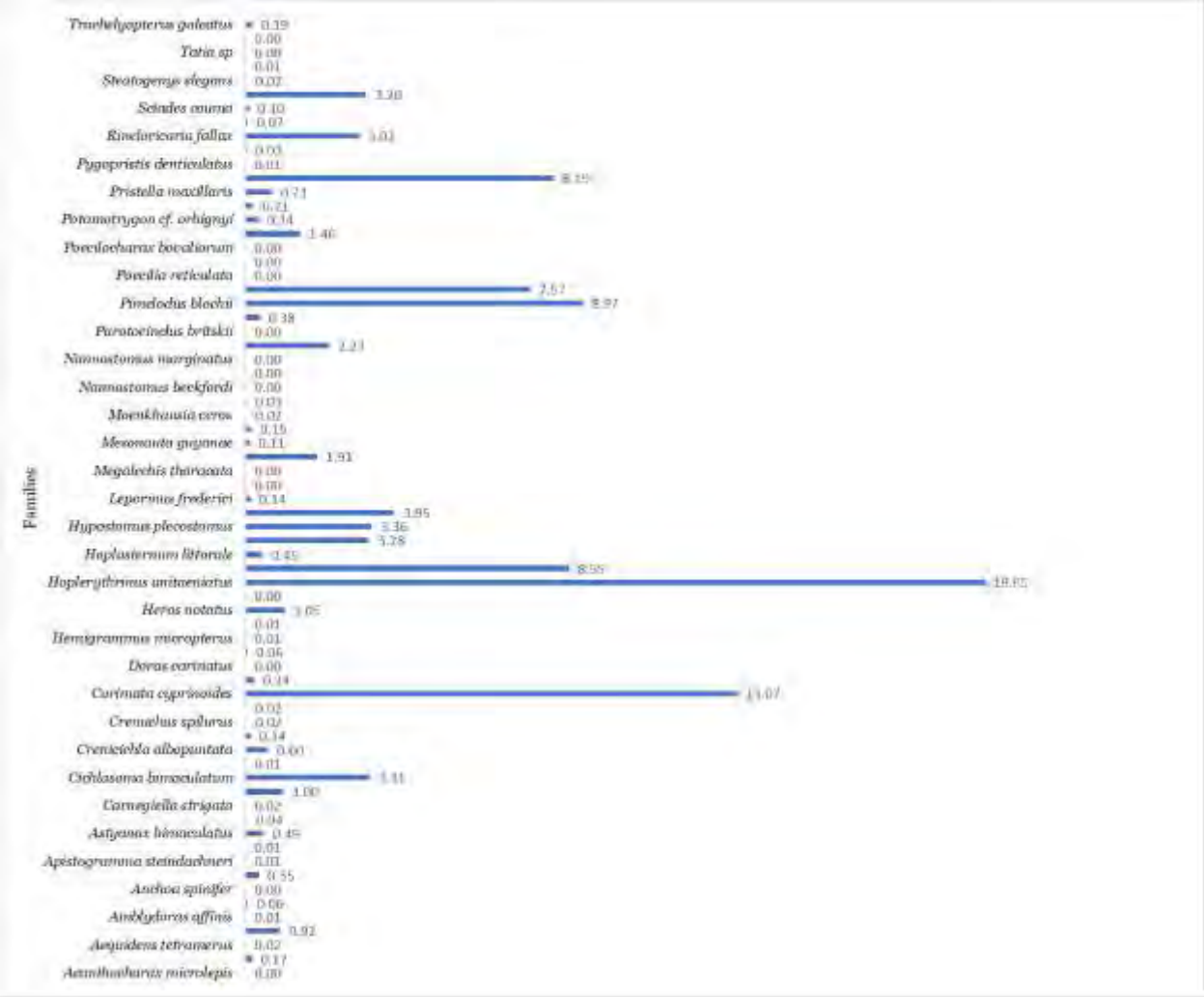


Figure 14: Wet season relative biomass of fish species

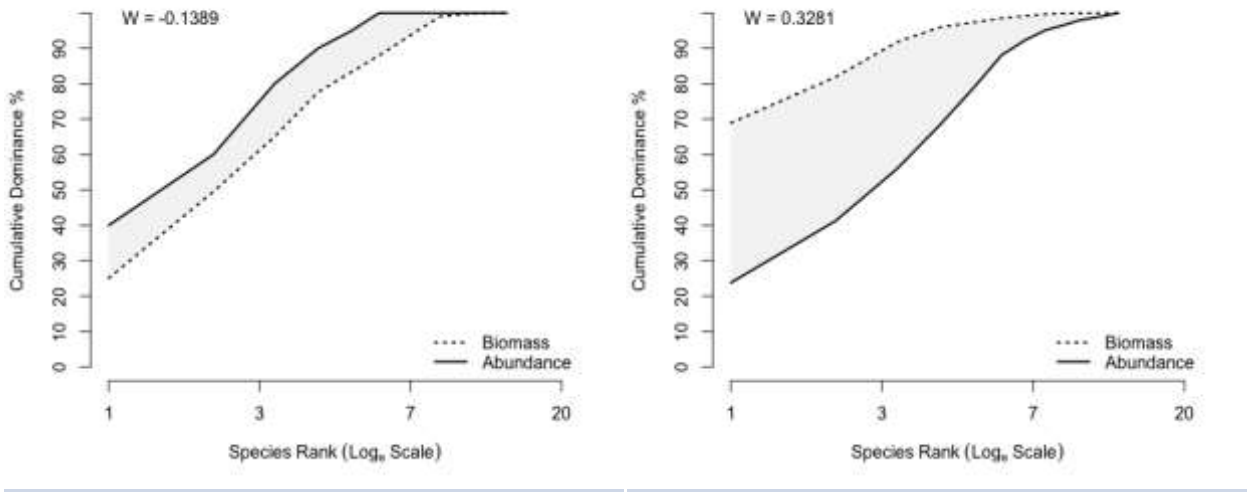
The combined survey showed that *Hoplerythrinus unitaeniatus* had the highest relative biomass (17.7%), with individuals ranging in sizes from 17 and 32 cm (mean 19.08±10.41 cm), the second-highest was for *Curimata cyprinoides* with relative biomass of 15.2% and individuals ranging in sizes between 4.0 and 24.6 cm (9.79±8.87 cm), followed by *Pygocentrus nattereri* with relative biomass 9.0 % and individuals with sizes from 14.5 to 23.0 cm (19.75±2.37 cm), and *Plagioscion squamosissimus* relative biomass was 8.1% and ranged in sizes from 2.20 to 57.0 cm (10.06±18.98 cm). *Hoplias malabaricus* had a relative biomass of 7.6% and individuals with sizes 0.25 to 41.0 cm

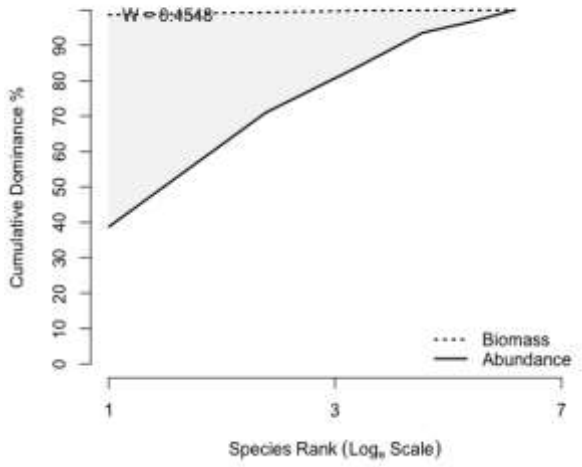
(15.44±14.42 cm), *Pimelodus blochii* (size range 0.017 to 36.0 cm and mean 16.26±12.49 cm) had a relative biomass of 5.5%, while *Krobia guianensis* (sizes 0.25 to 17.5 cm and mean 4.59±4.63 cm) 4.8% and *Oreochromis niloticus* (sizes 0.12 to 32.0 cm and mean 3.17±6.20 cm) had 4.1% of the relative biomass. The other remaining species recorded for the survey each had less than 4% of the relative total fish biomass , respectively.

Curimata cyprinoides had the highest relative biomass (18.40%) with individuals ranging in sizes from 4.0 to 225 cm (mean 33.78±40.84 cm) in the dry season survey, this was followed by *Hoplerythrinus unitaeniatus* with relative biomass of 14.69% and individuals ranging in sizes between 17 and 32 cm (25.05±3.47 cm), *Pygocentrus nattereri* had relative biomass of 10.19% and had individuals with sizes 12.5 to 22 cm (18.15±3.01 cm), *Plagioscion squamosissimus* was the species with the fourth highest relative biomass 8.93% and ranged in sizes from 35 to 48.5 cm (42.67±6.93 cm) and *Oreochromis niloticus* had relative biomass of 7.07% and individuals with sizes 1.2 to 31.5 cm (8.72±10.22 cm). *Pygopristis denticulatus* (3.5 cm TL), *Poecilia reticulata* (1.9-2.0 cm and mean 1.95±0.07 cm), *Laimosemion agilae* (2.52 cm TL), *Heterocharax bellottii* (1.9-2.1 cm and mean 2±0.08 cm), *Cyphocharax spilurus* (3 cm TL) and *Apionichthys dumerili* (5 cm TL) are relatively smaller species in sizes and had the lowest relative biomass each of 0.00% (<0.001%), respectively.

In the wet season survey, *Hoplerythrinus unitaeniatus* had the highest relative biomass (19.7%) a slight increase from the dry season, with individuals ranging in sizes from 21 to 31.3 cm (mean 25.37±1.94cm), this was followed by *Curimata cyprinoides* with relative biomass of 13.1% , which is a 5% decrease compared to the dry season survey and individuals ranging in sizes between 1.2 and 24.6 cm (17.96±6.19 cm), *Pimelodus blochii* had relative biomass 9% and had individuals with sizes 0.017 to 36.0 cm (19.23±11.45

cm), *Hoplias malabaricus* relative biomass was 8.6% and ranged in sizes from 2.74 to 41.0 cm (20.99±13.82 cm), *Pygocentrus nattereri* with relative biomass of 8.2% and individuals with sizes 14.5 to 23.0 cm (19.75±2.37 cm) and *Plagioscion squamosissimus* with 7.6%. All other species each had less than 4% relative biomass for the wet season survey.

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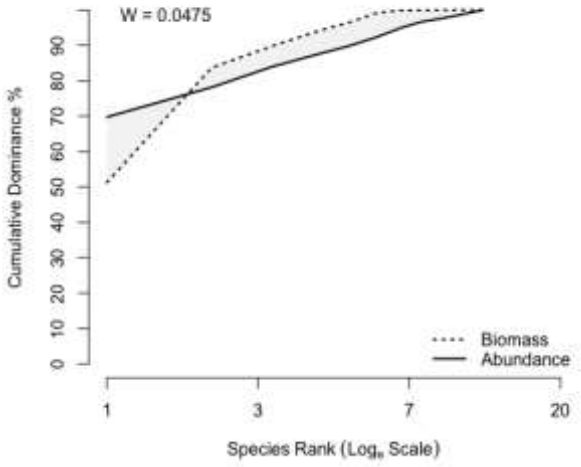
Biomass
Abundance
1 3 7
Species Rank (Log$_e$ Scale)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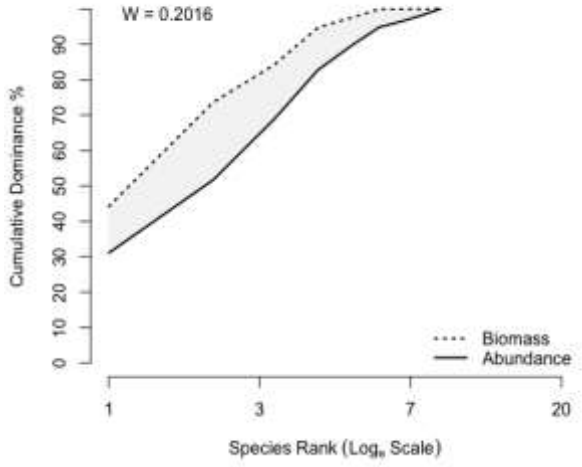
Biomass
Abundance
1 3 7 20
Species Rank (Log$_e$ Scale)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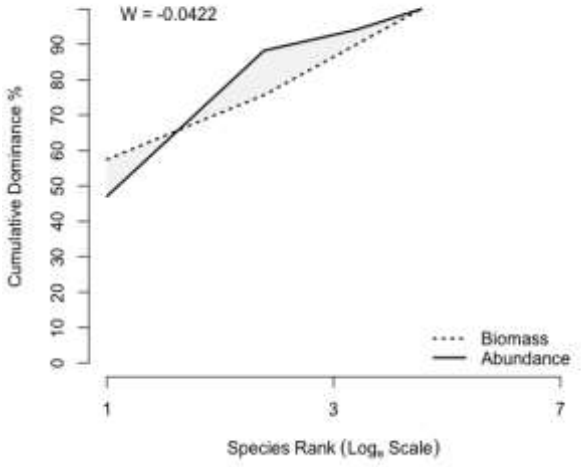
Biomass
Abundance
1 3 7 20
Species Rank (Log$_e$ Scale)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Biomass
Abundance
1 3 7
Species Rank (Log$_e$ Scale)

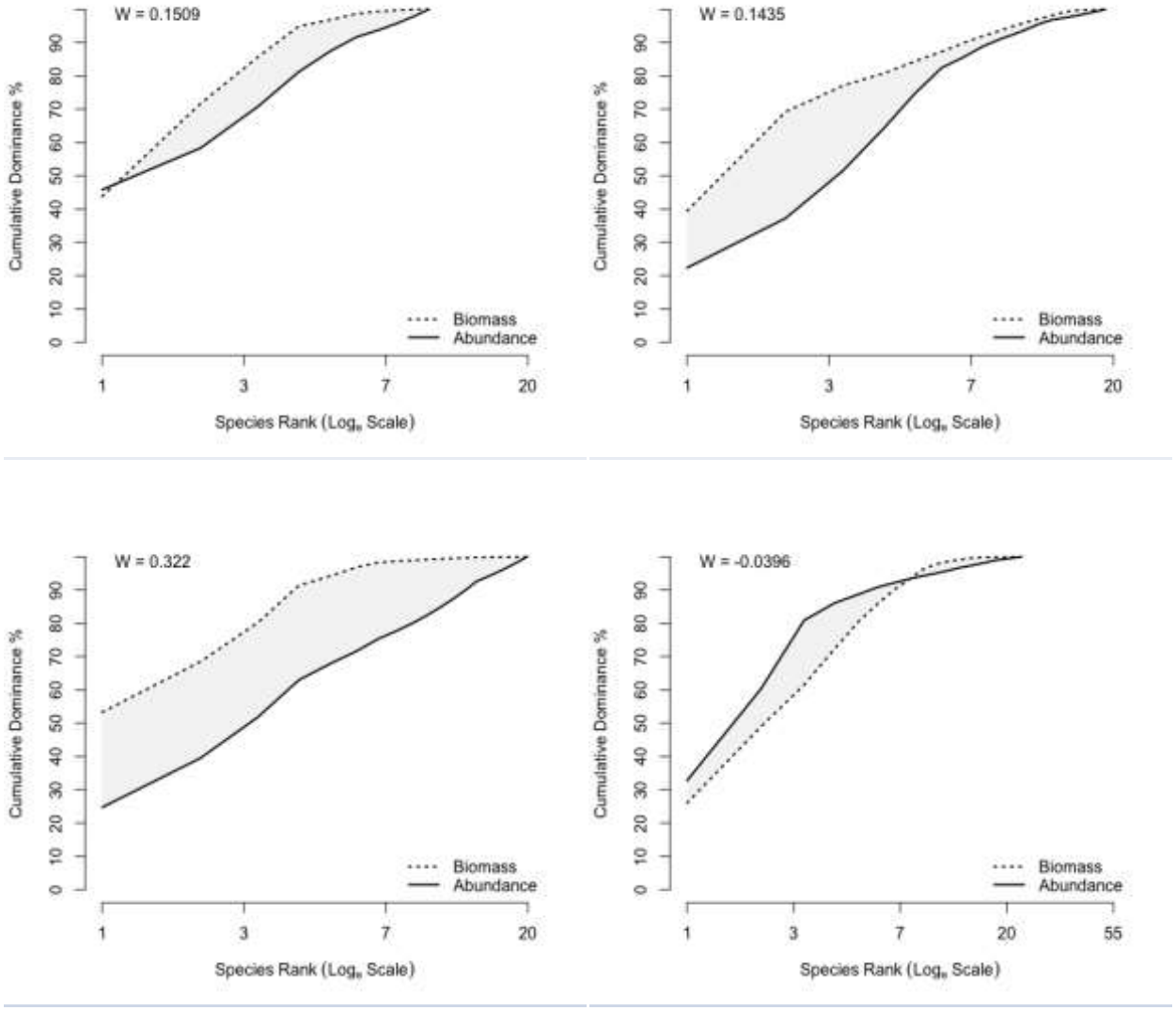
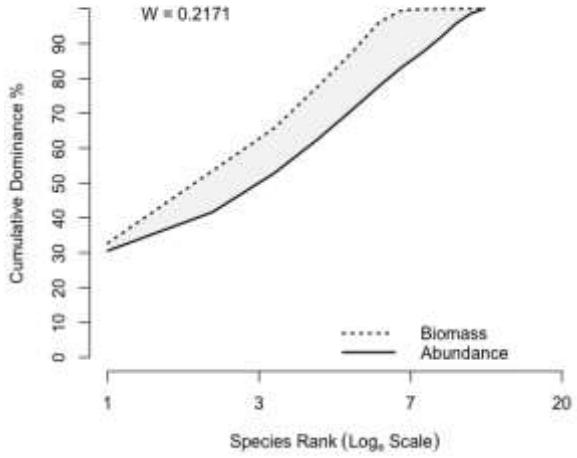


Figure 15: ABC Abundance-Biomass models and W-statistics for 10 sampling sites ERM -21-01-10) Dry season.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Biomass
Abundance
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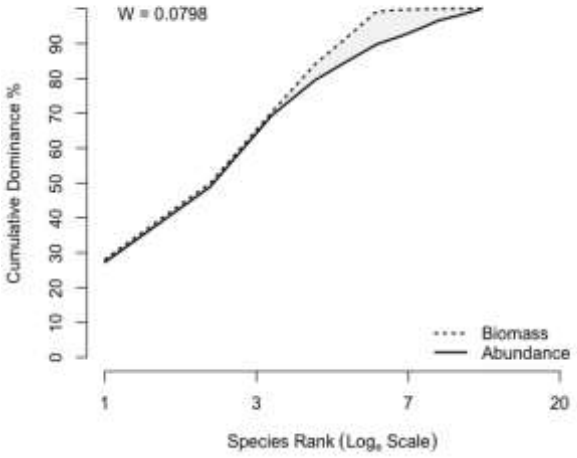
Species Rank (Log$_e$ Scale)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Biomass
Abundance
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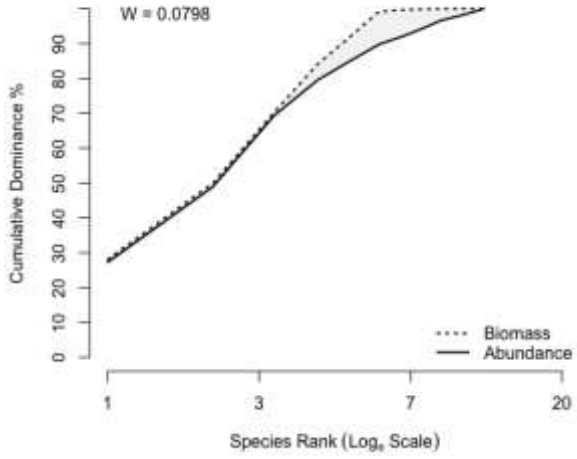
Species Rank (Log$_e$ Scale)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Biomass
Abundance
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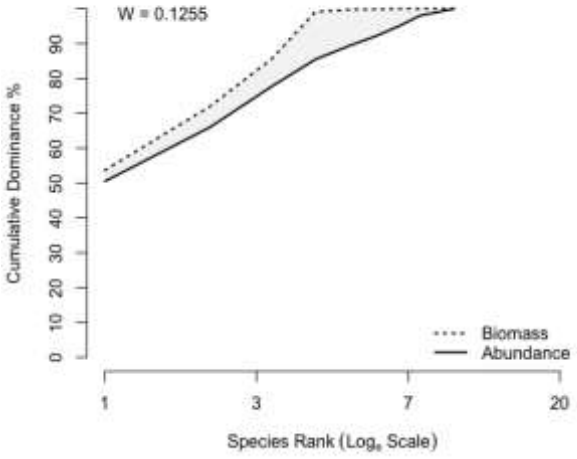
Species Rank (Log$_e$ Scale)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Biomass
Abundance
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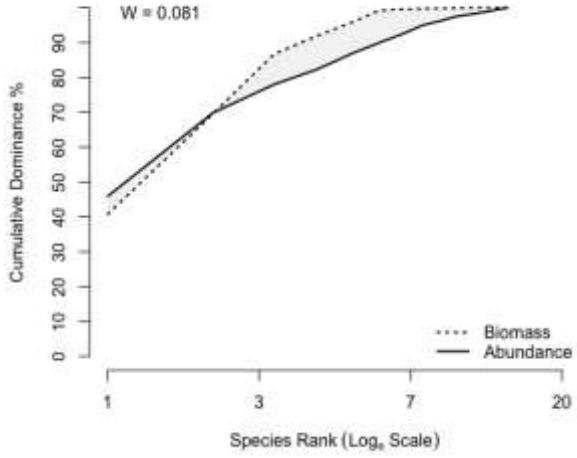
Species Rank (Log$_e$ Scale)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Biomass
Abundance
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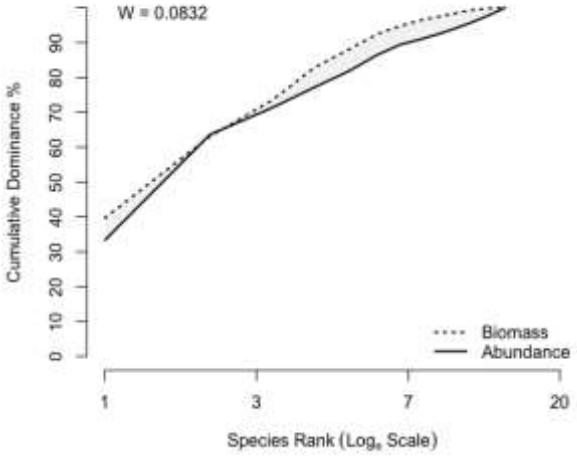
Species Rank (Log$_e$ Scale)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Biomass
Abundance
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Species Rank (Log$_e$ Scale)

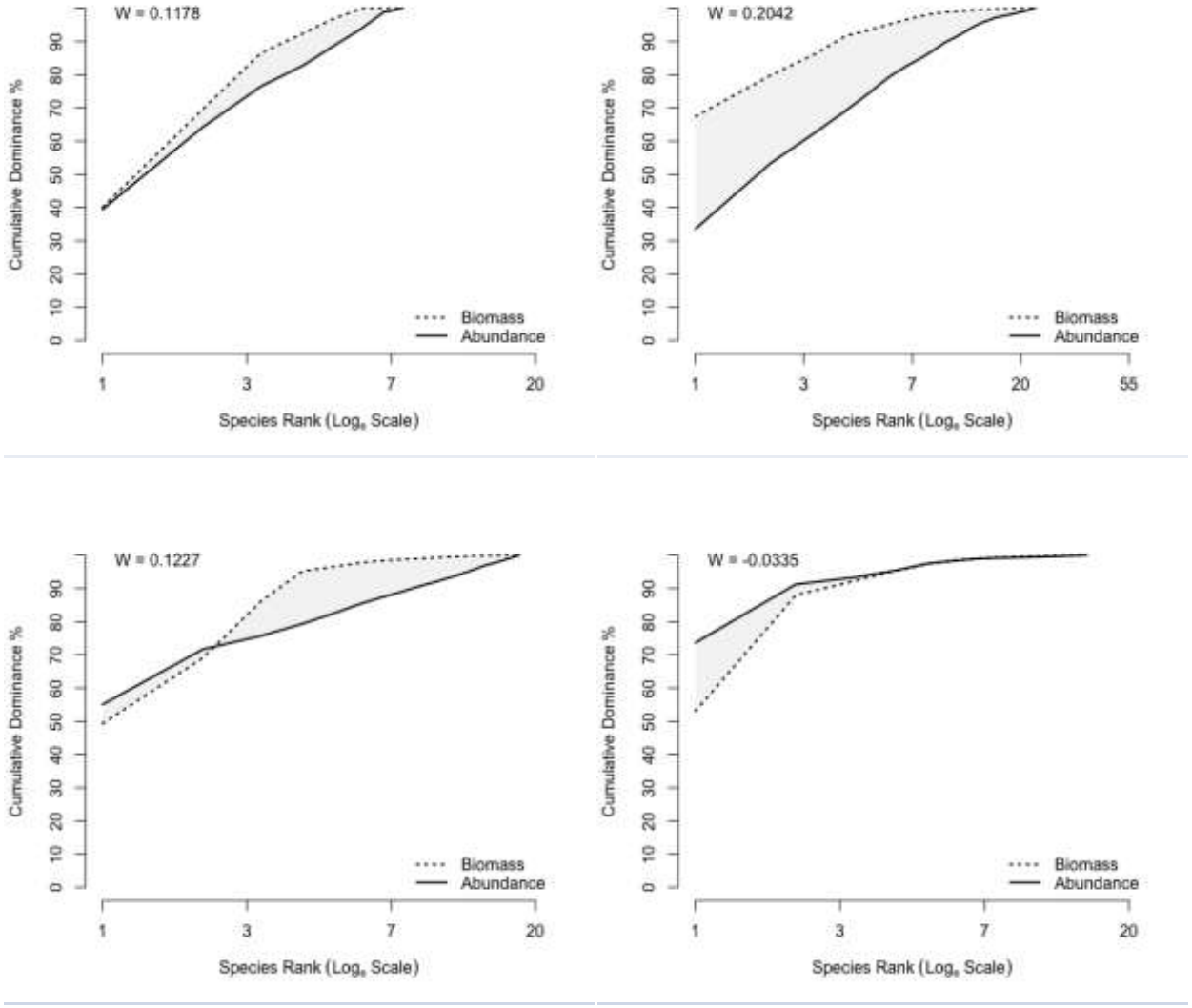

Figure 16: ABC Abundance-Biomass models and W-statistics for 10 sampling sites ERM -21-01-10)-Wet season.

ABC curves were used in this study to determine whether there was evidence of disturbance in the gas to energy inland fish community. The cumulative percentage abundance and biomass were used to create the abundance biomass curves (ABC curves). These curves were used to evaluate the disturbance status at each sampling site (Warwick, 1986). The ABC curves for the study sites in the Gas to Energy inland fisheries are given

in Fig16. Heavy disturbed environmental conditions for the combined survey were found for site ERM-21-10 (Cogland dam) with (negative W-statistic) and where the cumulative percentage dominance of the abundance curve was positioned above the cumulative percentage dominance of the biomass curve. Partially or moderately disturbed environmental conditions were found at sites ERM-21-01 (Mary bar-Crane village3), ERM-21-04 (Canal no.1), ERM-21-05 (Canal no.2),and ERM-21-09 (Wales #2) which showed overlapping biomass and abundance curves, with the cumulative percentage dominance of biomass being above the cumulative percentage dominance of abundance curves (also resulting in a positive W-statistic); and undisturbed environmental conditions were found for sites ERM-21-02 (Crane turn), ERM-21-03 (Parfaite Harmony), ERM-21-06 (Eastern Demerara Ref) and ERM-21-07 (Western Demerara MoF) and ERM-21-08 (Wales #1) which showed the biomass curves positioned above the abundance curves (with positive W-statistic) (See Appendix xxx).

For the dry season assessment, site ERM-21-1 (Crane Village), the cumulative percentage dominance of the abundance curve is positioned above the cumulative percentage dominance of the biomass curve (negative W-statistic), which indicates that the dominant fish species have a small contribution to the total biomass and is an indication of typically heavily disturbed environments (Clarke and Warwick 2001). In sites ERM-21-06 and ERM-21-10 (Cogland dam), the cumulative percentage dominance of abundance was slightly above the cumulative percentage dominance of biomass curves, which were also crossing each other, indicating partial to heavy disturbed environmental conditions, since there was also a negative W-statistic value. ERM-21-04 (Canal no. 1) and ERM-21-07 (Western Demerara MoF) showed overlapping cumulative percentage dominance of abundance and cumulative percentage dominance of biomass curves

indicating partially or moderately disturbed environmental conditions at these sites. In contrast, ERM-21-02 (Crane turn), ERM-21-03 (Parfaite Harmony), ERM-21-05 (Canal no. 2), ERM-21-08 (Wales #1) and ERM-21-09 (Wales #2) showed the biomass curves positioned above the abundance curves (with positive W-statistic), this indicates that large species are dominant in the assemblage, which is typical of better conserved or undisturbed environmental conditions at these survey sites for the gas to energy inland fisheries studies (dry season).

In the wet season, sites ERM-21-01 (Mary bar-Crane village), ERM-21-04 (Canal no.1) , ERM-21-07 (Western Demerara MoF), ERM-21-08 (Wales #1), ERM-22-11 (Connecting Channel #1) and ERM-22-12 (Connecting Channel #2) showed the cumulative percentage dominance of the biomass curve was positioned above the cumulative percentage dominance of the abundance curve (with a resulting positive W-statistic); an indication of undisturbed environmental conditions. Indications of partial disturbances in environmental conditions were found in sites ERM-21-02 (Crane turn), ERM-22-03 (Parfaite Harmony), ERM-21-05 (Canal no.2), ERM-21-06 (Eastern Demerara (Ref), ERM-21-09 (Wales #2) and ERM-22-13 (Wales #3), even though there were resulting positive W-statistics, there were overlapping (touching or crossing) of biomass and abundance curves; however the cumulative percentage dominance of biomass was above the cumulative percentage dominance of abundance curves. Only one site ERM-21-10 (Cogland dam) had a negative W-statistic value in the wet season, indicating heavy disturbances since the cumulative percentage dominance of abundance was above the cumulative percentage dominance of the biomass curve. Cogland dam sample site is within the vicinity of a major road network (dams) and surrounding agricultural farmlands and grazing livestock and hence substantial anthropogenic

activities and exposure to various forms of pollution. Estuarine sites such as ERM-21-06 (Eastern Demerara (Ref), ERM-21-07 (Western Demerara MoF), and estuarine influenced sites (ERM-21-01 Mary bar-Crane village and ERM-21-02 Crane turn) are variable in terms of environmental conditions (and or stress) daily and so careful with the application of the ABC curve analysis as an indicator of pollution in these types of sites are important, but in general, may be used as a tool for detecting environmental stress (Meire and Dereu, 1990).

Conservation status of fish species

77.22% (61) of all fish species recorded during the survey were classed as 'Not Listed' under the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species, 21.52% (17) species were listed as 'Least Concern' and one species (1.2%), the Tarpon/Cuffum (*Megalops atlanticus*), is listed as Vulnerable. This fish species has been assessed as having a decreasing and fragmenting population, heavily fish especially for sport fishing, and is considered to be at high risk for unnatural extinction without further human interventions (Adams et al., 2022). None of the species were listed under the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora.

The following species of fishes are important from a socioeconomic perspective and includes *Acestrorhynchus microlepis, Curimata cyprinoides, Hoplerythrinus unitaeniatus, Hoplias malabaricus, Serrasalmus rhombeus, Serrasalmus* species , *Pygocentrus nattereri, Acaronia nassa, Cichla ocellaris, Cichlasoma bimaculatum, Crenicichla alta, Crenicichla albopuntata, Heros notatus, Krobia guianensis, Mesonauta guyanae, Oreochromis niloticus, Hoplosternum littorale, Centropomus ensiferus, Plagioscion squamosissimus, Doras carinatus, Pimelodella cristata, Rhamdia sp., Hypostomus plecostomus, Hypopthylamus marginatus, Pimelodus blochii, Amphiarius rugispinis, Psuedoplatystoma fasciatum, Megalops atlanticus,* and *Trachelyopterus galeatus* are important food fishes for many local communities for subsistence and sometimes livelihood purposes.

Other species that are important to livelihood especially in the aquarium trade includes *Astyanax bimaculatus, Hemigrammus stictus, Moenkhausia* species, *Pristella maxillaris, Carnegiella strigata, Bryconops melanurus, Cyphocharax spilurus,*

Nannostomus marginatus, Pyrrhulina filamentosa, Apistogramma steindachneri, Heros notatus, Mesonauta guyanae, Nannacara anomala, Liamosemion agilae, Helogenes marmoratus, Rineloricaria fallax, Poecilia species, *Nannostomus beckfordi, Nannostomus harrisoni, Parotocinclus britskii, Poecilocharax bovaliorum, Polycentrus schomburgkii, Potamotrygon* species and *Tatia sp.* (Table 10).

Table 10: IUCN and CITES status of the fish species GTE Project

Species	IUCN	CITES
Acanthocharax microlepis	Not Listed	Not Listed
Acaronia nassa	Not Listed	Not Listed
Acestrorhynchus microlepis	Not Listed	Not Listed
Aequidens tetramerus	Not Listed	Not Listed
Ageneiosus inermis	Not Listed	Not Listed
Amblydoras affinis	Not Listed	Not Listed
Amphiarius rugispinis	Not Listed	Not Listed
Anchoa spinifer	Least Concern	Not Listed
Anchoviella lepidentostole	Least Concern	Not Listed
Apionichthys dumerili	Least Concern	Not Listed
Apistogramma steindachneri	Not Listed	Not Listed
Aspredo aspredo	Least Concern	Not Listed
Astyanax bimaculatus	Not Listed	Not Listed
Bryconops melanurus	Not Listed	Not Listed
Carnegiella strigata	Not Listed	Not Listed
Centropomus ensiferus	Least Concern	Not Listed
Charax gibbosus	Not Listed	Not Listed
Cichla ocellaris	Not Listed	Not Listed

Cichlasoma bimaculatum	Not Listed	Not Listed
Copella arnoldi	Not Listed	Not Listed
Crenicichla albopuntata	Not Listed	Not Listed
Crenicichla alta	Not Listed	Not Listed
Crenuchus spilurus	Not Listed	Not Listed
Ctenobrycon spilurus	Not Listed	Not Listed
Curimata cyprinoides	Not Listed	Not Listed
Cyphocharax spilurus	Not Listed	Not Listed
Doras carinatus	Least Concern	Not Listed
Eigenmannia nigra	Not Listed	Not Listed
Helogenes marmoratus	Not Listed	Not Listed
Hemigrammus micropterus	Not Listed	Not Listed
Hemigrammus stictus	Not Listed	Not Listed
Heros notatus	Not Listed	Not Listed
Heterocharax bellottii	Not Listed	Not Listed
Hoplerythrinus unitaeniatus	Not Listed	Not Listed
Hoplias malabaricus	Least Concern	Not Listed
Hoplosternum littorale	Not Listed	Not Listed
Hypopthylamus marginatus	Not Listed	Not Listed
Hypostomus plecostomus	Not Listed	Not Listed
Krobia guianensis	Not Listed	Not Listed
Laimosemion agilae	Not Listed	Not Listed
Leporinus frederici	Not Listed	Not Listed
Megalechis thoracata	Not Listed	Not Listed
Megalops atlanticus	Vulnerable	Not Listed
Mesonauta guyanae	Not Listed	Not Listed
Metynnis argenteus	Least Concern	Not Listed
Moenkhausia ceros	Not Listed	Not Listed

Moenkhausia sp.	Not Listed	N/A
Nannacara anomala	Not Listed	Not Listed
Nannostomus beckfordi	Not Listed	Not Listed
Nannostomus harrisoni	Least Concern	Not Listed
Nannostomus marginatus	Not Listed	Not Listed
Oreochromis niloticus	Least Concern	Not Listed
Parotocinclus britskii	Not Listed	Not Listed
Pimelodella cristata	Least Concern	Not Listed
Pimelodus blochii	Not Listed	Not Listed
Plagioscion squamosissimus	Least Concern	Not Listed
Poecilia reticulata	Least Concern	Not Listed
Poecilia vivipara	Not Listed	Not Listed
Poecilocharax bovaliorum	Not Listed	Not Listed
Polycentrus schomburgkii	Not Listed	Not Listed
Potamotrygon cf. orbignyi	Not Listed	Not Listed
Potamotrygon sp	N/A	N/A
Pristella maxillaris	Least Concern	Not Listed
Psuedoplatystoma fasciatum	Not Listed	Not Listed
Pygocentrus nattereri	Not Listed	Not Listed
Pygopristis denticulatus	Not Listed	Not Listed
Pyrrhulina filamentosa	Least Concern	Not Listed
Rhamdia sp.	Not Listed	N/A
Rineloricaria fallax	Not Listed	Not Listed
Roeboides thurni	Not Listed	Not Listed
Sciades couma	Least Concern	Not Listed
Serrasalmus rhombeus	Not Listed	Not Listed
Serrasalmus sp	Not Listed	N/A
Serrasalmus sp 1	Not Listed	N/A

Steatogenys elegans	Least Concern	Not Listed
Sternopygus macrurus	Not Listed	Not Listed
Tatia sp	Not Listed	N/A
Tomeurus sp	Not Listed	N/A
Trachelyopterus galeatus	Not Listed	Not Listed

Results and Discussion cont'd

When comparisons for species composition were made between the two seasons, twenty-four (24) new species occupying various niche and trophic positions were collected in the wet season that was absent from the dry season survey. These include *Acanthocharax microlepis, Aeqidens tetranerus, Ageneiosus inermis, Anchoa spinifer, Anchoviella lepidentostole, Copella arnoldi, Ctenobrycon spilurus, Eigenmannia nigra, Hemigrammus micropterus, Leporinus frederici, Megalechis thoracata, Megalops atlanticus, Metynnis argenteus, Nannostomus beckfordi, Nannostomus harrisoni, Parotocinclus britskii, Poecilocharax bovaliorum, Potamotrygon cf. orbignyi, Potamotrygon sp, Pygopristis denticulatus, Sciades couma, Tatia sp., Tomeurus sp. and Trachhelyopterus galeatus.* There were two new recorded fish orders (Myliobatiformes and Elopiformes) that were not collected during the dry season survey. The Myliobatiformes included the two species of *Potamotrygon* species collected for the estuary in the Demerara River Eastern reference site at low tide in the shallow waters of the mudflats; and Elopiformes for which the Tarpon or Cuffum (*Megalops atlanticus*) juveniles were at site ERM-21-01 Mary Bar Crane Seawall canal and ERM-21-02 Crane turn canal which was influenced by both estuarine and freshwater conditions from the Demerara river-Atlantic Ocean and inland sources respectively.

While there were no major changes in the number of fish families recorded among the dry and wet seasons with (26 and 26 families) respectively; there were compositional changes with reference to newly collected species in the wet season. There were differences in the number of genera between seasons (dry season had 49 and wet season with 62); a difference of thirteen (13) added fish genera for the overall survey. The majority of species recorded in the study for both seasons were from the order characiformes, which is a diverse order of ray-finned fishes with over 1800 species (Mirande, 2010). Ecologically, characiformes are very important in the food chains of freshwater ecosystems, since these species have various diet breaths and occupy different niches and a wide variety of habitats (Nelson, 2010).

The second most abundant order was the Siluriformes (catfishes), which are in keeping with trends in the tropics. These fishes are among the most diverse and common groups in the tropics and are highly adaptive since they can inhabit, inland, estuarine and marine waters (Bruton, 1996), variations in jaw morphology (Lujan et al., 2012), some species can breathe out of water, live in poor water quality among other niches in the ecosystem (Nelson, 1994, Lundberg & John, 2003). Cichliformes, was the next abundant fish order, and is one of the most diverse groups of fishes that have gone through rapid speciation processes that have allowed them to become high adaptable species to various environments and habitats, with distinct behaviour in parental care and feeding at various levels in the aquatic food chain (Kullander, 1998, Sparks et al. 2004); and then the Perciformes. The least represented fish order was Pleuronectiformes with one species belonging to the flatfish *Apionichthys dumerili* and Elopiformes for which the Tarpon *Megalops atlanticus.*

The most abundant species recorded in the survey was the small-sized, *Pristella maxillaris* from the family Characidae. This fish species is widely distributed and can tolerate a range of habitats, including both acidic and alkaline water, and it is tolerant to slightly brackish water conditions (Weirzman & Palmer, 1997) in calm waters with dense vegetation. *Pristella's* feed on worms, small crustaceans, and insects (Weirzman & Palmer, 1997) and were mostly recorded from one area at site 10 Cogland dam; which had vegetation on the banks and was also a relatively high insect presence and mild water salinity. These species are also utilized in the aquarium trade in Guyana.

The second most abundant species recorded was another small-sized fish, Roeboides *thurni*. These fishes are also widely distributed in the neotropics and were recorded in the rivers of Guyana. They are usually small-bodied and live in habitats with a pH range of 6.0-7.5 (Lucena, 2007). This coincides with the results of this study as the majority of these fishes were recorded in sites Mary bar, Crane turn, Parfaite Harmony and Cogland dam, where the pH ranged from 2.98– 7.03. The species is commonly collected for aquariums trade by trappers at the local community levels and may also likely tolerant to agricultural runoff and other pollutants.

Krobia guianensis was the third most abundant species, and they were found in both sites with little disturbances to heavy disturbances. These cichlid species were high in relative abundances and biomass is typically found in small streams or creeks with little current, pH range between 6.0-7.0, and temperatures from 23-25°C, where they feed on small invertebrates (van der Sleen and Albert, 2017).

Other abundant species from the studies were *Rineloricaria fallax, Hemigrammus micropterus, Astyanax bimaculatus, Crenuchus spilurus, Curimata cyprinoides, Moenkhausia ceros* and *Polycentrus schomburgkii.*

Indicator species

Fishes are good indicator species for future ecological monitoring since these species are used as surrogate measures of overall aquatic biodiversity and/or ecosystem health. Fishes are good biodiversity indicators as they are ecologically diverse, relatively common in a wide variety of habitats, well studied, relatively easy to sample and identify, and can respond relatively rapidly to changes in the environment.

We further investigated the species driving the site distribution pattern (Appendix III), referred to as intrinsic variables using a community multivariate analysis; *non-metric multidimensional scaling*, or NMDS. Approximately 4-5 distinct communities (Appendix III) were visualized using a reduced dimension of K=2 that produced a stress value of 0.0924 (permutation=100) in the NMDS of the fish community matrix. ANOSIM (R= 0.4114, p= 0.0096, Permutation 9999) indicated that there were significant differences between the fish communities that are exposed to different disturbance levels at the various sample sites.

Several species are known to tolerate habitat disturbances and can be used as indicators of stream health. The Erythrinidae family had two of the three species collected in this survey; the Yarrow (*Hoplerythrinus unitaeniatus*) and Houri (*Hoplias malabaricus*) that are ecologically important and can serve as indicator species, since they have anatomo-physiological adaptations; which is advantageous in allowing them to survive in habitats with extreme temperatures and low oxygen conditions including

shallow and calm water bodies, such as some of the sites surveyed like Parfaite Harmony, Canal no. 1 and no. 2 and Connecting Channel no. 1 and no. 2. *Hoplerythrinus unitaeniatus* is a facultative air-breather since it can utilize the oxygen from the air by swimming to the surface to breathe and may also have invasive potential (Cameron & Wood, 1978, Phillip, 1998, Da Silva et al., 2019).

Cichlasoma bimaculatum is another species known to tolerate low oxygen levels and disturbed environmental conditions and have invasive potential since they can outcompete other species for resources and have high reproductive capabilities. *Cichlasoma bimaculatum* are found in many canal systems and swamps especially on the coast in Guyana and are popular food fishes for subsistence and aquarium trades like erythrinids.

Polycentrus schomburgkii showed extreme variations in tolerance from sites that may have salinity/brackish- turbid water influence (Mary bar-Crane Village) to clear, fresh tannin black water sites like (Wales #1 and Wales #2); and pH between 6.0 and 7.0 and temperatures between 22-26°C in general (Britz and Kullander, 2002). These species were not found on the Demerara River sites.

Hoplosternum littorale is an arbor-plated catfish that is widely distributed in the Guianas right up to North America. This species has been introduced in many areas for fish farming and also has invasive capabilities. *H. littorale* is tolerant to disturbed conditions and are restricted to standing waters (such as canal systems) or swamps and floodplains with low dissolved oxygen since they can use gills and intestinal breathing and can survive extreme changes in seasonal conditions caused primarily by fluctuations in rainfall. They are popular food fishes for subsistence and aquarium trades.

The *Rineloricaria fallax* is from the armored catfish group found in a range of freshwater habitats. These species are commonly found in waters with a pH range of 5.8 -7.8 and a temperature of 15 – 25 ^{o}C (Ferraris, 2003). They are among the most peaceful of catfishes and feed on small aquatic crustaceans. The majority of these species were observed in the areas that were heavily disturbed from agricultural run-off which demonstrates their adaptable nature to disturbed environments. They are harmless to humans and while not a major food fish, they form part of the aquarium trade (Ferraris, 2013).

The *Serrasalmus rhombeus* species is widely distributed in many low-land areas throughout South America (Nico & Loftus, 2022). It can be commonly found in the Essequibo basins and coastal drainages of Guyana (Nico & Loftus, 2022). They generally thrive well in areas with a pH of 5.8 – 7.0 and in tropical temperatures ranging from 23 – 27 ^{o} C (Jegu, 2003). The *Serrasalmus* species are generally carnivorous and their opportunistic behaviors allow them to adapt to various habitats. They are not necessarily very aggressive; however, they have powerful dentitions that can cause serious bites if they feel threatened (Jegu, 2003). The *Serrasalmus* species is eaten by locals and is also a popular fish in the aquarium trade.

The *Oreochromis niloticus* are commonly found in a variety of fresh and brackish water habitats like lakes, rivers, sewage canals, irrigation channels, etc. (Trewavas, 1983). They are usually less tolerant to saltwater environments. They are very fast growing and tolerant to a wide range of nutritional regimes and water quality (Lee & Donaldson, 2001). This species is highly invasive in Guyana and can tolerate a range of habitats including heavily disturbed environments as seen in this study. They can grow to approximately

60.00 cm and weigh almost 4.3 kg (Trewavas, 1983). *Orechromis niloticus* is a commercial fish species that are popular in the aquaculture trade.

Curimata cyprinoides is a freshwater fish species commonly found in waters with a pH range of 6.0 – 7.8 and a temperature range of 23 – 27 ^{o} C (Vari, 1989). This species is distributed across South America in the Orinoco River delta, Atlantic drainages of the Guianas, lower Amazon, and Tocantins rivers (Vari, 1989). They commonly feed on organic debris and undergo mass migration during the reproductive season and are easily captured during this period (Vari, 1989). They have some tolerance to disturbed environments and are commonly consumed by locals.

Species that are highly sensitive to disturbances and may be a good indicator of aquatic health during the studies include several species as outlined below.

The *Carnegiella strigata* usually live in groups and feed on crustaceans and insects (Gery, 1977). They are found in freshwater habitats across the lower, middle and upper Amazon River Basin, south of Amazon, coastal drainages of Guyana and Suriname, etc. *Carnegiella strigata* usually tolerate pH ranges of 5.0 – 8.0 and temperatures of 24 – 28 ^{o} C and are commonly found in blackwater environments (Gery, 1977). They pose no threat to humans and are common aquarium fishes.

Heros notatus is a freshwater species distributed across the Amazon River basin, negro River basin (Kullander, 2003). They are commonly found in blackwater rivers and tributaries and tolerate a pH between 6 – 7 and temperature ranges 22 – 29 ^{o} C. The mature species usually have large black blotches along the ventral surface and sometimes a red color depending on the mood, water conditions, and stress level of the fish. They are common aquarium fishes and may be consumed by locals.

The *Mesonauta guyanae* is a tropical freshwater species that is distributed across South America including the Essequibo River drainage in Guyana and coastal drainages (Kullander, 2003). The species are usually slow-moving and can grow to up approximately 11.2 cm (Kullander, 2003). They feed on insects and plants and form part of the aquarium trade. They may also be eaten by locals.

The *Moenkhausia ceros* are a group of freshwater fishes that are native to tropical and sub-tropical South America (Lima et al., 2003). They are commonly found in slow-flowing rivers, tributaries, floodplains, and blackwater. This genus of fishes generally tolerates temperatures between 24 – 28 o C and pH ranges of 5.5 – 7.0 (Lima et al., 2003). These are usually very peaceful species and are common in the aquarium trade.

Pseudoplatystoma fasciatum is a species of whiskered catfish distributed in freshwater habitats of the South Americans such as Amazon, Orinoco, Essequibo, etc. (Lundberg & Littmann, 2003). They can tolerate pH ranges of 6.0 – 8.0 and temperatures between 24 – 28 ^{o} C (Lundberg & Littmann, 2003). This species prefers shady streams and feeds on other fishes as well as crabs (Lundberg & Littmann, 2003). This species is of high interest in aquaculture for food production as it is commonly consumed by locals.

Conclusion & Recommendations

Many of the fish sampling sites for the GTE project have straddled mostly man-made canal systems that were historically dug for drainage and irrigation purposes and that were generally disturbed due to anthropogenic activities such as roads, agriculture and infrastructural development. The survey yielded seventy-nine (79) species from the 13 sampling sites, belonging to ten (10) orders comprising 30 families and 72 genera. A total of fifty-five (55) species were collected from the ten (10) sampling sites during the Dry Season, belonging to seven (7) orders comprising 26 families and 49 genera and the wet season produced 68 species collected from the 13 sampling sites belonging to nine (9) orders comprising 26 families and 62 genera. One fish species recorded, the Tarpon/Cuffum (*Megalops atlanticus*) is listed as Vulnerable according to the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species, however, most species were listed as Least Concerned or Not Applicable and none were CITES appendix listed. Some of the large-sized fish species are used for subsistence purposes and a few are important in the aquarium trade and may sustain some community members' livelihoods. The project is likely to pose no major threats to the fish community within the area since the pipelines will run mostly over stream channels via land and or directional drilling below stream beds. However, during the pre-construction and construction phases, there are likely to be some impacts on the surrounding habitats and some impacts where stretches or parts of canals will be filled; hence ensuring alternatives (trade-offs) and proper implementation of mitigation measures and monitoring should resolve the issues and detect any changes in the habitat and species composition and biomass.

The thirteen (13) sample sites established in the area or alignment zones for the Gas to Energy project should be monitored to detect changes in species composition, distribution, abundance, and biomass. Fishes should be used as indicator species to detect changes in the biodiversity of the pipeline area. The same protocols used for baseline surveys should be used for fish monitoring. It is recommended that monitoring should be done the first year after the establishment of the pipeline for the Gas to Energy project and then every two (2) years (biennial) to three (3) years once the project becomes fully operational until the life of the project has ended. Post closure monitoring should also be implemented after the project has ended. It must be noted, to avoid and control for bias and allow for the comparison of results, the monitoring activities should occur at the same time of year that the baseline studies were conducted (October-November and (January-February). Where canals will be partially filled and mitigated by, for example; digging of alternate canals, continuous monitoring should be done to ensure fishes can re-colonize these new habitats.

A similar monitoring regime should be implemented for habitat structure and water quality parameters and should include but not be limited to pH, temperature, conductivity, total dissolved solids, total suspended solids, turbidity, dissolved oxygen and salinity. Any change in land use and or transformation of habitat should also be recorded throughout the monitoring of the aquatic environment and the fisheries.

Monitoring of species of conservation importance such as the Tarpon/Cuffum (*Megalops atlanticus*) listed as Vulnerable according to IUCN and migratory species; that become resident in the new habitat created by the flooding of habitats and or influenced by tidal and estuarine conditions in sites such as ERM-21-01 Mary bar-Crane Village, ERM-21-02 Crane turn and possibly ERM-21-10 at Cogland dam; to conserve these

species, even though there are many similar habitats on the West Demerara and along the coast of Guyana.

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Appendix I

Amblydoras affinis

Acestrorhynchus microlepis

Apionichthys dumerili

Liamosemion agilae.

Apistogramma steindachneri

Astyanax bimaculatus

Charax gibbosus

Carnegiella strigata

Centropomus ensiferus

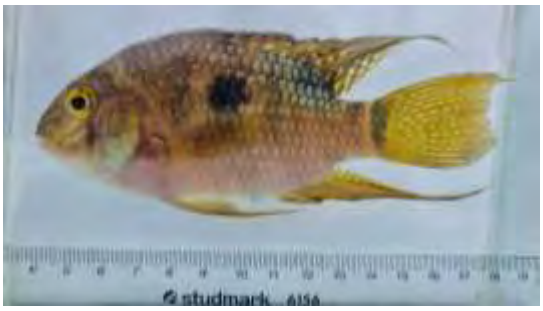
Bryconops melanurus

Cichla ocellaris

Cichlasoma bimaculatum

Crenuchus spilurus

Doras carinatus

 Helogenes mamoratus	 *Heterocharax bellottii*
 Pristella maxillaris	 *Nannostomus marginatus*
 Hoplias malabaricus	 *Sternopygus macrurus*
 Hypostomus plecostomus	 *Krobia guianensis*

Mesonauta guyanae

Heros notatus

Moenkhausia sp

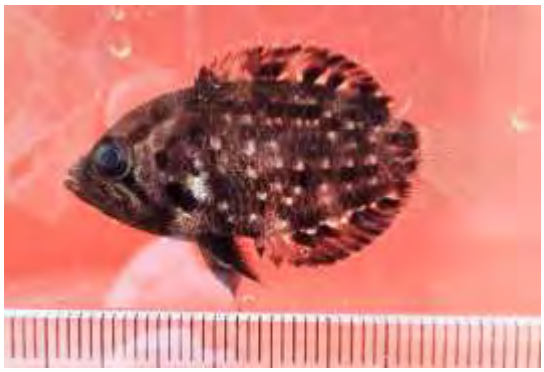
Nannacara anomala

Oreochromis niloticus

Pimelodus blochii

Plagioscion squamosissimus

Poecilia vivipara



Polycentrus schomburgkii

Pyrrhulina filamentosa

Roeboides thurni

Serrasalmus sp.

Pygopristis denticulatus

Steatogenya elegans

Cyphocharax spilurus

Serrasalmus rhombeus

Hypopthylamus marginatus

Rineloricaria fallax

Crenicichla albopuntata

Poecilia reticulata

 Crenicichla alta	 *Hoplerythrinus unitaeniatus*
 Acaronia nassa	 *Hemigrammus stictus*
 Psuedoplatystoma fasciatum	 *Hoplosternum littorale*

Amphiarius rugispinis

Pygocentrus nattereri

Curimata cyprinoides

Moenkhausia ceros

Pimelodella cristata

Aspredo aspredo

Rhamdia sp.

Acanthocharax microlepis

Anchoa spinifer

Tomerurus sp.

Anchoviella lepidentostole

Copella arnoldi

Ctenobrycon spilurus

Eigenmannia nigra

Megalechis thoracata

Megalops atlanticus

Hemigrammus micropterus

Leporinus frederici

Metynnis argenteus

Nannostomus beckfordi

Parotocinclus britskii

Poecilocharax bovaliorum

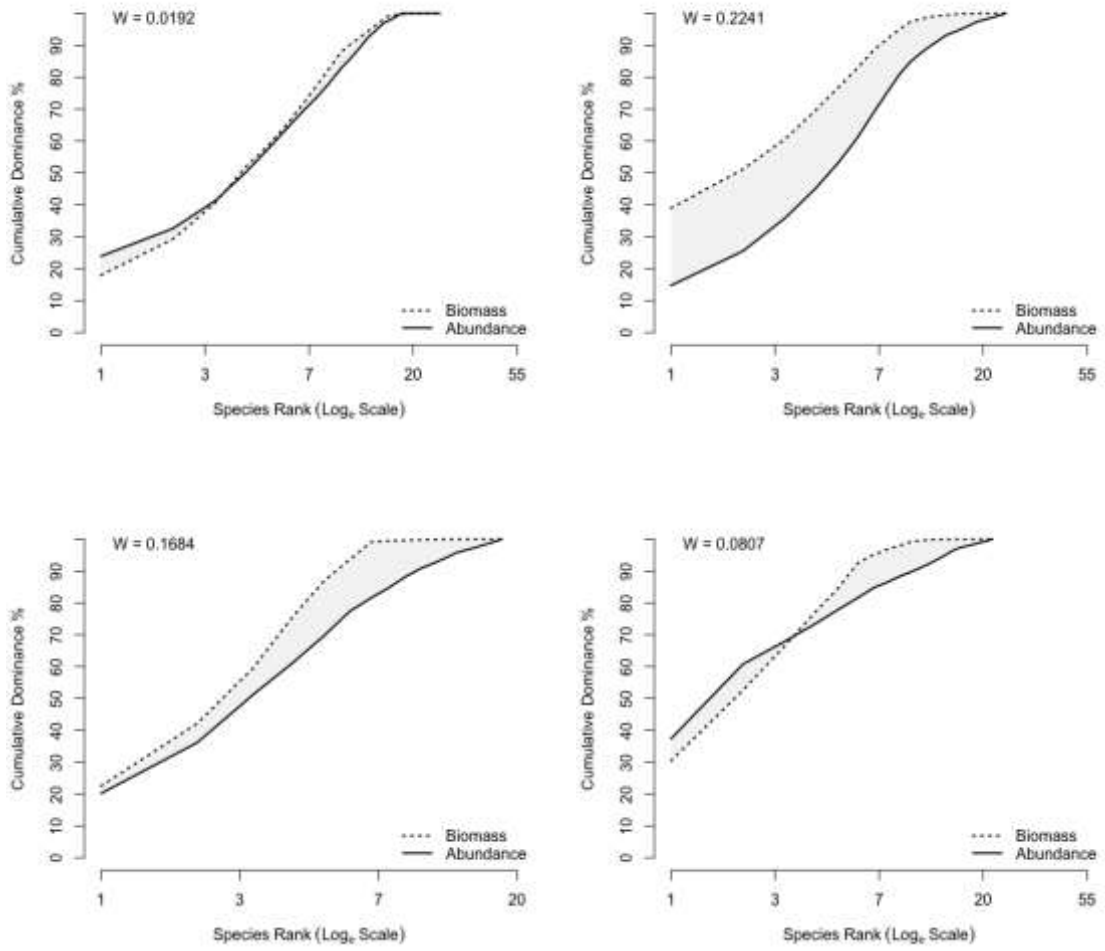
Potamotrygon cf orbignyi

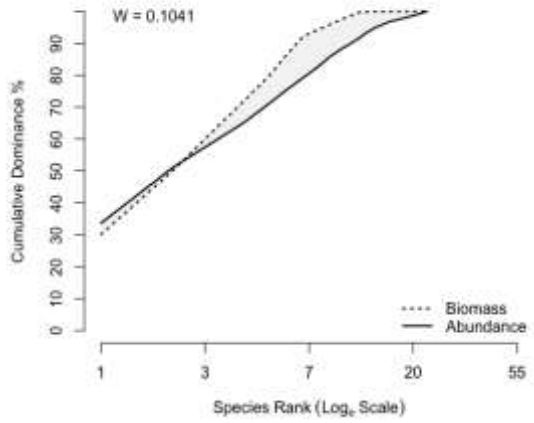
Potamotrygon sp.

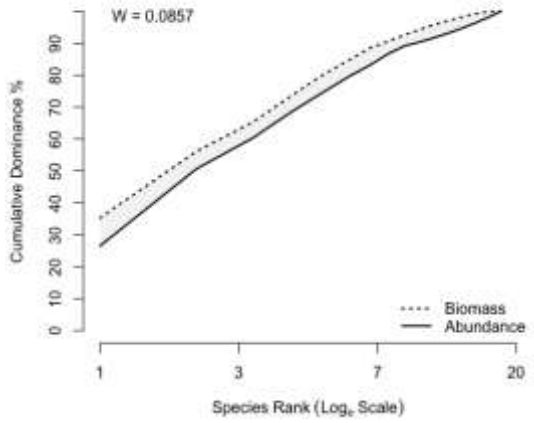
 Trachelyopterus galeatus	*Sciades couma*
Tatia sp.	 *Nannostomus harissoni*
Aequidens tetramerus	*Sternopygus macrurus*

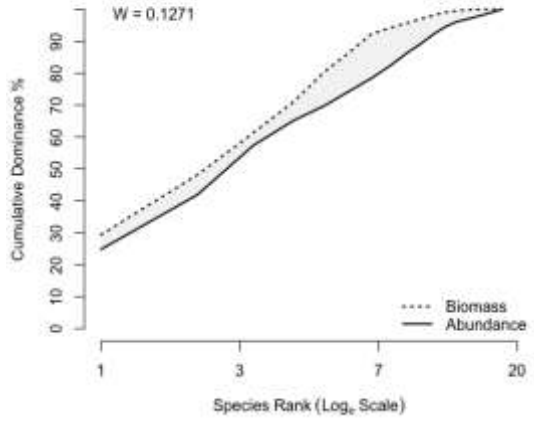
Appendix II

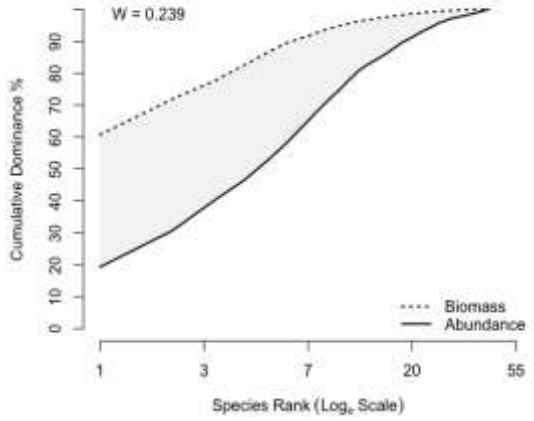
Figure xxx: ABC Abundance-Biomass models and W-statistics for 10 sampling sites ERM -21-01-10) Combined (Dry and Wet) Seasons

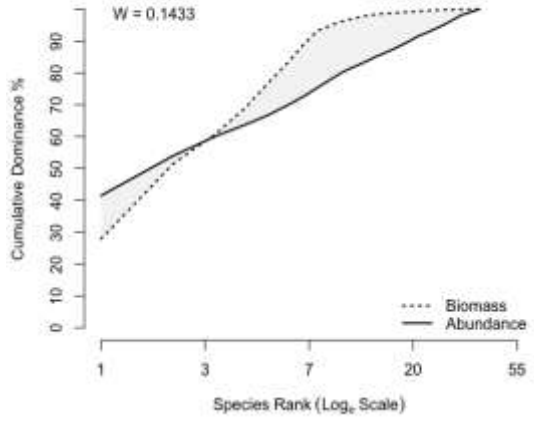



W = 0.1041
Cumulative Dominance %
0 10 20 30 40 50 60 70 80 90
Biomass
Abundance
1 3 7 20 55
Species Rank (Log$_e$ Scale)


W = 0.0857
Cumulative Dominance %
0 10 20 30 40 50 60 70 80 90
Biomass
Abundance
1 3 7 20
Species Rank (Log$_e$ Scale)


W = 0.1271
Cumulative Dominance %
0 10 20 30 40 50 60 70 80 90
Biomass
Abundance
1 3 7 20
Species Rank (Log$_e$ Scale)


W = 0.239
Cumulative Dominance %
0 10 20 30 40 50 60 70 80 90
Biomass
Abundance
1 3 7 20 55
Species Rank (Log$_e$ Scale)


W = 0.1433
Cumulative Dominance %
0 10 20 30 40 50 60 70 80 90
Biomass
Abundance
1 3 7 20 55
Species Rank (Log$_e$ Scale)

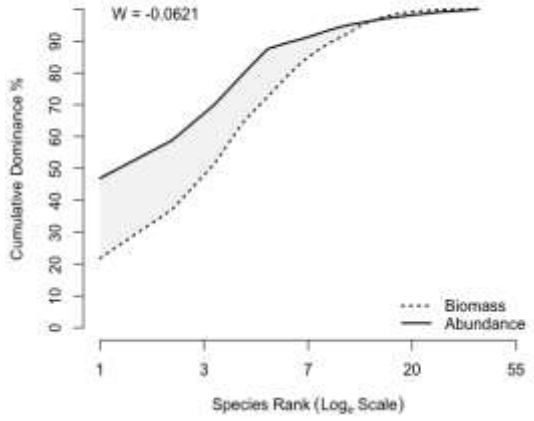
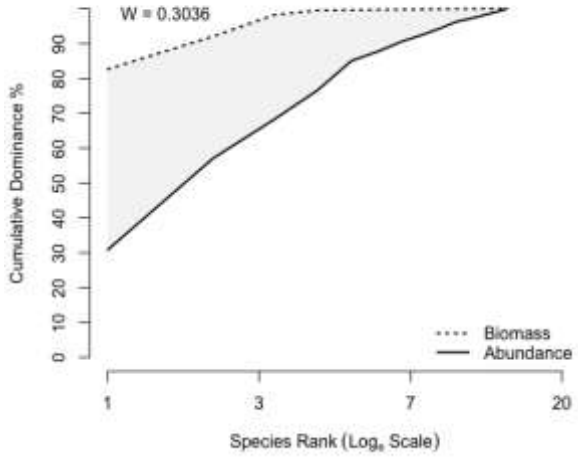
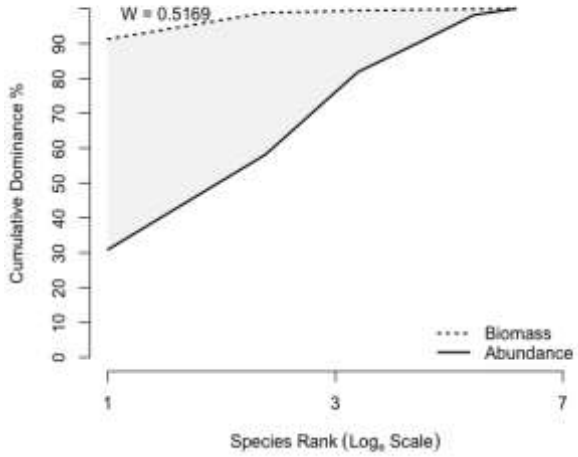
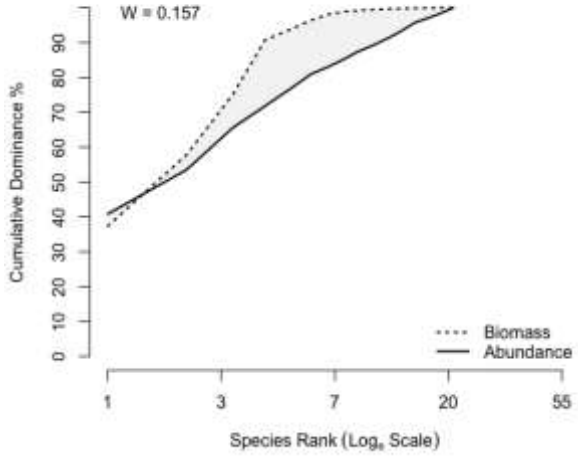

W = -0.0621
Cumulative Dominance %
0 10 20 30 40 50 60 70 80 90
Biomass
Abundance
1 3 7 20 55
Species Rank (Log$_e$ Scale)

Figure xxx: ABC Abundance-Biomass models and W-statistics for three (3) new sampling sites ERM -22-011 to 13) Wet Season.

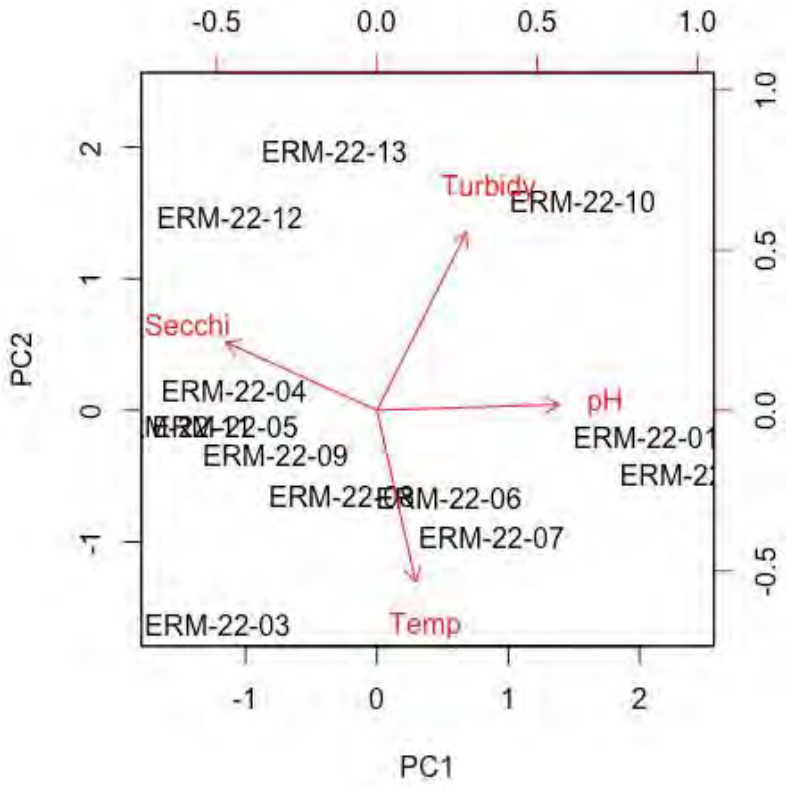




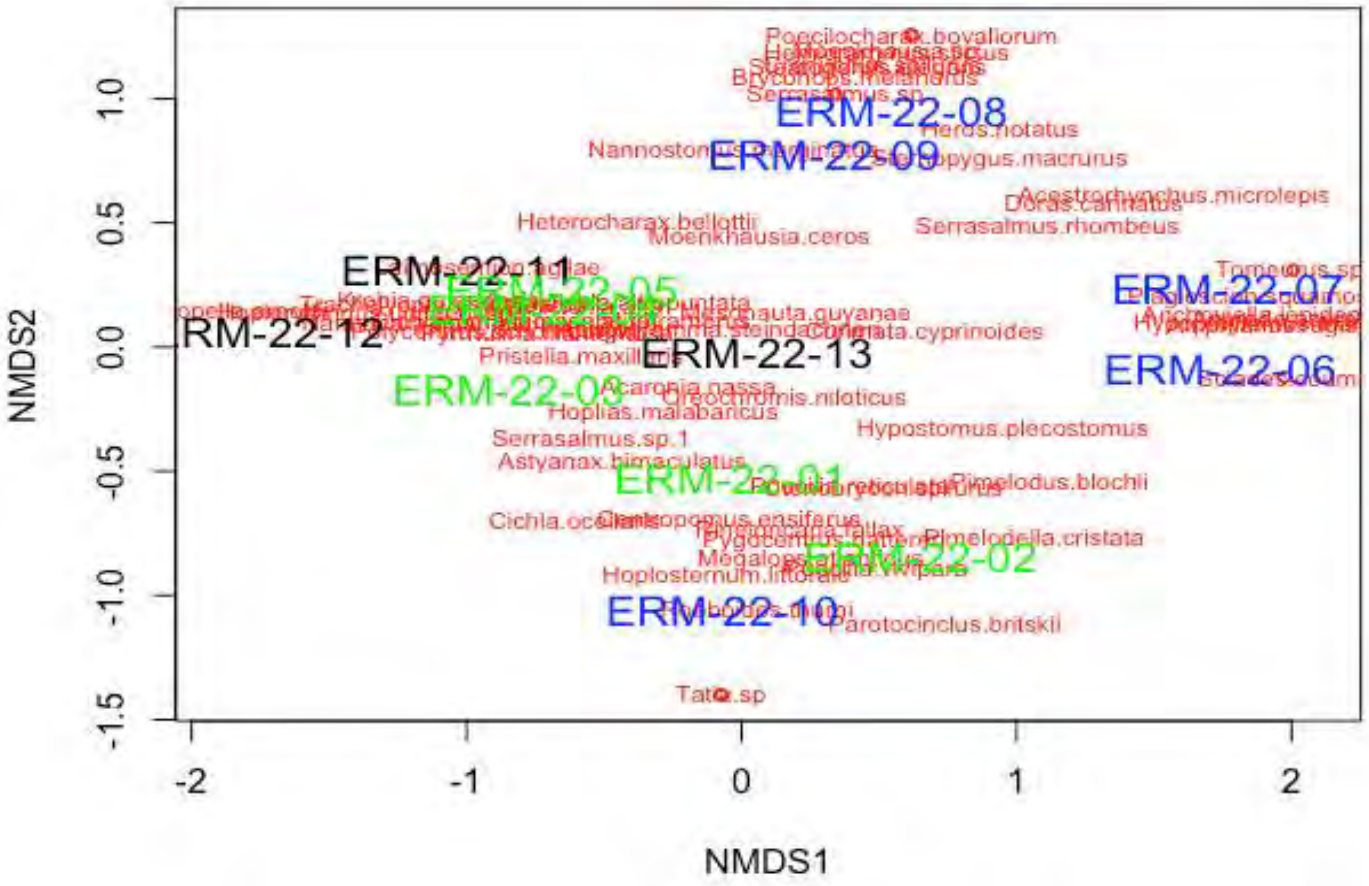


Appendix III

Table xxx: Outputs from



NMDS and PCA Analyses


NMDS1
NMDS2
-2
-1
0
1
2
1.0
0.5
0.0
-0.5
-1.0
-1.5
ERM-22-08
ERM-22-09
ERM-22-11
ERM-22-12
ERM-22-13
ERM-22-07
ERM-22-06
ERM-22-03
ERM-22-01
ERM-22-02
ERM-22-10
Poecilocharax.bovaliorum
Bryconops.melanurus
Nannostomus.beckfordi
Heros.notatus
Acestrorhynchus.microlepis
Doras.carinatus
Serrasalmus.rhombeus
Heterocharax.bellottii
Moenkhausia.ceros
Tometes.sp
Moenkhausia.guyanae
Hyphessobrycon.cyprinoides
Pristella.maxillaris
Acarophia.nassa
Oreochromis.niloticus
Hoplias.malabaricus
Hypostomus.plecostomus
Serrasalmus.sp.1
Astyanax.bimaculatus
Pimelodus.blochii
Cichla.ocellaris
Geophagus.iporanga
Pimelodella.cristata
Hoplosternum.littorale
Parotocinclus.britskii
Tatia.sp

NMDS Outputs

			NMDS1	NMDS2	r2	Pr(>r)	
Acanthocharax.microlepis		Acanthocharax.micro	0.17338	0.98486	0.2782	0.237	
Acaronia.nassa		Acaronia.nassa	0.12876	-0.99166	0.0062	0.972	
Acestrorhynchus.microlepis	.	Acestrohynchus.mici	0.51413	0.85771	0.4644	0.052	
Aequidens.tetramerus		Aequidens.tetramerus	-0.82136	0.57042	0.0397	0.873	
Agenelosus.inermis		Agenelosus.inermis	0.98555	-0.16941	0.2621	0.310	
Amphilophus.rupisparsus	*	Amblydoras.affinis	-0.01929	-0.99981	0.3135	0.082	
Amphilophus.rupisparsus		Amphilophus.rupisparsus	0.99744	0.07155	0.5469	0.026	
Anchovia.spinifer	*	Anchoa.spinifer	0.91819	0.39614	0.2834	0.132	
Anchoviella.lepidentostole	*	Anchoviella.lepidento	0.98279	0.18471	0.5610	0.015	
Apistogramma.steindachneri		Apistogramma.steindachneri	0.91819	0.39614	0.2834	0.132	
Aspredo.aspredo	*	Aspredo.aspredo	0.48026	0.87713	0.0162	0.913	
Astyanax.bimaculatus	**	Astyanax.bimaculatus	0.99138	0.13102	0.5788	0.012	
Bryconops.melanurus		Bryconops.melanurus	-0.02399	-0.99971	0.4694	0.003	
Carnegiella.strigata	*	Carnegiella.strigata	0.13370	0.99102	0.3184	0.112	
Centropomus.ensiferus		Centropomus.ensiferi	0.15785	0.98746	0.4631	0.032	
Charax.gibbosus	.	Charax.gibbosus	-0.02281	-0.99974	0.0783	0.701	
Cichla.ocellaris		Cichla.ocellaris	-0.01929	-0.99981	0.3135	0.082	
Cichlasoma.bimaculatum		Cichlasoma.bimacula	-0.12979	-0.99154	0.3310	0.120	
Copella.arnoldi		Copella.arnoldi	-0.88841	0.45904	0.2894	0.160	
Crenicichla.albopuntata		Crenicichla.albopunta	-0.97343	0.22898	0.3336	0.092	
Crenicichla.alta		Crenicichla.alta	-0.53217	0.84664	0.1094	0.645	
Crenuchus.spilurus	*	Crenicichla.alta	-0.68748	0.72621	0.2362	0.249	
Ctenobrycon.spilurus		Crenuchus.spilurus	0.15822	0.98740	0.4598	0.032	
Curimata.cyprinoides	***	Ctenobrycon.spilurus	0.26780	-0.96347	0.2068	0.416	
Cyphocharax.spilurus	.	Curimata.cyprinoides	0.86243	0.50617	0.8068	0.001	
Doras.carinatus	.	Cyphocharax.spilurus	-0.01929	-0.99981	0.3135	0.082	
Eigenmannia.nigra		Doras.carinatus	0.30858	0.95120	0.3164	0.085	
Helogenes.marmoratus		Eigenmannia.nigra	0.17338	0.98486	0.2782	0.237	
Hemigrammus.micropterus		Helogenes.marmorati	0.17338	0.98486	0.2782	0.237	
Hemigrammus.stictus	*	Hemigrammus.micro	-0.01929	-0.99981	0.3135	0.082	
Heros.notatus	*	Hemigrammus.stictus	0.16928	0.98557	0.3270	0.028	
Heterocharax.bellottii		Heros.notatus	0.21592	0.97641	0.5312	0.011	
Hoplerythrinus.unitaeniatus	**	Heterocharax.bellotti	-0.20062	0.97967	0.1186	0.526	
Hoplias.malabaricus		Hoplerythrinus.unitae	-0.95338	0.30178	0.5874	0.010	
Hoplosternum.littorale		Hoplias.malabaricus	-0.21776	-0.97600	0.2940	0.206	
Hypopthyiamus.marginatus	*	Hoplosternum.littorali	-0.02069	-0.99979	0.3406	0.119	
Hypostomus.plecostomus		Hypopthyiamus.marg	0.99606	0.08867	0.5823	0.026	
Krobia.guianensis		Hypostomus.plecosto	0.65441	-0.75614	0.2194	0.290	
Laimosemion.agilae		Krobia.guianensis	-0.83629	0.54828	0.1662	0.428	
Leporinus.friderici		Laimosemion.agilae	-0.72895	0.68457	0.2500	0.240	
Megalechis.thoracata		Leporinus.friderici	0.17338	0.98486	0.2782	0.237	
Megalops.atlanticus		Megalechis.thoracata	-0.01929	-0.99981	0.3135	0.082	
Mesonauta.guyanae		Megalops.atlanticus	0.06735	-0.99773	0.1762	0.424	
Metynnis.argenteus		Mesonauta.guyanae	0.75154	0.65969	0.0167	0.925	
Moenkhausia.ceros		Metynnis.argenteus	0.17338	0.98486	0.2782	0.237	
Moenkhausia.sp.	*	Moenkhausia.ceros	0.16457	0.98636	0.1984	0.343	
Nannacara.anomala		Moenkhausia.sp.	0.17034	0.98539	0.3137	0.050	
Nannostomus.beckfordi		Nannacara.anomala	-0.93091	0.36525	0.2918	0.166	
Nannostomus.harrisoni		Nannostomus.beckfo	0.17338	0.98486	0.2782	0.237	
Nannostomus.marginatus	*	Nannostomus.harriso	0.11901	0.99289	0.1735	0.569	
Oreochromis.niloticus		Nannostomus.margin	0.12570	0.99207	0.3865	0.037	
Parotocinclus.britskii		Oreochromis.niloticus	0.44511	0.89547	0.0644	0.684	
Pimelodella.cristata	*	Parotocinclus.britskii	0.23099	-0.97296	0.2351	0.475	
Pimelodus.blochii	*	Pimelodella.cristata	0.42451	-0.90542	0.5048	0.028	
Plagioscion.squamosissimus	*	Pimelodus.blochii	0.68697	-0.72696	0.4068	0.068	
Poecilia.reticulata		Plagioscion.squamos	0.94177	0.33627	0.3637	0.015	
Poecilia.vivipara		Poecilia.reticulata	0.24460	-0.96957	0.1365	0.553	
Poecilocharax.bovallorum		Poecilia.vivipara	0.21483	-0.97665	0.2682	0.226	
Polycentrus.schomburgkii		Poecilocharax.bovalli	0.17338	0.98486	0.2782	0.237	
Potamotrygon.cf..orbignyi		Polycentrus.schombu	-0.99989	-0.01489	0.2865	0.172	
Potamotrygon.sp		Potamotrygon.cf..orbi	0.98555	-0.16941	0.2621	0.310	
Pristella.maxillaris		Potamotrygon.sp.	0.98555	-0.16941	0.2621	0.310	
Pseudoplatystoma.fasciatum		Pristella.maxillaris	-0.85442	-0.51958	0.0764	0.718	
Pygocentrus.nattereri	**	Pseudoplatystoma.fa	0.11901	0.99289	0.1735	0.569	
Pygopristis.denticulatus	.	Pygocentrus.nattereri	0.12380	-0.99231	0.5738	0.008	
Pyrrhulina.filamentosa		Pygopristis.denticulat	-0.01929	-0.99981	0.3135	0.082	
Rhamdia.sp.	.	Pyrrhulina.filamentos	-0.99895	-0.04574	0.1596	0.437	
Rineloricaria.fallax	*	Rhamdia.sp.	-0.01929	-0.99981	0.3135	0.082	
Roeboides.thurni	**	Rineloricaria.fallax	0.08521	-0.99787	0.5568	0.017	
Sciades.couma		Roeboides.thurni	-0.00869	-0.99995	0.4064	0.005	
Serrasalmus.rhombeus	**	Sciades.couma	0.98555	-0.16941	0.2621	0.310	
Serrasalmus.sp		Serrasalmus.rhombeu	0.45983	0.88801	0.7012	0.003	
Serrasalmus.sp.1		Serrasalmus.sp	0.11901	0.99289	0.1735	0.569	
Steatogenys.elegans	*	Serrasalmus.sp.1	-0.25651	-0.96654	0.1529	0.451	
Sternopygus.macrurus	*	Steatogenys.elegans	0.15240	0.98832	0.4904	0.032	
Tatia.sp	.	Sternopygus.macrurus	0.24333	0.96994	0.4768	0.014	
Tomeurus.sp.		Tatia.sp	-0.01929	-0.99981	0.3135	0.082	
Trachelyopterus.galeatus		Tomeurus.sp.	0.91819	0.39614	0.2834	0.132	
---		Trachelyopterus.galea	-0.89368	0.44870	0.1661	0.430	

Signif. codes: 0 '***' 0.00 1 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Permutation: free
Number of permutations: 999

$factors
Centroids:

	NMD	S1	NMDS2
DisturbanceEst	1.75	71	0.0714
DisturbanceMarginal	-0.51	05	-0.2398
DisturbanceSub-Optimal	0.01	49	0.3840

Goodness of fit:

	r2	Pr(>r)	
Disturbance	0.5433	0.003	**

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Permutation: free
Number of permutations: 999

PCA Outputs

Standard deviations (1, .., p=4):
[1] 1.3476964 1.0603739 0.9485318 0.3995107

Rotation (n x k) = (4 x 4):

	PC1	PC2	PC3	PC4
pH	-0.7116004	-0.02261251	-0.03671873	-0.7012598
Temp	-0.1511420	0.66867287	-0.70817296	0.1688697
Turbidy	-0.3489178	-0.69397144	-0.48496370	0.4018336
Secchi	0.5907936	-0.26602426	-0.51161345	-0.5641263

	PC1	PC2	PC3	PC4
ERM-22-01	2.0507085	-0.2030697	0.49521665	0.62603199
ERM-22-02	2.4044334	-0.4879394	1.02210280	0.11532000
ERM-22-03	-1.2122499	-1.6311773	1.71231758	-0.28168399
ERM-22-04	-1.0851068	-0.1475737	0.72790214	-0.09420628
ERM-22-05	-1.1550943	-0.1279710	0.70669140	-0.01287688
ERM-22-06	0.5476252	-0.6811440	-1.44810208	-0.04391771
ERM-22-07	0.8732746	-0.9810213	-1.11396120	0.12805048
ERM-22-08	-0.2678959	-0.6506511	-1.02144763	-0.48382305
ERM-22-09	-0.7711127	-0.3419623	-1.01048954	-0.02816977
ERM-22-10	1.5678372	1.5880752	0.25987102	-0.87436858
ERM-22-11	-1.5126952	-0.1206649	-0.23049054	0.45409599
ERM-22-12	-1.1172443	1.4749016	-0.16170984	0.05332629
ERM-22-13	-0.3224600	1.9752503	0.06808927	0.44122146

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APPENDIX I

Baseline Noise Monitoring Report

Resubmitted without changes

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Baseline Noise Monitoring Report

Gas to Energy Project

March 2022

Project No.: 0590231

The business of sustainability

ERM

CONTENTS

1 INTRODUCTION 1
1.1 Noise Regulatory Framework 1
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Acronyms and Abbreviations

Consultants	Environmental Resources Management (ERM), E&A Consultants, Inc. (E&A), Caribbean Engineering & Management Consultants Inc. (CEMCO), University of Guyana Centre for the Study of Biological Diversity (CSBD), and Leon Moore Nature Experience (LMNE), Caribbean Transportation Consultancy Services Company Limited (CARITRANS), and SLR International Corporation (SLR)
dBA	A-weighted decibel
IFC	International Finance Corporation
L_{10}	noise level exceeded 10 percent of the time
L_{50}	noise level exceeded 50 percent of the time
L_{90}	noise level exceeded 90 percent of the time
LA_{eq}	A-weighted equivalent sound level
Ldn	ambient day-night sound levels
L_{eq}	equivalent sound level
L_{min}	minimum sound level
L_{max}	maximum sound level
MOF	material offloading facility
NGL Plant	natural gas liquids processing plant
Project	Gas to Energy Project

1 INTRODUCTION

The Consultants undertaking the Environmental Impact Assessment for the Gas to Energy Project (Project) conducted a baseline noise monitoring study in support of the assessment of potential sound-related impacts from the Project. This report describes the methodology and results of that noise monitoring study. The noise monitoring study was completed to assess potential sound-related Project impacts on human receptors in the vicinity of the proposed Project Footprint. The noise monitoring study was conducted in December 2021; the study included both a desktop and field assessment. Existing ambient noise sources in the Study Area were anticipated to be vehicular traffic along roadways, human activity in residential areas, noise from agricultural activities, and natural sources such as wind and wildlife.

1.1 Noise Regulatory Framework

1.1.1 Noise Ordinances

Noise monitoring procedures for the study were developed based on International Finance Corporation (IFC) *Environmental, Health, and Safety (EHS) Guidelines* for baseline noise assessments (IFC 2007). The IFC recommends 48 hours as a typical monitoring period, or covering differing time periods within several days, including weekday and weekend. The IFC recommends that highly intrusive noises, such as noise from aircraft flyovers and passing trains, should not be included when establishing background noise levels (IFC 2007).

Guyana's *Environmental Protection (Noise Management) Regulations 2000* establish regulations for noise management from various activities including construction, transport, industry, commerce, and other institutions. Pursuant to these regulations, the Guyana Environmental Protection Agency along with the Guyana National Bureau of Standards developed *Interim Guidelines for Noise Emissions into the Environment* (GNBS 2010). Emissions to the environment must comply with the limits specified in Table 1. The categories applicable to the Project are construction and industrial activities during the Construction and Operations stages of the Project, respectively.

Table 1: Guyana Guideline Values for Noise in Specific Environments

Categories	Daytime Limits in dBA [a]	Nighttime Limits in dBA [b]	
Residential	75	60	
Institutional	75	60	
Educational	75	60	
Industrial	100	80	
Commercial	80	65	
Construction	90	75	
Transportation	100	80	
Recreational	100	18:00–01:00	100
		01:00–08:00	70

Source: GNBS 2010

dBA= A-weighted decibel

[a] Daytime: 06:00–18:00

[b] Nighttime: 18:00–06:00 unless otherwise indicated (i.e., for recreational)

2 PROJECT DESCRIPTION

The proposed Project facilities will be located in three work areas (Figure 1) :

- Offshore pipeline—an offshore component that involves approximately 220 kilometers of a subsea pipeline extending from new subsea tie-ins at the Destiny and Unity Floating Production, Storage, and Offloading vessels in the Stabroek Block to a proposed shore landing located approximately 3.5 kilometers west of the mouth of the Demerara River;
- Onshore pipeline—an onshore pipeline, which is a continuation of the offshore pipeline, that will extend linearly approximately 25 kilometers from the shore landing to a proposed natural gas liquids processing plant (NGL Plant); and
- NGL Plant—an NGL Plant and associated infrastructure (e.g., heavy haul road, temporary material offloading facility [MOF]) located approximately 23 kilometers upstream from the mouth of the Demerara River on the west bank.

The onshore pipeline and the NGL Plant are located within Region 3 of Guyana. Some existing facilities (e.g., shorebases, helipads, roads) within Region 4 will also be used to support Project activities principally related to transporting equipment, supplies, products, and workers to and from the Georgetown area to the above locations of the Project components.

3 BASELINE NOISE MONITORING STUDY PROCEDURES

3.1.1 Noise Monitoring Locations

To support selection of locations for baseline noise monitoring, a desktop assessment was conducted that reviewed aerial imagery for the purpose of identifying potential noise-sensitive properties in the vicinity of the Project Footprint.[1] Potential noise-sensitive properties were identified within a distance of 0.8 kilometer of the onshore pipeline corridor and within 1.6 kilometers of the NGL Plant facilities (inclusive of NGL Plant, worker camp, temporary MOF, and heavy haul road).

Table 2 provides the coordinates for the baseline noise monitoring locations along with a description of the selection criteria used in choosing the monitoring location. These monitoring locations are presented on Figure 1. The monitoring locations are divided into short-term monitoring locations and long-term monitoring locations.

Table 2: Baseline Noise Monitoring Locations

Location ID	Description	Latitude	Longitude
Long-term Monitoring Location			
M-1	Residences near main camp/temporary MOF	6.634867	-58.217230
M-2	Free and Easy village residences along West Bank Public Road	6.65671	-58.20721
M-3	Other residences near NGL Plant boundary	6.623939	-58.219916
Short-term Monitoring Locations			
M-4	Canal 2, residences along canal near onshore pipeline	6.729899	-58.248433
M-5	Canal 1, residences along canal near onshore pipeline	6.764683	-58.241159
M-6	Parfaite Harmonie Backlands residences near pipeline	6.778178	-58.239957
M-7	Best Village residences near pipeline	6.813888	-58.205403
M-8	West Bank Public Road (along primary public road to be used for access to NGL Plant)	6.747726	-58.203725
M-9	Demerara Harbour Bridge (along primary public road to be used for access to NGL Plant)	6.777849	-58.196734

[1] A noise-sensitive property includes real property normally used for sleeping or as schools, churches, hospitals, or public libraries. Properties used solely for industrial or agricultural activities are not considered noise-sensitive properties for the purpose of this assessment.

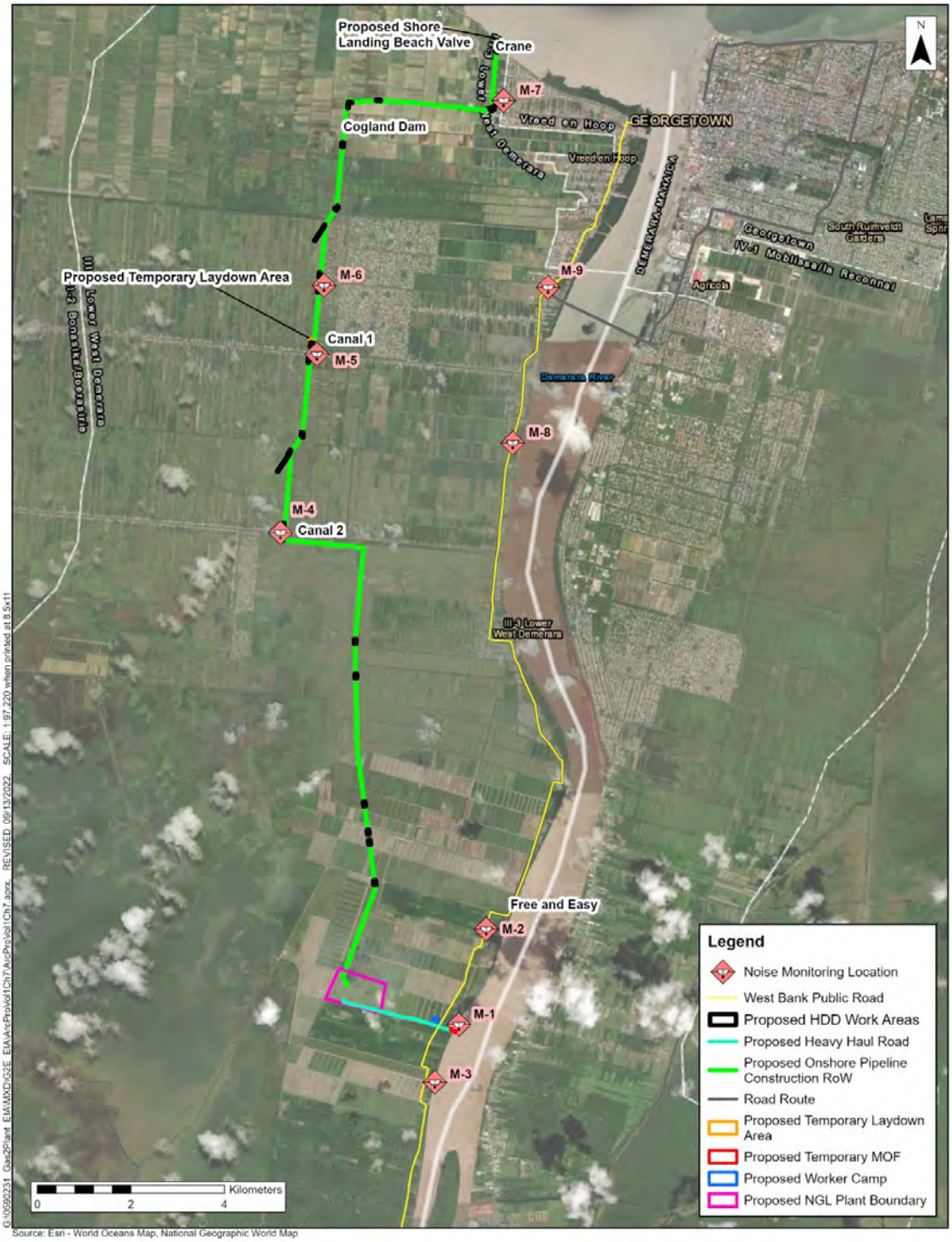

Figure 1: Baseline Noise Monitoring Locations

3.1.2 Noise Monitoring Schedule

With the exception of M-1 and M-3, which could not be accessed to during the field data collection effort, baseline noise measurements were collected at each of the identified measurement locations on the following schedule.

Short-term Monitoring Locations

- Four 1-hour monitoring periods: [2]
  - 1 daytime hour on a weekday
  - 1 nighttime hour on a weekday
  - 1 daytime hour on a weekend
  - 1 nighttime hour on a weekend

Long-term Monitoring Location

- One 48-hour measurement

Measurements were not collected during periods of rain or when average winds exceed 12 miles per hour.

3.1.3 Noise Monitoring Equipment

The following equipment was used to collect baseline noise measurements:

- Type 1 sound level meter with 1/3 octave band analyzer (Casella CEL-63X)
- Weather-proof windscreen
- Camera tripod
- Sound level meter calibrator
- Kestrel weather meter capable of measuring wind speed, temperature, and relative humidity
- Global Position System
- Camera

3.1.4 Noise Monitoring Procedures

Prior to the beginning of each measurement period, the sound level meter was programmed to record at 1-minute intervals for the duration of the 1-hour or 48-hour measurement period. The sound level meter was set to slow response and to record equivalent sound pressure level (L_{eq}); minimum sound pressure level (L_{min}); maximum sound pressure level (L_{max}); and the 10-, 50-, and 90-percent exceedance sound pressure levels (L_{10}, L_{50}, L_{90}) in A-weighted decibels (dBA). The sound level meter was field-calibrated before and after each measurement period.

For the 1-hour measuring periods, the sound level meter was affixed on a tripod approximately 5 feet above the ground, was positioned at least 10 feet from any reflective surface (e.g., house, building wall, solid fence), and was fitted with a weather-proof windscreen. For 8-hour and 48-hour measuring periods, the sound level meter was connected to an external battery and a microphone extension cord, and was placed inside an environmental enclosure, which was locked and secured to a sturdy object. The microphone was affixed on a tripod approximately 5 feet above the ground, was positioned at least 10 feet from any reflective surface, and was fitted with a weather-proof windscreen.

During each measurement period, field personnel recorded periods of rain and high wind speeds. The data from these periods were later excluded from sound pressure level calculations, as per standard practice (see Section 3.1.2, Noise Monitoring Schedule).

Following the measurement period, sound level data were downloaded from the sound level meter. The calibration certificate was scanned prior to returning to the rental company.

[2] The IFC defines daytime to be 07:00-22:00 and nighttime to be 22:00-07:00.

4 RESULTS AND DISCUSSION

Average daytime, nighttime, and day-night sound levels calculated from measurements collected during the baseline noise monitoring study are presented in Table 3. Baseline average daytime sound levels ranged at the noise monitoring locations from 35.4 to 67.5 dBA, all of which are below the above-referenced daytime limits for the respective receptor categories. Baseline average nighttime sound levels ranged from 44.7 to 64.9 dBA, four of which (M-2, M-4, M-5, and M-7) had at least one monitoring period where the nighttime average sound level exceeded the above-referenced nighttime limits for the respective receptor categories. The ambient day-night sound levels (Ldn)—which include a 10 dBA addition to measured nighttime sound levels to account for greater sensitivity to noise at night—ranged from 50.4 to 70.1 dBA. Measured sound levels were generally higher during the day than at night at most of the monitoring locations, with the exception of M-2, M-4, and M-6. The highest average daytime sound level (67.5 dBA) occurred at M-9—near the Demerara Harbour Bridge—predominantly driven by the high traffic volume on the bridge throughout the day (Table 3).

Table 3: Day, Night, and Day-Night (Ldn) Average Sound Levels at Baseline Noise Monitoring Locations

Location ID	Measurement Type	Sound Levels (dBA)		
		Daytime Average Sound Level	Nighttime Average Sound Level	L_{dn}
M-1	48-hour	NM	NM	NM
M-2	48-hour	62.4	64.9	69.0
M-3	48-hour	NM	NM	NM
M-4	1-hour weekday	61.1	63.0	61.9
	1-hour weekend	61.6	61.1	61.4
M-5	1-hour weekday	63.3	59.7	62.3
	1-hour weekend	61.8	61.1	61.4
M-6	1-hour weekday	35.4	56.2	52.0
	1-hour weekend	55.1	55.5	55.3
M-7	1-hour weekday	56.5	54.3	55.8
	1-hour weekend	65.0	64.7	64.9
M-8	1-hour weekday	57.7	52.8	56.4
	1-hour weekend	52.0	44.7	50.4
M-9	8-hour weekday	67.5	64.3	70.1

NM = Not measured; measurement location was not accessible during field activities.

Daytime and nighttime equivalent sound levels (LAeq) ranged from 35.4 to 67.0 dBA at the monitoring locations (Table 4), with all values below the above-referenced daytime limits for the respective receptor categories, and the same four locations having nighttime average sound level exceeding the above-referenced nighttime limits for the respective receptor categories. The minimum sound levels ranged from 26.8 to 52.0 dBA. Minimum sound levels occurred during weekdays at all the short-term monitoring locations (M-4 to M-9). Maximum sound levels ranged from 51.5 to 93.2 dBA. There was no apparent pattern for when maximum sound levels occurred at the monitoring locations. In addition to having the highest baseline daytime average, M-9 also had the highest maximum (93.2 dBA) and equivalent (67.0 dBA) sound levels. The lowest baseline sound levels occurred at M-6.

Table 4: A-weighted Equivalent (LAeq), Minimum, and Maximum Sound Levels at Baseline Noise Monitoring Locations

Monitoring Location	Measurement Type	LAeq	LAmin	LAmax
M-2	48-hour	63.0	---	89.3
M-4	1-hour weekday-daytime	61.1	45.2	79.6
	1-hour weekday-nighttime	63.0	34.6	79.1
	1-hour weekend-daytime	61.6	47.5	80.0
	1-hour weekend-nighttime	61.1	52.0	82.0
M-5	1-hour weekday-daytime	63.3	33.1	91.6
	1-hour weekday-nighttime	59.7	42.8	82.0
	1-hour weekend-daytime	61.8	36.2	87.6
	1-hour weekend-nighttime	61.1	52.0	82.0
M-6	1-hour weekday-daytime	35.4	26.8	51.5
	1-hour weekday-nighttime	56.2	34.6	75.4
	1-hour weekend-daytime	55.1	36.0	72.0
	1-hour weekend-nighttime	55.5	46.5	73.5
M-7	1-hour weekday-daytime	56.5	32.6	74.6
	1-hour weekday-nighttime	54.3	43.6	73.0
	1-hour weekend-daytime	65.0	41.2	86.3
	1-hour weekend-nighttime	64.7	43.0	90.5
M-8	1-hour weekday-daytime	57.7	42.8	82.2
	1-hour weekday-nighttime	52.8	37.7	80.8
	1-hour weekend-daytime	52.0	43.6	67.8
	1-hour weekend-nighttime	44.7	39.8	60.6
M-9	8-hour (15:00-23:00)	67.0	43.3	93.2

5 REFERENCES

International Finance Corporation. 2007. *Environmental, Health, and Safety (EHS) Guidelines, Noise Management.* Accessed: 14 March 2022. Retrieved from: https://www.ifc.org/wps/wcm/connect/4a4db1c5-ee97-43ba-99dd-8b120b22ea32/1-7%2BNoise.pdf?MOD=AJPERES&CVID=ls4XYBw

GNBS (Guyana National Bureau of Standards). 2010. *Interim Guidelines for Noise Emission into the Environment.*

APPENDIX J

Construction Noise Calculations

Resubmitted without changes

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Gas-to-Energy Project
Construction Noise Calculations - NGL Plant - Impact Magnitude

Phase 1 - Clearing

Equipment	Quantity	Source SPL (single)	Source SPL (aggregate)	Ref distance (m)	Duty Cycle	Negligible (m)	Small (m)	Medium (m)	L_{eq} (Ld) @ 100 m	L_{eq} (Ld) @ 500 m	L_{eq} (Ld) @ 1000 m
555D Skidder Tractor	1	85	85.0	15.23999951	50%	360	500	1000	54.5	51.7	45.6
Tigercat 720G Wheel Feller Buncher	1	85	85.0	15.23999951	50%	360	500	1000	54.5	51.7	45.6
586 C Tractor w/ HM825 Grinder	1	89	89.0	15.23999951	50%	360	500	1000	58.5	55.7	49.6
D6 Dozer w/ Winch	1	85	85.0	15.23999951	50%	360	500	1000	54.5	51.7	45.6
CAT 320 Excavator w/ Thumb Attachment	1	85	85.0	15.23999951	50%	360	500	1000	54.5	51.7	45.6
730 Dump Trucks	3	88	92.8	15.23999951	50%	360	500	1000	62.3	59.4	53.4
Aggregate									65.5	62.6	56.6

Phase 2 - Cut

Equipment	Quantity	Source SPL		Ref distance (feet)	Duty Cycle	Negligible (m)	Small (m)	Medium (m)	L_{eq} (Ld) @ 100 m	L_{eq} (Ld) @ 500 m	L_{eq} (Ld) @ 1000 m
730 Dump Trucks	19	88	100.8	15.23999951	50%	100	500	1000	81.4	67.5	61.4
D6 Dozer	2	85	88.0	15.23999951	50%	100	500	1000	68.7	54.7	48.7
CAT 320 Excavator	3	85	89.8	15.23999951	50%	100	500	1000	70.4	56.4	50.4
Aggregate									82.0	68.0	62.0

Phase 3 - Fill

Equipment	Quantity	Source SPL		Ref distance (feet)	Duty Cycle	Negligible (m)	Small (m)	Medium (m)	L_{eq} (Ld) @ 100 m	L_{eq} (Ld) @ 500 m	L_{eq} (Ld) @ 1000 m
730 Dump Trucks	19	88	100.8	15.23999951	50%	100	500	1000	81.4	67.5	61.4
D6 Dozer	3	85	89.8	15.23999951	50%	100	500	1000	70.4	56.4	50.4
CAT 320 Excavator	3	85	89.8	15.23999951	50%	100	500	1000	70.4	56.4	50.4
CAT 815K Sheep's Foot Compactor	5	82	89.0	15.23999951	50%	100	500	1000	69.6	55.7	49.6
Barrell/Smooth Drum Compactor	2	82	85.0	15.23999951	50%	100	500	1000	65.7	51.7	45.7
Aggregate									82.4	68.4	62.4

Pile Driving

Equipment	Quantity	Source SPL		Ref distance (feet)	Duty Cycle	Negligible (m)	Small (m)	Medium (m)	L_{eq} (Ld) @ 100 m	L_{eq} (Ld) @ 500 m	L_{eq} (Ld) @ 1000 m
Hydraulic Hammer Pile Driving	3	101	105.8	15.23999951	50%	100	500	1000	86.4	72.4	66.4

Footnotes
1 Based on U.S. Federal Highway Administration Roadway Contruction Noise Model User's Guide, January 2006

Gas-to-Energy Project

Construction Noise Calculations - Onshore Pipeline - Impact Magnitude

Phase 1 - Clearing/ROW

Equipment	Quantity	Source SPL (single)	Source SPL (aggregate)	Ref distance (m)	Duty Cycle	Negligible (m)	Small (m)	Medium (m)	L_{eq} (Ld) @ Negligible	L_{eq} (Ld) @ Small	L_{eq} (Ld) @ Medium
555D Skidder Tractor	1	85	85.0	15.23999951	50%	177	99	56	60.7	65.7	70.7
Tigercat 720G Wheel Feller Buncher	1	85	85.0	15.23999951	50%	177	99	56	60.7	65.7	70.7
586 C Tractor w/ HM825 Grinder	1	89	89.0	15.23999951	50%	177	99	56	64.7	69.7	74.7
D6 Dozer w/ Winch	1	85	85.0	15.23999951	50%	177	99	56	60.7	65.7	70.7
CAT 320 Excavator w/ Thumb Attachment	1	85	85.0	15.23999951	50%	177	99	56	60.7	65.7	70.7
730 Dump Trucks	1	88	88.0	15.23999951	50%	177	99	56	63.7	68.7	73.7
Aggregate									70.0	75.0	80.0

Phase 2 - Construction along ROW

Equipment	Quantity	Source SPL		Ref distance (feet)	Duty Cycle	Negligible (m)	Small (m)	Medium (m)	L_{eq} (Ld) @ Negligible	L_{eq} (Ld) @ Small	L_{eq} (Ld) @ Medium
Pipe Bending Machine	1	85	85.0	15.23999951	50%	180	102	57	60.5	65.5	70.5
Manual Welding Station	3	85	89.8	15.23999951	50%	180	102	57	65.3	70.2	75.3
X-Ray Station	1	85	85.0	15.23999951	50%	180	102	57	60.5	65.5	70.5
Joint Coating Station	2	85	88.0	15.23999951	50%	180	102	57	63.6	68.5	73.5
Side booms	3	83	87.8	15.23999951	50%	180	102	57	63.3	68.2	73.3
Aggregate									70.0	75.0	80.0

Phase 3 - Backfill

Equipment	Quantity	Source SPL		Ref distance (feet)	Duty Cycle	Negligible (m)	Small (m)	Medium (m)	L_{eq} (Ld) @ Negligible	L_{eq} (Ld) @ Small	L_{eq} (Ld) @ Medium
D6 Dozer	1	85	85.0	15.23999951	50%	96	54	30	66.0	71.0	76.0
CAT 320 Excavator	1	85	85.0	15.23999951	50%	96	54	30	66.0	71.0	76.0
CAT 815K Sheep's Foot Compactor	1	82	82.0	15.23999951	50%	96	54	30	63.0	68.0	73.0
Aggregate									70.0	75.0	80.0

Footnotes

1 Based on U.S. Federal Highway Administration Roadway Contruction Noise Model User's Guide, January 2006

Gas-to-Energy Project

Construction Noise Calculations - NGL Plant - Monitoring Location Impacts

Phase 1 - Clearing

Equipment	Quantity	Source SPL (single)	Source SPL (aggregate)	Ref distance (m)	Duty Cycle	M-1 (m)	M-2 (m)	M-3 (m)	L_{eq} (Ld) @ M-1	L_{eq} (Ld) @ M-2	L_{eq} (Ld) @ M-3
555D Skidder Tractor	1	85	85.0	15.23999951	50%	1765	2470	1910	40.7	37.8	40.0
Tigercat 720G Wheel Feller Buncher	1	85	85.0	15.23999951	50%	1765	2470	1910	40.7	37.8	40.0
586 C Tractor w/ HM825 Grinder	1	89	89.0	15.23999951	50%	1765	2470	1910	44.7	41.8	44.0
D6 Dozer w/ Winch	1	85	85.0	15.23999951	50%	1765	2470	1910	40.7	37.8	40.0
CAT 320 Excavator w/ Thumb Attachment	1	85	85.0	15.23999951	50%	1765	2470	1910	40.7	37.8	40.0
730 Dump Trucks	3	88	92.8	15.23999951	50%	1765	2470	1910	48.5	45.6	47.8
Aggregate									51.7	48.8	51.0

Phase 2 - Cut

Equipment	Quantity	Source SPL		Ref distance (feet)	Duty Cycle	M-1 (m)	M-2 (m)	M-3 (m)	L_{eq} (Ld) @ M-1	L_{eq} (Ld) @ M-2	L_{eq} (Ld) @ M-3
730 Dump Trucks	19	88	100.8	15.23999951	50%	1765	2470	1910	56.5	53.6	55.8
D6 Dozer	2	85	88.0	15.23999951	50%	1765	2470	1910	43.7	40.8	43.0
CAT 320 Excavator	3	85	89.8	15.23999951	50%	1765	2470	1910	45.5	42.6	44.8
Aggregate									57.0	54.1	56.4

Phase 3 - Fill

Equipment	Quantity	Source SPL		Ref distance (feet)	Duty Cycle	M-1 (m)	M-2 (m)	M-3 (m)	L_{eq} (Ld) @ M-1	L_{eq} (Ld) @ M-2	L_{eq} (Ld) @ M-3
730 Dump Trucks	19	88	100.8	15.23999951	50%	1765	2470	1910	56.5	53.6	55.8
D6 Dozer	3	85	89.8	15.23999951	50%	1765	2470	1910	45.5	42.6	44.8
CAT 320 Excavator	3	85	89.8	15.23999951	50%	1765	2470	1910	45.5	42.6	44.8
CAT 815K Sheep's Foot Compactor	5	82	89.0	15.23999951	50%	1765	2470	1910	44.7	41.8	44.0
Barrell/Smooth Drum Compactor	2	82	85.0	15.23999951	50%	1765	2470	1910	40.7	37.8	40.0
Aggregate									57.5	54.6	56.8

Pile Driving

Equipment	Quantity	Source SPL		Ref distance (feet)	Duty Cycle	M-1 (m)	M-2 (m)	M-3 (m)	L_{eq} (Ld) @ M-1	L_{eq} (Ld) @ M-2	L_{eq} (Ld) @ M-3
Hydraulic Hammer Pile Driving	3	101	105.8	15.23999951	50%	1765	2470	1910	61.5	58.6	60.8

Footnotes

1 Based on U.S. Federal Highway Administration Roadway Contruction Noise Model User's Guide, January 2006

Gas-to-Energy Project
Construction Noise Calculations - Onshore Pipeline - Monitoring Location Impacts

Phase 1 - Clearing/ROW

Equipment	Quantity	Source SPL (single)	Source SPL (aggregate)	Ref distance (m)	Duty Cycle	M-4 (m)	M-5 (m)	M-6 (m)	M-7 (m)	L_{eq} (Ld) @ M-4	L_{eq} (Ld) @ M-5	L_{eq} (Ld) @ M-6	L_{eq} (Ld) @ M-7	
555D Skidder Tractor	1	85	85.0	15.23999951	50%	160	175	100	230	61.6	60.8	65.6	58.4	
Tigercat 720G Wheel Feller Buncher	1	85	85.0	15.23999951	50%	160	175	100	230	61.6	60.8	65.6	58.4	
586 C Tractor w/ HM825 Grinder	1	89	89.0	15.23999951	50%	160	175	100	230	65.6	64.8	69.6	62.4	
D6 Dozer w/ Winch	1	85	85.0	15.23999951	50%	160	175	100	230	61.6	60.8	65.6	58.4	
CAT 320 Excavator w/ Thumb Attachment	1	85	85.0	15.23999951	50%	160	175	100	230	61.6	60.8	65.6	58.4	
730 Dump Trucks	1	88	88.0	15.23999951	50%	160	175	100	230	64.6	63.8	68.6	61.4	
Aggregate										70.9	70.1	74.9	67.7	

Phase 2 - Construction along ROW

Equipment	Quantity	Source SPL		Ref distance (feet)	Duty Cycle	M-4 (m)	M-5 (m)	M-6 (m)	M-7 (m)	L_{eq} (Ld) @ M-4	L_{eq} (Ld) @ M-5	L_{eq} (Ld) @ M-6	L_{eq} (Ld) @ M-7	
Pipe Bending Machine	1	85	85.0	15.23999951	50%	160	175	100	230	61.6	60.8	65.6	58.4	
Manual Welding Station	3	85	89.8	15.23999951	50%	160	175	100	230	66.3	65.6	70.4	63.2	
X-Ray Station	1	85	85.0	15.23999951	50%	160	175	100	230	61.6	60.8	65.6	58.4	
Joint Coating Station	2	85	88.0	15.23999951	50%	160	175	100	230	64.6	63.8	68.7	61.4	
Side booms	3	83	87.8	15.23999951	50%	160	175	100	230	64.3	63.6	68.4	61.2	
Aggregate										71.1	70.3	75.1	67.9	

Phase 3 - Backfill

Equipment	Quantity	Source SPL		Ref distance (feet)	Duty Cycle	M-4 (m)	M-5 (m)	M-6 (m)	M-7 (m)	L_{eq} (Ld) @ M-4	L_{eq} (Ld) @ M-5	L_{eq} (Ld) @ M-6	L_{eq} (Ld) @ M-7	
D6 Dozer	1	85	85.0	15.23999951	50%	160	175	100	230	61.6	60.8	65.6	58.4	
CAT 320 Excavator	1	85	85.0	15.23999951	50%	160	175	100	230	61.6	60.8	65.6	58.4	
CAT 815K Sheep's Foot Compactor	1	82	82.0	15.23999951	50%	160	175	100	230	58.6	57.8	62.6	55.4	
Aggregate										65.5	64.8	69.6	62.4	

Footnotes
1 Based on U.S. Federal Highway Administration Roadway Contruction Noise Model User's Guide, January 2006

Gas-to-Energy Project
HDD Noise Calculations - Impact Magnitude

HDD Entry Point Noise Calculations - Negligible Daytime

HDD Entry Point Sound Pressure Level = 83 dBA at 15.2 m [1]
Corresponding Sound Power Level = 115 dBA

Distance to Receptor			Octave Band Center Frequency (Hz)										
Meters	Feet		31	63	125	250	500	1000	2000	4000	8000	16000	dBA
65	213												
		Typical construction spectrum per EEI		**109**	**114**	**117**	**112**	**110**	**107**	**101**	**95**		**115**
		Hemispherical Spreading (Distance) =	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	
		Intermediate SPL	-45	64	69	72	67	65	62	56	50	-45	70.7
		Atmospheric Absorption (59 F / 70%RH) =	0	0	0	0	0	0	-1	-2	-6	-20	
		SPL with Atmos. Absorp.	-45	64	69	72	67	65	62	55	45	-65	70.3
												Additional Reduction due to Atmospheric Absorption (dBA):	**0.3**
		Excess Anomalous Attenuation	0	0	0	0	0	0	0	-1	-1	-1	
		HDD SPL with Atmos Absorp and Excess Anomalous Atten	**-45**	**64**	**69**	**72**	**67**	**65**	**61**	**54**	**44**	**-66**	**70.0**
												Additional Reduction due to Excess Anomalous Attenuation (dBA):	**0.3**
												Total Reduction for Both Atmos. Absorp. And Excess Anomalous Atten. (dBA):	**0.6**

(1) Burge and Kitech. 2009. "Methods for predicting and evaluating noise from horizontal directional drilling (HDD) equipment". Proceedings of InterNoise 2009.

Gas-to-Energy Project
HDD Noise Calculations - Impact Magnitude

HDD Entry Point Noise Calculations - Small Daytime

HDD Entry Point Sound Pressure Level = 83 dBA at 15.2 m [(1)]
Corresponding Sound Power Level = 115 dBA

Distance to Receptor			Octave Band Center Frequency (Hz)									
Meters	Feet		31	63	125	250	500	1000	2000	4000	8000	16000	dBA
38	125												
		Typical construction spectrum per EEI		**109**	**114**	**117**	**112**	**110**	**107**	**101**	**95**		**115**
		Hemispherical Spreading (Distance) =	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	
		Intermediate SPL	-40	69	74	77	72	70	67	61	55	-40	75.3
		Atmospheric Absorption (59 F / 70%RH) =	0	0	0	0	0	0	0	-1	-3	-12	
		SPL with Atmos. Absorp.	-40	69	74	77	72	70	67	60	52	-52	75.1
												Additional Reduction due to Atmospheric Absorption (dBA):	**0.2**
		Excess Anomalous Attenuation	0	0	0	0	0	0	0	0	0	-1	
		HDD SPL with Atmos Absorp and Excess Anomalous Atten	**-40**	**69**	**74**	**77**	**72**	**70**	**66**	**60**	**51**	**-52**	**75.0**
												Additional Reduction due to Excess Anomalous Attenuation (dBA):	**0.2**
												Total Reduction for Both Atmos. Absorp. And Excess Anomalous Atten. (dBA):	**0.4**

(1) Burge and Kitech. 2009. "Methods for predicting and evaluating noise from horizontal directional drilling (HDD) equipment". Proceedings of InterNoise 2009.

Gas-to-Energy Project
HDD Noise Calculations - Impact Magnitude

HDD Entry Point Noise Calculations - Medium Daytime

HDD Entry Point Sound Pressure Level = 83 dBA at 15.2 m [1]
Corresponding Sound Power Level = 115 dBA

Distance to Receptor			Octave Band Center Frequency (Hz)										
Meters	Feet		31	63	125	250	500	1000	2000	4000	8000	16000	dBA
22	71												
		Typical construction spectrum per EEI		**109**	**114**	**117**	**112**	**110**	**107**	**101**	**95**		**115**
		Hemispherical Spreading (Distance) =	-35	-35	-35	-35	-35	-35	-35	-35	-35	-35	
		Intermediate SPL	-35	74	79	82	77	75	72	66	60	-35	80.3
		Atmospheric Absorption (59 F / 70%RH) =	0	0	0	0	0	0	0	-1	-2	-7	
		SPL with Atmos. Absorp.	-35	74	79	82	77	75	72	65	58	-42	80.1
												Additional Reduction due to Atmospheric Absorption (dBA):	**0.1**
		Excess Anomalous Attenuation	0	0	0	0	0	0	0	0	0	0	
		HDD SPL with Atmos Absorp and Excess Anomalous Atten	**-35**	**74**	**79**	**82**	**77**	**75**	**72**	**65**	**58**	**-42**	**80.0**
												Additional Reduction due to Excess Anomalous Attenuation (dBA):	**0.1**
												Total Reduction for Both Atmos. Absorp. And Excess Anomalous Atten. (dBA):	**0.2**

(1) Burge and Kitech. 2009. "Methods for predicting and evaluating noise from horizontal directional drilling (HDD) equipment". Proceedings of InterNoise 2009.

Gas-to-Energy Project
HDD Noise Calculations - Impact Magnitude

HDD Entry Point Noise Calculations - Negligible Night

HDD Entry Point Sound Pressure Level = 83 dBA at 15.2 m [(1)]
Corresponding Sound Power Level = 115 dBA

Distance to Receptor			Octave Band Center Frequency (Hz)										
Meters	Feet		31	63	125	250	500	1000	2000	4000	8000	16000	dBA
295	968												
		Typical construction spectrum per EEI		**109**	**114**	**117**	**112**	**110**	**107**	**101**	**95**		**115**
		Hemispherical Spreading (Distance) =	-58	-58	-58	-58	-58	-58	-58	-58	-58	-58	
		Intermediate SPL	-58	51	56	59	54	52	49	43	37	-58	57.5
		Atmospheric Absorption (59 F / 70%RH) =	0	0	0	0	-1	-1	-3	-7	-26	-92	
		SPL with Atmos. Absorp.	-58	51	56	59	54	51	47	36	11	-149	56.2
												Additional Reduction due to Atmospheric Absorption (dBA):	**1.3**
		Excess Anomalous Attenuation	0	0	-1	-1	-1	-1	-2	-3	-4	-4	
		HDD SPL with Atmos Absorp and Excess Anomalous Atten	**-58**	**51**	**56**	**58**	**53**	**50**	**45**	**33**	**8**	**-154**	**55.0**
												Additional Reduction due to Excess Anomalous Attenuation (dBA):	**1.2**
												Total Reduction for Both Atmos. Absorp. And Excess Anomalous Atten. (dBA):	**2.5**

(1) Burge and Kitech. 2009. "Methods for predicting and evaluating noise from horizontal directional drilling (HDD) equipment". Proceedings of InterNoise 2009.

Gas-to-Energy Project
HDD Noise Calculations - Impact Magnitude

HDD Entry Point Noise Calculations - Small Night

HDD Entry Point Sound Pressure Level = 83 dBA at 15.2 m [1]
Corresponding Sound Power Level = 115 dBA

Distance to Receptor			Octave Band Center Frequency (Hz)										
Meters	Feet		31	63	125	250	500	1000	2000	4000	8000	16000	dBA
184	604												
		Typical construction spectrum per EEI		**109**	**114**	**117**	**112**	**110**	**107**	**101**	**95**		**115**
		Hemispherical Spreading (Distance) =	-54	-54	-54	-54	-54	-54	-54	-54	-54	-54	
		Intermediate SPL	-54	55	60	63	58	56	53	47	41	-54	61.6
		Atmospheric Absorption (59 F / 70%RH) =	0	0	0	0	0	-1	-2	-5	-16	-57	
		SPL with Atmos. Absorp.	-54	55	60	63	58	56	52	43	25	-111	60.8
												Additional Reduction due to Atmospheric Absorption (dBA):	**0.9**
		Excess Anomalous Attenuation	0	0	0	0	-1	-1	-1	-2	-2	-3	
		HDD SPL with Atmos Absorp and Excess Anomalous Atten	**-54**	**55**	**60**	**63**	**57**	**55**	**50**	**41**	**23**	**-114**	**60.0**
												Additional Reduction due to Excess Anomalous Attenuation (dBA):	**0.8**
												Total Reduction for Both Atmos. Absorp. And Excess Anomalous Atten. (dBA):	**1.7**

(1) Burge and Kitech. 2009. "Methods for predicting and evaluating noise from horizontal directional drilling (HDD) equipment". Proceedings of InterNoise 2009.

Gas-to-Energy Project
HDD Noise Calculations - Impact Magnitude

HDD Entry Point Noise Calculations - Medium Night

HDD Entry Point Sound Pressure Level = 83 dBA at 15.2 m [1]
Corresponding Sound Power Level = 115 dBA

Distance to Receptor			Octave Band Center Frequency (Hz)										
Meters	Feet		31	63	125	250	500	1000	2000	4000	8000	16000	dBA
111	364												
		Typical construction spectrum per EEI		**109**	**114**	**117**	**112**	**110**	**107**	**101**	**95**		**115**
		Hemispherical Spreading (Distance) =	-49	-49	-49	-49	-49	-49	-49	-49	-49	-49	
		Intermediate SPL	-49	60	65	68	63	61	58	52	46	-49	66.0
		Atmospheric Absorption (59 F / 70%RH) =	0	0	0	0	0	0	-1	-3	-10	-34	
		SPL with Atmos. Absorp.	-49	60	65	68	63	60	57	49	36	-84	65.5
												Additional Reduction due to Atmospheric Absorption (dBA):	**0.6**
		Excess Anomalous Attenuation	0	0	0	0	0	-1	-1	-1	-1	-2	
		HDD SPL with Atmos Absorp and Excess Anomalous Atten	**-49**	**60**	**65**	**67**	**62**	**60**	**56**	**48**	**35**	**-85**	**65.0**
												Additional Reduction due to Excess Anomalous Attenuation (dBA):	**0.5**
												Total Reduction for Both Atmos. Absorp. And Excess Anomalous Atten. (dBA):	**1.1**

(1) Burge and Kitech. 2009. "Methods for predicting and evaluating noise from horizontal directional drilling (HDD) equipment". Proceedings of InterNoise 2009.

Gas-to-Energy Project
HDD Noise Calculations - Monitoring Location Impacts

HDD Entry Point Noise Calculations - M-4

HDD Entry Point Sound Pressure Level = 83 dBA at 15.2 m [1]
Corresponding Sound Power Level = 115 dBA

Distance to Receptor			Octave Band Center Frequency (Hz)										
Meters	Feet		31	63	125	250	500	1000	2000	4000	8000	16000	dBA
110	361												
		Typical construction spectrum per EEI		**109**	**114**	**117**	**112**	**110**	**107**	**101**	**95**		**115**
		Hemispherical Spreading (Distance) =	-49	-49	-49	-49	-49	-49	-49	-49	-49	-49	
		Intermediate SPL	-49	60	65	68	63	61	58	52	46	-49	66.1
		Atmospheric Absorption (59 F / 70%RH) =	0	0	0	0	0	0	-1	-3	-10	-34	
		SPL with Atmos. Absorp.	-49	60	65	68	63	60	57	49	36	-83	65.6
												Additional Reduction due to Atmospheric Absorption (dBA):	**0.5**
		Excess Anomalous Attenuation	0	0	0	0	0	-1	-1	-1	-1	-2	
		HDD SPL with Atmos Absorp and Excess Anomalous Atten	**-49**	**60**	**65**	**67**	**62**	**60**	**56**	**48**	**35**	**-85**	**65.1**
												Additional Reduction due to Excess Anomalous Attenuation (dBA):	**0.5**
												Total Reduction for Both Atmos. Absorp. And Excess Anomalous Atten. (dBA):	**1.0**

(1) Burge and Kitech. 2009. "Methods for predicting and evaluating noise from horizontal directional drilling (HDD) equipment". Proceedings of InterNoise 2009.

Gas-to-Energy Project
HDD Noise Calculations - Monitoring Location Impacts

HDD Entry Point Noise Calculations - M-5

HDD Entry Point Sound Pressure Level = 83 dBA at 15.2 m [(1)]
Corresponding Sound Power Level = 115 dBA

Distance to Receptor			Octave Band Center Frequency (Hz)									
Meters	Feet		31	63	125	250	500	1000	2000	4000	8000	16000	dBA
140	459												
		Typical construction spectrum per EEI		**109**	**114**	**117**	**112**	**110**	**107**	**101**	**95**		**115**
		Hemispherical Spreading (Distance) =	-51	-51	-51	-51	-51	-51	-51	-51	-51	-51	
		Intermediate SPL	-51	58	63	66	61	59	56	50	44	-51	64.0
		Atmospheric Absorption (59 F / 70%RH) =	0	0	0	0	0	-1	-1	-4	-12	-44	
		SPL with Atmos. Absorp.	-51	58	63	66	60	58	55	46	31	-95	63.3
												Additional Reduction due to Atmospheric Absorption (dBA):	**0.7**
		Excess Anomalous Attenuation	0	0	0	0	-1	-1	-1	-1	-2	-2	
		HDD SPL with Atmos Absorp and Excess Anomalous Atten	**-51**	**58**	**62**	**65**	**60**	**57**	**54**	**45**	**30**	**-97**	**62.7**
												Additional Reduction due to Excess Anomalous Attenuation (dBA):	**0.6**
												Total Reduction for Both Atmos. Absorp. And Excess Anomalous Atten. (dBA):	**1.3**

(1) Burge and Kitech. 2009. "Methods for predicting and evaluating noise from horizontal directional drilling (HDD) equipment". Proceedings of InterNoise 2009.

HDD Entry Point Noise Calculations - M-6

HDD Entry Point Sound Pressure Level = 83 dBA at 15.2 m [1]
Corresponding Sound Power Level = 115 dBA

Distance to Receptor			Octave Band Center Frequency (Hz)										
Meters	Feet		31	63	125	250	500	1000	2000	4000	8000	16000	dBA
55	180												
		Typical construction spectrum per EEI		**109**	**114**	**117**	**112**	**110**	**107**	**101**	**95**		**115**
		Hemispherical Spreading (Distance) =	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	
		Intermediate SPL	-43	66	71	74	69	67	64	58	52	-43	72.1
		Atmospheric Absorption (59 F / 70%RH) =	0	0	0	0	0	0	0	-1	-5	-17	
		SPL with Atmos. Absorp.	-43	66	71	74	69	67	63	56	47	-60	71.8
		Additional Reduction due to Atmospheric Absorption (dBA)											**0.3**
		Excess Anomalous Attenuation	0	0	0	0	0	0	0	-1	-1	-1	
		HDD SPL with Atmos Absorp and Excess Anomalous Atten	**-43**	**66**	**71**	**74**	**69**	**66**	**63**	**56**	**46**	**-61**	**71.6**
		Additional Reduction due to Excess Anomalous Attenuation (dBA)											**0.3**
		Total Reduction for Both Atmos. Absorp. And Excess Anomalous Atten. (dBA)											**0.5**

Ldn
78.0

(1) Burge and Kitech. 2009. "Methods for predicting and evaluating noise from horizontal directional drilling (HDD) equipment". Proceedings of InterNoise 2009.

Gas-to-Energy Project
HDD Noise Calculations - Monitoring Location Impacts

HDD Entry Point Noise Calculations - M-7

HDD Entry Point Sound Pressure Level = 83 dBA at 15.2 m [1]
Corresponding Sound Power Level = 115 dBA

Distance to Receptor Meters	Feet		Octave Band Center Frequency (Hz) 31	63	125	250	500	1000	2000	4000	8000	16000	dBA	
217	712													
		Typical construction spectrum per EEI		**109**	**114**	**117**	**112**	**110**	**107**	**101**	**95**		**115**	
		Hemispherical Spreading (Distance) =	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55		
		Intermediate SPL	-55	54	59	62	57	55	52	46	40	-55	60.2	
		Atmospheric Absorption (59 F / 70%RH) =	0	0	0	0	-1	-1	-2	-5	-19	-67		
		SPL with Atmos. Absorp.	-55	54	59	62	56	54	50	41	21	-122	59.2	
		Additional Reduction due to Atmospheric Absorption (dBA)											**1.0**	
		Excess Anomalous Attenuation	0	0	0	-1	-1	-1	-2	-2	-3	-3		
		HDD SPL with Atmos Absorp and Excess Anomalous Atten	**-55**	**54**	**58**	**61**	**56**	**53**	**48**	**38**	**18**	**-126**	**58.3**	**Ldn 64.7**
		Additional Reduction due to Excess Anomalous Attenuation (dBA)											**0.9**	
		Total Reduction for Both Atmos. Absorp. And Excess Anomalous Atten. (dBA)											**1.9**	

(1) Burge and Kitech. 2009. "Methods for predicting and evaluating noise from horizontal directional drilling (HDD) equipment". Proceedings of InterNoise 2009.

APPENDIX K

Ambient Onshore Air Quality Monitoring Report

Resubmitted without changes

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Date	Ending At	$PM_{2.5}$ µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
05/02/2022	1:00	IO	IO	0.16	2.1	ZS	ZS	6.4	IO	IO	IO	IO
	2:00	IO	IO	0.07	1.1	-1.8	0.6	8.6	IO	IO	IO	IO
	3:00	IO	IO	0.04	0.6	-1.5	0.1	16.0	IO	IO	IO	IO
	4:00	IO	IO	0.03	1.3	-1.9	0.5	16.1	IO	IO	IO	IO
	5:00	IO	IO	0.02	5.5	-2.2	0.9	11.6	IO	IO	IO	IO
	6:00	IO	IO	0.05	7.4	-1.8	0.6	11.0	IO	IO	IO	IO
	7:00	IO	IO	0.09	11.5	0.2	1.5	11.1	IO	IO	IO	IO
	8:00	IO	IO	0.19	18.8	0.2	0.8	7.6	IO	IO	IO	IO
	9:00	IO	IO	0.20	17.8	0.8	0.6	11.3	IO	IO	IO	IO
	10:00	IO	IO	0.18	18.9	1.0	0.4	13.7	IO	IO	IO	IO
	11:00	IO	IO	0.06	9.5	0.1	0.6	16.2	IO	IO	IO	IO
	12:00	IO	IO	0.04	6.4	-0.8	0.7	14.4	IO	IO	IO	IO
	13:00	IO	IO	-0.02	1.5	-1.1	0.5	17.4	IO	IO	IO	IO
	14:00	IO	IO	0.00	4.4	-0.9	0.6	16.7	IO	IO	IO	IO
	15:00	IO	IO	-0.05	0.3	-1.5	0.3	19.5	IO	IO	IO	IO
	16:00	IO	IO	-0.06	0.0	-1.6	0.2	18.7	IO	IO	IO	IO
	17:00	IO	IO	-0.07	0.0	-1.6	0.6	17.1	IO	IO	IO	IO
	18:00	IO	IO	-0.06	0.0	-1.7	0.4	16.4	IO	IO	IO	IO
	19:00	IO	IO	-0.07	0.1	-1.6	0.1	16.0	IO	IO	IO	IO
	20:00	IO	IO	0.01	3.0	-1.6	1.0	13.3	IO	IO	IO	IO
	21:00	IO	IO	0.02	4.9	-1.4	0.6	7.1	IO	IO	IO	IO
	22:00	IO	IO	GEN	GEN	1.1	1.6	13.7	IO	IO	IO	IO
	23:00	IO	IO	GEN	GEN	5.8	1.8	11.7	IO	IO	IO	IO
	0:00	IO	IO	GEN	GEN	ZS	ZS	12.4	IO	IO	IO	IO
Min		ID	ID	-0.1	0.0	-2.2	0.1	6.4	ID	ID	ID	ID
Max		ID	ID	0.2	18.9	5.8	1.8	19.5	ID	ID	ID	ID
Average		ID	ID	0.0	5.5	-0.6	0.7	13.5	ID	ID	ID	ID

Date	Hour Ending At	PM1IO µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
06/02/2022	1:00	IO	IO	0.00	9.0	3.0	0.5	2.7	IO	IO	IO	IO
	2:00	IO	IO	GEN	GEN	5.6	1.4	11.8	IO	IO	IO	IO
	3:00	IO	IO	GEN	GEN	6.4	0.1	6.9	IO	IO	IO	IO
	4:00	IO	IO	GEN	GEN	7.0	1.0	11.3	IO	IO	IO	IO
	5:00	IO	IO	-0.03	11.7	6.6	1.0	11.5	IO	IO	IO	IO
	6:00	IO	IO	GEN	GEN	7.3	0.1	23.2	IO	IO	IO	IO
	7:00	IO	IO	0.36	43.7	8.9	1.1	22.2	IO	IO	IO	IO
	8:00	IO	IO	GEN	GEN	12.5	0.4	22.3	IO	IO	IO	IO
	9:00	IO	IO	0.29	37.8	14.0	-0.8	16.3	IO	IO	IO	IO
	10:00	IO	IO	GEN	GEN	14.1	0.7	23.9	IO	IO	IO	IO
	11:00	IO	IO	0.14	20.2	12.9	-0.1	19.0	IO	IO	IO	IO
	12:00	IO	IO	-0.10	1.4	8.0	0.5	17.7	IO	IO	IO	IO
	13:00	IO	IO	-0.13	0.3	5.7	0.2	20.0	IO	IO	IO	IO
	14:00	IO	IO	-0.13	0.2	3.9	0.1	19.5	IO	IO	IO	IO
	15:00	IO	IO	-0.12	0.9	2.8	0.3	19.0	IO	IO	IO	IO
	16:00	IO	IO	-0.14	0.1	2.4	-0.1	19.1	IO	IO	IO	IO
	17:00	IO	IO	-0.14	0.1	1.4	0.3	18.3	IO	IO	IO	IO
	18:00	IO	IO	-0.14	0.1	0.9	0.5	17.5	IO	IO	IO	IO
	19:00	IO	IO	-0.14	0.9	0.6	0.3	14.9	IO	IO	IO	IO
	20:00	IO	IO	-0.14	2.0	0.6	0.1	11.7	IO	IO	IO	IO
	21:00	IO	IO	-0.12	0.5	0.2	0.5	12.7	IO	IO	IO	IO
	22:00	IO	IO	-0.07	2.4	0.5	0.0	9.6	IO	IO	IO	IO
	23:00	IO	IO	-0.05	1.5	0.1	0.6	6.5	IO	IO	IO	IO
	0:00	IO	IO	-0.09	ZS	-0.2	1.2	5.2	IO	IO	IO	IO
Min		ID	ID	-0.1	ID	-0.2	-0.8	2.7	ID	ID	ID	ID
Max		ID	ID	0.4	ID	14.1	1.4	23.9	ID	ID	ID	ID
Average		ID	ID	0.0	ID	5.2	0.4	15.1	ID	ID	ID	ID

Date	Hour Ending At	PM1IO µg/m³	$PM_{2.5}$ µg/m³	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	H_2S ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
07/02/2022	1:00	IO	IO	0.06	13.9	ZS	ZS	5.8	IO	IO	IO	IO
	2:00	IO	IO	-0.02	6.1	0.7	0.7	2.3	IO	IO	IO	IO
	3:00	IO	IO	-0.05	4.7	0.4	0.9	0.8	IO	IO	IO	IO
	4:00	IO	IO	-0.03	6.2	1.0	0.4	1.5	IO	IO	IO	IO
	5:00	IO	IO	0.01	5.8	0.8	1.1	0.6	IO	IO	IO	IO
	6:00	IO	IO	-0.03	3.3	0.3	1.4	0.6	IO	IO	IO	IO
	7:00	IO	IO	0.15	8.0	0.7	1.0	1.9	IO	IO	IO	IO
	8:00	IO	IO	0.32	11.8	1.6	0.9	6.6	IO	IO	IO	IO
	9:00	IO	IO	-0.13	0.8	0.6	0.6	16.7	IO	IO	IO	IO
	10:00	IO	IO	-0.15	0.1	0.0	0.3	19.5	IO	IO	IO	IO
	11:00	IO	IO	-0.15	0.1	-0.7	0.6	20.1	IO	IO	IO	IO
	12:00	IO	IO	-0.16	0.0	-0.5	0.3	20.6	IO	IO	IO	IO
	13:00	IO	IO	-0.15	0.1	-1.0	0.6	19.4	IO	IO	IO	IO
	14:00	IO	IO	-0.15	0.2	-0.7	0.6	19.6	IO	IO	IO	IO
	15:00	IO	IO	-0.16	0.1	-1.0	0.4	18.5	IO	IO	IO	IO
	16:00	IO	IO	-0.16	0.1	-1.1	0.2	17.8	IO	IO	IO	IO
	17:00	IO	IO	-0.17	0.1	-1.0	0.3	17.9	IO	IO	IO	IO
	18:00	IO	IO	-0.15	0.3	-0.8	0.5	17.0	IO	IO	IO	IO
	19:00	IO	IO	-0.16	0.4	-0.5	-0.1	15.0	IO	IO	IO	IO
	20:00	IO	IO	-0.15	0.5	-0.6	0.4	12.9	IO	IO	IO	IO
	21:00	IO	IO	-0.17	0.3	-0.9	0.2	13.8	IO	IO	IO	IO
	22:00	IO	IO	-0.17	0.1	-1.2	0.8	14.6	IO	IO	IO	IO
	23:00	IO	IO	-0.16	0.2	-1.3	0.4	13.4	IO	IO	IO	IO
	0:00	IO	IO	-0.17	0.1	-1.1	0.5	12.3	IO	IO	IO	IO
Min		ID	ID	-0.2	0.0	-1.3	-0.1	0.6	ID	ID	ID	ID
Max		ID	ID	0.3	13.9	1.6	1.4	20.6	ID	ID	ID	ID
Average		ID	ID	-0.1	2.6	-0.3	0.6	12.1	ID	ID	ID	ID

Date	Hour Ending At	PM1IO µg/m³	$PM_{2.5}$ µg/m³	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
08/02/2022	1:00	IO	IO	-0.17	ZS	-1.5	0.5	12.2	IO	IO	IO	IO
	2:00	IO	IO	-0.17	1.3	ZS	ZS	10.9	IO	IO	IO	IO
	3:00	IO	IO	-0.18	0.5	-1.1	0.6	11.3	IO	IO	IO	IO
	4:00	IO	IO	-0.11	1.5	-0.8	0.7	4.0	IO	IO	IO	IO
	5:00	IO	IO	0.41	3.6	-0.2	1.0	3.3	IO	IO	IO	IO
	6:00	IO	IO	0.50	3.6	0.1	1.1	2.8	IO	IO	IO	IO
	7:00	IO	IO	0.55	2.7	0.3	1.4	1.9	IO	IO	IO	IO
	8:00	IO	IO	0.11	2.9	0.2	0.8	9.3	IO	IO	IO	IO
	9:00	IO	IO	-0.13	0.4	-0.6	0.3	17.2	IO	IO	IO	IO
	10:00	IO	IO	-0.13	0.8	-0.7	0.5	19.9	IO	IO	IO	IO
	11:00	IO	IO	-0.16	0.1	-1.3	0.5	22.5	IO	IO	IO	IO
	12:00	IO	IO	-0.13	1.5	-1.3	0.3	22.2	IO	IO	IO	IO
	13:00	IO	IO	-0.15	0.7	-1.1	0.6	24.0	IO	IO	IO	IO
	14:00	IO	IO	-0.15	0.7	-1.3	0.2	23.2	IO	IO	IO	IO
	15:00	IO	IO	-0.15	0.3	-1.4	0.3	23.6	IO	IO	IO	IO
	16:00	IO	IO	-0.15	0.1	-1.3	0.4	23.4	IO	IO	IO	IO
	17:00	IO	IO	-0.15	0.3	-1.5	0.3	22.9	IO	IO	IO	IO
	18:00	IO	IO	-0.15	0.2	-1.2	0.2	20.9	IO	IO	IO	IO
	19:00	IO	IO	-0.13	0.8	-0.8	0.1	16.6	IO	IO	IO	IO
	20:00	IO	IO	-0.11	1.3	-1.1	0.6	14.6	IO	IO	IO	IO
	21:00	IO	IO	-0.07	1.1	-1.1	0.5	14.3	IO	IO	IO	IO
	22:00	IO	IO	-0.08	0.9	-0.9	0.3	13.3	IO	IO	IO	IO
	23:00	IO	IO	-0.10	0.6	-1.1	0.3	13.7	IO	IO	IO	IO
	0:00	IO	IO	-0.10	ZS	ZS	ZS	11.8	IO	IO	IO	IO
Min		ID	ID	-0.2	0.1	-1.5	0.1	1.9	ID	ID	ID	ID
Max		ID	ID	0.5	3.6	0.3	1.4	24.0	ID	ID	ID	ID
Average		ID	ID	0.0	1.2	-0.9	0.5	15.0	ID	ID	ID	ID

Date	Hour Ending At	PM1IO µg/m³	$PM_{2.5}$ µg/m³	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
09/02/2022	1:00	IO	IO	GEN	2.5	ZS	ZS	5.4	IO	IO	IO	IO
	2:00	IO	IO	0.78	4.2	-0.3	0.8	4.1	IO	IO	IO	IO
	3:00	IO	IO	0.89	3.7	0.0	1.1	3.2	IO	IO	IO	IO
	4:00	IO	IO	0.60	4.0	-0.2	0.9	2.4	IO	IO	IO	IO
	5:00	IO	IO	0.36	9.3	-0.1	0.1	3.4	IO	IO	IO	IO
	6:00	IO	IO	GEN	GEN	3.4	0.3	9.1	IO	IO	IO	IO
	7:00	IO	IO	0.29	23.2	4.3	0.7	6.7	IO	IO	IO	IO
	8:00	IO	IO	GEN	GEN	5.1	0.0	5.7	IO	IO	IO	IO
	9:00	IO	IO	0.32	35.6	7.7	-0.3	12.3	IO	IO	IO	IO
	10:00	IO	IO	-0.09	2.6	3.6	0.5	15.2	IO	IO	IO	IO
	11:00	IO	IO	-0.04	6.5	1.9	0.6	13.5	IO	IO	IO	IO
	12:00	IO	IO	-0.07	4.6	1.1	0.2	15.5	IO	IO	IO	IO
	13:00	IO	IO	-0.08	3.4	0.4	0.4	17.5	IO	IO	IO	IO
	14:00	IO	IO	-0.12	0.0	-0.1	0.2	16.1	IO	IO	IO	IO
	15:00	IO	IO	-0.12	0.6	-0.1	0.6	18.4	IO	IO	IO	IO
	16:00	IO	IO	-0.13	0.5	-0.4	0.2	18.4	IO	IO	IO	IO
	17:00	IO	IO	-0.11	0.6	0.6	0.1	18.2	IO	IO	IO	IO
	18:00	IO	IO	-0.13	0.2	-0.4	0.3	18.0	IO	IO	IO	IO
	19:00	IO	IO	-0.12	0.5	-0.7	-0.2	16.1	IO	IO	IO	IO
	20:00	IO	IO	-0.11	0.2	-0.4	0.2	14.5	IO	IO	IO	IO
	21:00	IO	IO	-0.08	1.0	0.0	0.1	14.2	IO	IO	IO	IO
	22:00	IO	IO	0.05	18.2	0.3	0.7	12.3	IO	IO	IO	IO
	23:00	IO	IO	GEN	GEN	2.2	0.3	10.7	IO	IO	IO	IO
	0:00	IO	IO	GEN	GEN	ZS	ZS	6.2	IO	IO	IO	IO
Min		ID	ID	-0.1	0.0	-0.7	-0.3	2.4	ID	ID	ID	ID
Max		ID	ID	0.9	35.6	7.7	1.1	18.4	ID	ID	ID	ID
Average		ID	ID	0.1	6.1	1.3	0.4	11.5	ID	ID	ID	ID

Date	Hour Ending At	PM1IO µg/m³	$PM_{2.5}$ µg/m³	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
10/02/2022	1:00	IO	IO	-0.02	16.3	2.4	0.5	6.5	IO	IO	IO	IO
	2:00	IO	IO	GEN	ZS	2.7	0.8	8.0	IO	IO	IO	IO
	3:00	IO	IO	-0.02	7.5	3.2	0.6	1.3	IO	IO	IO	IO
	4:00	IO	IO	-0.02	5.7	1.6	0.6	3.7	IO	IO	IO	IO
	5:00	IO	IO	0.02	4.6	1.3	0.5	2.9	IO	IO	IO	IO
	6:00	IO	IO	0.04	13.0	1.6	0.4	7.1	IO	IO	IO	IO
	7:00	IO	IO	-0.06	2.8	1.0	-0.1	15.6	IO	IO	IO	IO
	8:00	IO	IO	0.22	13.7	1.5	0.8	6.8	IO	IO	IO	IO
	9:00	IO	IO	0.12	14.1	4.7	0.2	9.6	IO	IO	IO	IO
	10:00	IO	IO	-0.04	3.7	0.9	0.6	19.8	IO	IO	IO	IO
	11:00	IO	IO	-0.08	0.7	0.2	0.4	21.5	IO	IO	IO	IO
	12:00	IO	IO	-0.08	0.7	0.1	0.8	20.9	IO	IO	IO	IO
	13:00	IO	IO	-0.07	IV	IV	IV	19.7	IO	IO	IO	IO
	14:00	IO	IO	-0.09	1.0	IV	IV	21.4	IO	IO	IO	IO
	15:00	IO	IO	-0.08	2.0	IV	IV	20.1	IO	IO	IO	IO
	16:00	IO	IO	-0.10	0.9	IV	IV	21.1	IO	IO	IO	IO
	17:00	IO	IO	-0.09	0.7	-0.8	0.5	21.5	IO	IO	IO	IO
	18:00	IO	IO	-0.08	0.5	-0.8	0.0	19.9	IO	IO	IO	IO
	19:00	IO	IO	-0.07	0.7	-0.8	0.2	16.4	IO	IO	IO	IO
	20:00	IO	IO	-0.07	0.4	-0.9	0.1	14.1	IO	IO	IO	IO
	21:00	IO	IO	-0.06	0.3	-0.8	0.2	15.0	IO	IO	IO	IO
	22:00	IO	IO	-0.06	0.2	-0.8	0.3	15.1	IO	IO	IO	IO
	23:00	IO	IO	-0.06	0.1	-1.1	0.5	15.3	IO	IO	IO	IO
	0:00	IO	IO	-0.06	0.1	-1.5	0.7	19.3	IO	IO	IO	IO
Min		ID	ID	-0.1	0.1	-1.5	-0.1	1.3	ID	ID	ID	ID
Max		ID	ID	0.2	16.3	4.7	0.8	21.5	ID	ID	ID	ID
Average		ID	ID	0.0	4.1	0.7	0.4	14.3	ID	ID	ID	ID

Date	Hour Ending At	PM1IO	$PM_{2.5}$	CO	NO_2	SO_2	H_2S	O_3	Benzene	Toluene	Ethylbenzene	Xylene
		µg/m³	µg/m³	ppm	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
11/02/2022	1:00	IO	IO	-0.06	ZS	-1.3	0.2	20.2	IO	IO	IO	IO
	2:00	IO	IO	-0.06	0.5	ZS	ZS	20.4	IO	IO	IO	IO
	3:00	IO	IO	-0.01	6.4	-0.7	0.5	12.3	IO	IO	IO	IO
	4:00	IO	IO	-0.04	2.3	-0.6	0.5	18.2	IO	IO	IO	IO
	5:00	IO	IO	-0.04	0.4	-0.7	0.5	16.5	IO	IO	IO	IO
	6:00	IO	IO	-0.04	0.1	-0.9	0.6	20.2	IO	IO	IO	IO
	7:00	IO	IO	-0.02	0.4	-1.5	0.3	18.8	IO	IO	IO	IO
	8:00	IO	IO	-0.03	0.7	-1.4	0.4	20.3	IO	IO	IO	IO
	9:00	IO	IO	-0.03	0.3	-1.3	0.4	24.6	IO	IO	IO	IO
	10:00	IO	IO	-0.04	0.2	-1.5	0.6	29.3	IO	IO	IO	IO
	11:00	IO	IO	-0.05	0.0	-1.7	0.3	29.5	IO	IO	IO	IO
	12:00	IO	IO	-0.05	0.0	-1.8	0.3	31.5	IO	IO	IO	IO
	13:00	IO	IO	-0.04	0.7	-1.6	0.4	30.4	IO	IO	IO	IO
	14:00	IO	IO	-0.04	0.1	-1.7	0.3	28.3	IO	IO	IO	IO
	15:00	IO	IO	-0.03	1.0	-1.9	0.6	27.1	IO	IO	IO	IO
	16:00	IO	IO	-0.01	1.1	-1.9	0.8	25.3	IO	IO	IO	IO
	17:00	IO	IO	-0.02	1.2	-1.7	0.2	24.8	IO	IO	IO	IO
	18:00	IO	IO	-0.01	0.2	-1.6	0.0	23.7	IO	IO	IO	IO
	19:00	IO	IO	0.01	0.5	-1.1	0.0	22.4	IO	IO	IO	IO
	20:00	IO	IO	0.02	0.7	-1.4	0.5	20.1	IO	IO	IO	IO
	21:00	IO	IO	0.02	0.7	-1.3	0.4	18.7	IO	IO	IO	IO
	22:00	IO	IO	0.02	1.0	-1.0	0.3	20.9	IO	IO	IO	IO
	23:00	IO	IO	0.01	0.7	-0.8	0.4	22.7	IO	IO	IO	IO
	0:00	IO	IO	0.02	ZS	ZS	ZS	20.2	IO	IO	IO	IO
Min		ID	ID	-0.1	0.0	-1.9	0.0	12.3	ID	ID	ID	ID
Max		ID	ID	0.0	6.4	-0.6	0.8	31.5	ID	ID	ID	ID
Average		ID	ID	0.0	0.9	-1.3	0.4	22.8	ID	ID	ID	ID

Date	Ending At	PM_{10}	$PM_{2.5}$	CO	NO_2	SO_2	H_2S	O_3	Benzene	Toluene	Ethylbenzene	Xylene
		µg/m³	µg/m³	ppm	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
12/02/2022	1:00	IO	IO	0.01	0.2	ZS	ZS	18.7	IO	IO	IO	IO
	2:00	IO	IO	0.02	0.2	-0.8	0.6	17.2	IO	IO	IO	IO
	3:00	IO	IO	0.02	0.2	-0.9	0.4	18.9	IO	IO	IO	IO
	4:00	IO	IO	0.02	0.1	-0.8	0.0	20.3	IO	IO	IO	IO
	5:00	IO	IO	0.03	0.2	-1.4	0.2	20.5	IO	IO	IO	IO
	6:00	IO	IO	0.04	0.5	-1.3	0.4	19.6	IO	IO	IO	IO
	7:00	IO	IO	0.08	4.0	-1.1	0.3	15.4	IO	IO	IO	IO
	8:00	IO	IO	0.28	12.3	-0.1	0.6	9.8	IO	IO	IO	IO
	9:00	IO	IO	0.15	5.7	-0.2	0.5	15.4	IO	IO	IO	IO
	10:00	IO	IO	0.10	2.5	-0.5	0.2	18.1	IO	IO	IO	IO
	11:00	IO	IO	0.13	4.2	0.0	0.4	18.3	IO	IO	IO	IO
	12:00	IO	IO	0.07	0.8	-0.7	0.7	22.2	IO	IO	IO	IO
	13:00	IO	IO	0.14	3.3	-0.6	0.4	19.6	IO	IO	IO	IO
	14:00	IO	IO	0.14	4.0	-0.3	0.3	18.9	IO	IO	IO	IO
	15:00	IO	IO	0.06	0.3	-0.7	0.5	22.9	IO	IO	IO	IO
	16:00	IO	IO	0.10	2.3	-0.6	0.5	21.7	IO	IO	IO	IO
	17:00	IO	IO	0.22	13.3	4.2	1.4	11.3	IO	IO	IO	IO
	18:00	IO	IO	0.18	9.9	3.9	0.8	13.3	IO	IO	IO	IO
	19:00	IO	IO	0.09	0.5	-0.6	0.6	21.2	IO	IO	IO	IO
	20:00	IO	IO	0.10	0.7	-0.3	0.1	19.1	IO	IO	IO	IO
	21:00	IO	IO	0.10	0.6	-0.7	0.3	19.6	IO	IO	IO	IO
	22:00	IO	IO	0.09	0.1	-0.9	0.6	18.4	IO	IO	IO	IO
	23:00	IO	IO	0.10	0.0	-0.9	0.6	18.4	IO	IO	IO	IO
	0:00	IO	IO	0.09	0.0	ZS	ZS	20.1	IO	IO	IO	IO
Min		ID	ID	0.0	0.0	-1.4	0.0	9.8	ID	ID	ID	ID
Max		ID	ID	0.3	13.3	4.2	1.4	22.9	ID	ID	ID	ID
Average		ID	ID	0.1	2.8	-0.2	0.5	18.3	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
13/02/2022	1:00	IO	IO	0.10	0.0	-0.7	0.4	19.8	IO	IO	IO	IO
	2:00	IO	IO	0.10	ZS	-0.7	0.3	17.9	IO	IO	IO	IO
	3:00	IO	IO	0.10	0.2	-0.8	0.7	18.3	IO	IO	IO	IO
	4:00	IO	IO	0.11	0.1	-0.7	0.4	17.7	IO	IO	IO	IO
	5:00	IO	IO	0.11	0.0	-0.7	0.3	19.1	IO	IO	IO	IO
	6:00	IO	IO	0.11	0.0	-1.0	0.2	19.7	IO	IO	IO	IO
	7:00	IO	IO	0.12	0.3	-0.6	0.3	19.5	IO	IO	IO	IO
	8:00	IO	IO	0.13	0.1	-1.3	0.5	19.4	IO	IO	IO	IO
	9:00	IO	IO	0.13	-0.1	-1.4	0.4	23.6	IO	IO	IO	IO
	10:00	IO	IO	0.13	-0.1	-1.1	0.3	22.9	IO	IO	IO	IO
	11:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	12:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	13:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	14:00	IO	IO	0.40	-0.1	-0.9	0.5	21.2	IO	IO	IO	IO
	15:00	IO	IO	0.29	-0.1	-1.3	0.6	21.1	IO	IO	IO	IO
	16:00	IO	IO	0.26	-0.1	-1.1	0.1	20.6	IO	IO	IO	IO
	17:00	IO	IO	0.24	-0.2	-1.4	0.1	20.7	IO	IO	IO	IO
	18:00	IO	IO	0.25	0.2	-1.4	0.4	20.5	IO	IO	IO	IO
	19:00	IO	IO	0.26	0.3	-1.4	0.4	18.5	IO	IO	IO	IO
	20:00	IO	IO	0.24	0.4	-1.2	0.1	14.4	IO	IO	IO	IO
	21:00	IO	IO	0.22	0.1	-1.5	0.3	15.0	IO	IO	IO	IO
	22:00	IO	IO	0.22	0.0	-1.3	0.6	14.7	IO	IO	IO	IO
	23:00	IO	IO	ZS	0.1	-1.3	0.6	14.0	IO	IO	IO	IO
	0:00	IO	IO	0.23	ZS	-1.7	0.6	13.3	IO	IO	IO	IO
Min		ID	ID	0.1	-0.2	-1.7	0.1	13.3	ID	ID	ID	ID
Max		ID	ID	0.4	0.4	-0.6	0.7	23.6	ID	ID	ID	ID
Average		ID	ID	0.2	0.1	-1.1	0.4	18.6	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
14/02/2022	1:00	IO	IO	0.27	2.7	ZS	ZS	10.4	IO	IO	IO	IO
	2:00	IO	IO	0.28	3.7	-1.1	0.6	7.2	IO	IO	IO	IO
	3:00	IO	IO	0.34	8.0	-0.2	1.3	4.4	IO	IO	IO	IO
	4:00	IO	IO	0.25	0.9	-0.3	0.7	7.8	IO	IO	IO	IO
	5:00	IO	IO	0.24	0.2	-0.7	0.5	10.5	IO	IO	IO	IO
	6:00	IO	IO	0.25	0.2	-1.0	0.7	12.7	IO	IO	IO	IO
	7:00	IO	IO	0.26	0.1	-0.8	0.3	14.1	IO	IO	IO	IO
	8:00	IO	IO	0.31	1.5	-1.0	0.6	16.1	IO	IO	IO	IO
	9:00	IO	IO	0.29	1.0	-0.9	0.4	17.1	IO	IO	IO	IO
	10:00	IO	IO	0.28	0.5	-1.3	0.5	19.0	IO	IO	IO	IO
	11:00	IO	IO	0.31	2.8	-1.0	0.5	18.6	IO	IO	IO	IO
	12:00	IO	IO	0.69	3.8	-0.4	0.3	17.8	IO	IO	IO	IO
	13:00	IO	IO	0.30	1.5	-1.0	0.2	18.0	IO	IO	IO	IO
	14:00	IO	IO	0.28	0.6	-1.2	0.1	19.1	IO	IO	IO	IO
	15:00	IO	IO	0.30	2.3	-1.2	0.4	18.7	IO	IO	IO	IO
	16:00	IO	IO	0.30	2.6	-1.0	0.1	18.1	IO	IO	IO	IO
	17:00	IO	IO	0.28	-0.1	-1.0	0.0	17.5	IO	IO	IO	IO
	18:00	IO	IO	0.29	0.0	-1.1	0.1	16.4	IO	IO	IO	IO
	19:00	IO	IO	0.30	-0.1	-1.3	0.3	17.0	IO	IO	IO	IO
	20:00	IO	IO	0.29	0.0	-1.4	0.2	15.1	IO	IO	IO	IO
	21:00	IO	IO	0.32	1.1	-1.4	0.7	11.1	IO	IO	IO	IO
	22:00	IO	IO	0.45	12.7	0.0	0.3	8.0	IO	IO	IO	IO
	23:00	IO	IO	0.37	9.0	-0.1	0.6	10.0	IO	IO	IO	IO
	0:00	IO	IO	0.40	15.2	0.2	0.9	9.4	IO	IO	IO	IO
Min		ID	ID	0.2	-0.1	-1.4	0.0	4.4	ID	ID	ID	ID
Max		ID	ID	0.7	15.2	0.2	1.3	19.1	ID	ID	ID	ID
Average		ID	ID	0.3	2.9	-0.8	0.5	13.9	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
15/02/2022	1:00	IO	IO	0.48	ZS	1.9	0.4	12.2	IO	IO	IO	IO
	2:00	IO	IO	0.37	7.0	ZS	ZS	10.0	IO	IO	IO	IO
	3:00	IO	IO	0.33	1.2	-0.5	0.7	13.4	IO	IO	IO	IO
	4:00	IO	IO	0.33	1.4	-0.6	0.5	14.7	IO	IO	IO	IO
	5:00	IO	IO	0.31	-0.2	-0.7	0.5	18.8	IO	IO	IO	IO
	6:00	IO	IO	0.31	0.2	-0.9	0.6	18.0	IO	IO	IO	IO
	7:00	IO	IO	0.34	0.5	-0.5	0.5	15.0	IO	IO	IO	IO
	8:00	IO	IO	0.38	0.9	-0.4	0.6	14.5	IO	IO	IO	IO
	9:00	IO	IO	0.35	0.4	-0.7	0.5	16.7	IO	IO	IO	IO
	10:00	IO	IO	0.37	1.6	-0.4	0.4	17.7	IO	IO	IO	IO
	11:00	IO	IO	0.36	0.1	-0.7	0.8	20.9	IO	IO	IO	IO
	12:00	IO	IO	0.35	0.0	-0.3	-0.3	21.1	IO	IO	IO	IO
	13:00	IO	IO	0.36	0.0	-0.4	0.5	21.1	IO	IO	IO	IO
	14:00	IO	IO	0.37	0.2	-0.3	-0.3	19.2	IO	IO	IO	IO
	15:00	IO	IO	0.37	-0.1	-1.0	0.1	17.9	IO	IO	IO	IO
	16:00	IO	IO	0.38	-0.1	-1.7	0.8	17.2	IO	IO	IO	IO
	17:00	IO	IO	0.38	-0.1	-1.7	0.8	21.1	IO	IO	IO	IO
	18:00	IO	IO	0.39	-0.1	-1.1	0.4	21.3	IO	IO	IO	IO
	19:00	IO	IO	0.40	0.1	-1.0	0.5	17.9	IO	IO	IO	IO
	20:00	IO	IO	0.41	0.5	-0.8	0.7	18.0	IO	IO	IO	IO
	21:00	IO	IO	0.41	0.2	-0.8	0.5	18.1	IO	IO	IO	IO
	22:00	IO	IO	0.40	0.0	-0.7	0.5	20.1	IO	IO	IO	IO
	23:00	IO	IO	0.40	-0.1	-0.8	0.6	21.3	IO	IO	IO	IO
	0:00	IO	IO	0.41	ZS	-0.7	0.4	15.5	IO	IO	IO	IO
Min		ID	ID	0.3	-0.2	-1.7	-0.3	10.0	ID	ID	ID	ID
Max		ID	ID	0.5	7.0	1.9	0.8	21.3	ID	ID	ID	ID
Average		ID	ID	0.4	0.6	-0.6	0.5	17.6	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
16/02/2022	1:00	IO	IO	0.42	1.4	ZS	ZS	15.5	IO	IO	IO	IO
	2:00	IO	IO	ZS	3.2	-0.6	0.5	13.7	IO	IO	IO	IO
	3:00	IO	IO	0.41	0.9	-0.5	0.4	16.2	IO	IO	IO	IO
	4:00	IO	IO	0.41	-0.1	-0.4	0.3	18.5	IO	IO	IO	IO
	5:00	IO	IO	0.41	0.1	-0.8	0.6	17.6	IO	IO	IO	IO
	6:00	IO	IO	0.43	0.6	-0.4	0.2	12.0	IO	IO	IO	IO
	7:00	IO	IO	0.43	0.2	-0.7	1.1	16.7	IO	IO	IO	IO
	8:00	IO	IO	0.45	0.1	-0.5	0.2	19.7	IO	IO	IO	IO
	9:00	IO	IO	0.43	-0.1	-0.8	0.4	25.0	IO	IO	IO	IO
	10:00	IO	IO	0.42	-0.2	-1.3	0.3	25.5	IO	IO	IO	IO
	11:00	IO	IO	0.42	-0.1	-1.5	0.6	26.0	IO	IO	IO	IO
	12:00	IO	IO	0.41	-0.2	-0.7	0.1	26.3	IO	IO	IO	IO
	13:00	IO	IO	0.42	-0.2	-0.7	0.5	26.0	IO	IO	IO	IO
	14:00	IO	IO	0.43	-0.1	-0.4	0.0	24.9	IO	IO	IO	IO
	15:00	IO	IO	0.43	-0.1	-0.6	0.2	24.7	IO	IO	IO	IO
	16:00	IO	IO	0.43	-0.2	-0.7	0.3	23.9	IO	IO	IO	IO
	17:00	IO	IO	0.42	-0.2	-1.0	0.7	23.6	IO	IO	IO	IO
	18:00	IO	IO	0.44	0.1	-0.8	0.3	23.4	IO	IO	IO	IO
	19:00	IO	IO	0.45	0.1	-0.9	0.0	20.5	IO	IO	IO	IO
	20:00	IO	IO	0.45	0.2	-1.4	0.5	19.4	IO	IO	IO	IO
	21:00	IO	IO	0.46	0.0	-1.5	0.6	20.3	IO	IO	IO	IO
	22:00	IO	IO	0.46	-0.1	-1.4	0.4	19.4	IO	IO	IO	IO
	23:00	IO	IO	0.47	-0.1	-1.1	0.1	18.2	IO	IO	IO	IO
	0:00	IO	IO	0.46	-0.1	ZS	ZS	20.0	IO	IO	IO	IO
Min		ID	ID	0.4	-0.2	-1.5	0.0	12.0	ID	ID	ID	ID
Max		ID	ID	0.5	3.2	-0.4	1.1	26.3	ID	ID	ID	ID
Average		ID	ID	0.4	0.2	-0.9	0.4	20.7	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
17/02/2022	1:00	IO	IO	0.46	-0.2	-1.1	0.6	19.4	IO	IO	IO	IO
	2:00	IO	IO	0.47	ZS	-1.4	0.9	18.2	IO	IO	IO	IO
	3:00	IO	IO	0.47	0.1	-1.0	0.3	17.4	IO	IO	IO	IO
	4:00	IO	IO	0.48	0.2	-0.7	0.2	25.5	IO	IO	IO	IO
	5:00	IO	IO	0.48	0.0	-0.8	0.6	24.0	IO	IO	IO	IO
	6:00	IO	IO	0.50	0.1	-0.7	0.6	18.2	IO	IO	IO	IO
	7:00	IO	IO	0.52	1.3	-0.4	0.1	15.2	IO	IO	IO	IO
	8:00	IO	IO	0.52	0.1	-0.6	0.4	18.5	IO	IO	IO	IO
	9:00	IO	IO	0.51	0.0	-0.9	0.5	24.4	IO	IO	IO	IO
	10:00	IO	IO	0.51	0.2	-0.8	0.2	26.8	IO	IO	IO	IO
	11:00	IO	IO	0.50	-0.1	-0.7	0.4	27.5	IO	IO	IO	IO
	12:00	IO	IO	0.59	0.3	-0.4	0.1	28.3	IO	IO	IO	IO
	13:00	IO	IO	0.56	0.5	-1.0	0.6	27.0	IO	IO	IO	IO
	14:00	IO	IO	0.58	1.4	-0.9	0.3	26.7	IO	IO	IO	IO
	15:00	IO	IO	0.58	0.9	-0.8	0.3	25.9	IO	IO	IO	IO
	16:00	IO	IO	0.64	3.6	-0.3	-0.1	21.4	IO	IO	IO	IO
	17:00	IO	IO	0.56	0.9	-0.8	0.3	22.7	IO	IO	IO	IO
	18:00	IO	IO	0.55	0.0	-0.8	0.1	23.6	IO	IO	IO	IO
	19:00	IO	IO	0.59	0.7	-0.7	0.2	20.8	IO	IO	IO	IO
	20:00	IO	IO	0.56	0.2	-0.7	0.2	18.0	IO	IO	IO	IO
	21:00	IO	IO	0.56	0.0	-0.7	0.3	18.0	IO	IO	IO	IO
	22:00	IO	IO	0.58	0.2	-1.0	0.4	17.7	IO	IO	IO	IO
	23:00	IO	IO	0.56	0.1	-0.9	0.5	17.5	IO	IO	IO	IO
	0:00	IO	IO	ZS	0.2	-0.9	0.2	16.6	IO	IO	IO	IO
Min		ID	ID	0.5	-0.2	-1.4	-0.1	15.2	ID	ID	ID	ID
Max		ID	ID	0.6	3.6	-0.3	0.9	28.3	ID	ID	ID	ID
Average		ID	ID	0.5	0.5	-0.8	0.3	21.6	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
18/02/2022	1:00	IO	IO	0.57	ZS	-0.9	-0.2	15.6	IO	IO	IO	IO
	2:00	IO	IO	0.60	1.1	ZS	ZS	11.1	IO	IO	IO	IO
	3:00	IO	IO	0.63	2.5	-1.0	1.2	3.3	IO	IO	IO	IO
	4:00	IO	IO	0.67	4.8	-0.2	0.6	3.9	IO	IO	IO	IO
	5:00	IO	IO	0.66	3.5	-0.9	0.7	6.2	IO	IO	IO	IO
	6:00	IO	IO	0.86	13.9	0.4	0.5	1.8	IO	IO	IO	IO
	7:00	IO	IO	0.85	4.2	2.6	-1.7	5.9	IO	IO	IO	IO
	8:00	IO	IO	0.66	1.0	0.5	-0.2	17.1	IO	IO	IO	IO
	9:00	IO	IO	0.64	0.4	-0.7	0.2	22.4	IO	IO	IO	IO
	10:00	IO	IO	0.62	0.2	-1.3	0.6	25.0	IO	IO	IO	IO
	11:00	IO	IO	0.65	1.0	-0.5	0.1	25.7	IO	IO	IO	IO
	12:00	IO	IO	0.63	1.7	-0.9	0.4	23.9	IO	IO	IO	IO
	13:00	IO	IO	0.62	0.2	-1.0	0.1	25.7	IO	IO	IO	IO
	14:00	IO	IO	0.65	0.4	-0.7	0.1	27.5	IO	IO	IO	IO
	15:00	IO	IO	0.65	0.7	-0.5	-0.2	24.3	IO	IO	IO	IO
	16:00	IO	IO	0.64	0.6	-0.7	0.0	23.4	IO	IO	IO	IO
	17:00	IO	IO	0.63	0.0	-0.5	-0.2	23.7	IO	IO	IO	IO
	18:00	IO	IO	0.64	0.5	-0.9	0.3	21.7	IO	IO	IO	IO
	19:00	IO	IO	0.65	0.2	-0.6	-0.3	17.8	IO	IO	IO	IO
	20:00	IO	IO	0.66	0.1	-1.1	0.2	16.2	IO	IO	IO	IO
	21:00	IO	IO	0.68	0.5	-1.0	0.4	15.8	IO	IO	IO	IO
	22:00	IO	IO	0.68	0.5	-0.9	0.5	15.6	IO	IO	IO	IO
	23:00	IO	IO	0.68	0.4	-0.7	0.0	16.3	IO	IO	IO	IO
	0:00	IO	IO	0.67	ZS	ZS	ZS	16.8	IO	IO	IO	IO
Min		ID	ID	0.6	0.0	-1.3	-1.7	1.8	ID	ID	ID	ID
Max		ID	ID	0.9	13.9	2.6	1.2	27.5	ID	ID	ID	ID
Average		ID	ID	0.7	1.7	-0.5	0.1	17.0	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
19/02/2022	1:00	IO	IO	0.67	0.3	ZS	ZS	15.3	IO	IO	IO	IO
	2:00	IO	IO	0.77	7.1	-0.5	0.3	8.1	IO	IO	IO	IO
	3:00	IO	IO	0.69	1.6	-0.9	0.6	12.8	IO	IO	IO	IO
	4:00	IO	IO	0.73	5.9	-0.7	0.6	10.0	IO	IO	IO	IO
	5:00	IO	IO	0.73	5.8	-0.2	0.0	12.5	IO	IO	IO	IO
	6:00	IO	IO	0.70	0.7	-0.7	0.6	16.1	IO	IO	IO	IO
	7:00	IO	IO	0.73	3.3	-0.8	0.8	12.3	IO	IO	IO	IO
	8:00	IO	IO	0.80	4.2	-0.7	0.4	15.8	IO	IO	IO	IO
	9:00	IO	IO	0.77	3.1	-0.4	0.1	20.7	IO	IO	IO	IO
	10:00	IO	IO	0.74	2.0	-0.5	-0.2	23.4	IO	IO	IO	IO
	11:00	IO	IO	0.72	0.5	-0.9	0.5	24.9	IO	IO	IO	IO
	12:00	IO	IO	0.75	2.1	-0.7	0.6	23.2	IO	IO	IO	IO
	13:00	IO	IO	0.76	2.4	-0.5	0.2	23.9	IO	IO	IO	IO
	14:00	IO	IO	0.77	3.7	-0.6	0.0	23.3	IO	IO	IO	IO
	15:00	IO	IO	0.74	1.4	-0.7	0.3	22.5	IO	IO	IO	IO
	16:00	IO	IO	0.74	0.7	-0.7	0.5	24.1	IO	IO	IO	IO
	17:00	IO	IO	0.76	0.7	-0.7	0.0	23.9	IO	IO	IO	IO
	18:00	IO	IO	0.74	0.0	-0.7	0.1	22.8	IO	IO	IO	IO
	19:00	IO	IO	0.74	0.0	-0.6	0.3	20.5	IO	IO	IO	IO
	20:00	IO	IO	0.76	0.2	-0.9	-0.1	17.4	IO	IO	IO	IO
	21:00	IO	IO	0.79	0.6	-0.9	0.3	15.5	IO	IO	IO	IO
	22:00	IO	IO	0.80	0.2	-0.5	0.3	15.4	IO	IO	IO	IO
	23:00	IO	IO	0.78	0.2	ZS	ZS	14.2	IO	IO	IO	IO
	0:00	IO	IO	0.77	0.1	ZS	ZS	15.1	IO	IO	IO	IO
Min		ID	ID	0.7	0.0	-0.9	-0.2	8.1	ID	ID	ID	ID
Max		ID	ID	0.8	7.1	-0.2	0.8	24.9	ID	ID	ID	ID
Average		ID	ID	0.7	1.9	-0.6	0.3	18.1	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
20/02/2022	1:00	IO	IO	0.77	0.1	-0.6	0.5	14.8	IO	IO	IO	IO
	2:00	IO	IO	0.78	ZS	-0.4	-0.2	13.8	IO	IO	IO	IO
	3:00	IO	IO	0.78	0.4	-0.4	0.2	15.2	IO	IO	IO	IO
	4:00	IO	IO	0.80	2.4	-0.5	0.5	12.6	IO	IO	IO	IO
	5:00	IO	IO	0.79	0.3	-0.4	0.3	17.5	IO	IO	IO	IO
	6:00	IO	IO	0.80	0.3	-0.4	0.0	13.4	IO	IO	IO	IO
	7:00	IO	IO	0.79	0.0	-0.6	0.0	19.8	IO	IO	IO	IO
	8:00	IO	IO	0.80	-0.1	-0.7	0.2	19.3	IO	IO	IO	IO
	9:00	IO	IO	0.81	-0.1	-1.0	0.5	19.9	IO	IO	IO	IO
	10:00	IO	IO	0.82	0.0	-1.3	0.8	20.8	IO	IO	IO	IO
	11:00	IO	IO	0.81	-0.1	-0.6	0.1	19.3	IO	IO	IO	IO
	12:00	IO	IO	0.84	1.3	-0.4	0.3	16.5	IO	IO	IO	IO
	13:00	IO	IO	GEN	GEN	2.5	0.4	13.4	IO	IO	IO	IO
	14:00	IO	IO	0.95	8.5	2.0	0.4	15.9	IO	IO	IO	IO
	15:00	IO	IO	0.95	6.6	1.3	0.2	16.1	IO	IO	IO	IO
	16:00	IO	IO	0.86	1.3	0.0	0.7	19.6	IO	IO	IO	IO
	17:00	IO	IO	0.93	4.7	1.4	0.4	16.1	IO	IO	IO	IO
	18:00	IO	IO	0.99	8.9	3.6	1.9	10.6	IO	IO	IO	IO
	19:00	IO	IO	0.89	1.3	0.2	0.7	13.8	IO	IO	IO	IO
	20:00	IO	IO	0.88	0.7	0.0	0.1	15.0	IO	IO	IO	IO
	21:00	IO	IO	0.87	0.5	0.0	0.2	14.4	IO	IO	IO	IO
	22:00	IO	IO	ZS	0.3	-0.1	0.3	14.4	IO	IO	IO	IO
	23:00	IO	IO	ZS	ZS	-0.1	0.2	13.7	IO	IO	IO	IO
	0:00	IO	IO	0.87	ZS	-0.7	0.1	13.5	IO	IO	IO	IO
Min		ID	ID	0.8	-0.1	-1.3	-0.2	10.6	ID	ID	ID	ID
Max		ID	ID	1.0	8.9	3.6	1.9	20.8	ID	ID	ID	ID
Average		ID	ID	0.8	1.9	0.1	0.4	15.8	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
21/02/2022	1:00	IO	IO	0.88	0.4	ZS	ZS	13.0	IO	IO	IO	IO
	2:00	IO	IO	0.88	0.4	-0.4	0.2	12.7	IO	IO	IO	IO
	3:00	IO	IO	0.92	1.7	-0.5	0.9	6.0	IO	IO	IO	IO
	4:00	IO	IO	0.90	0.6	-0.4	0.4	10.0	IO	IO	IO	IO
	5:00	IO	IO	0.89	0.0	-0.6	0.9	16.8	IO	IO	IO	IO
	6:00	IO	IO	0.96	3.5	-0.2	0.4	11.3	IO	IO	IO	IO
	7:00	IO	IO	GEN	GEN	0.9	1.0	6.3	IO	IO	IO	IO
	8:00	IO	IO	1.23	22.3	4.0	0.7	7.9	IO	IO	IO	IO
	9:00	IO	IO	0.95	1.2	0.7	-0.2	16.1	IO	IO	IO	IO
	10:00	IO	IO	0.96	2.7	0.4	-0.3	15.3	IO	IO	IO	IO
	11:00	IO	IO	0.92	0.3	-0.3	0.4	19.6	IO	IO	IO	IO
	12:00	IO	IO	0.92	-0.2	-0.4	0.2	20.1	IO	IO	IO	IO
	13:00	IO	IO	0.98	5.1	0.2	0.0	16.8	IO	IO	IO	IO
	14:00	IO	IO	1.01	8.6	0.9	0.7	15.4	IO	IO	IO	IO
	15:00	IO	IO	0.94	0.1	-0.2	0.7	18.9	IO	IO	IO	IO
	16:00	IO	IO	ZA	0.4	0.0	0.5	19.2	IO	IO	IO	IO
	17:00	IO	IO	ZA	0.2	0.0	0.2	18.8	IO	IO	IO	IO
	18:00	IO	IO	0.26	-0.2	-0.1	0.3	19.0	IO	IO	IO	IO
	19:00	IO	IO	0.28	0.0	-0.2	0.4	16.5	IO	IO	IO	IO
	20:00	IO	IO	0.33	2.4	0.0	0.2	11.2	IO	IO	IO	IO
	21:00	IO	IO	0.31	0.5	0.1	0.3	13.6	IO	IO	IO	IO
	22:00	IO	IO	0.31	0.0	-0.3	0.8	15.2	IO	IO	IO	IO
	23:00	IO	IO	0.31	0.1	-0.1	0.3	14.6	IO	IO	IO	IO
	0:00	IO	IO	0.32	-0.1	-0.3	0.3	17.2	IO	IO	IO	IO
Min		ID	ID	0.3	-0.2	-0.6	-0.3	6.0	ID	ID	ID	ID
Max		ID	ID	1.2	22.3	4.0	1.0	20.1	ID	ID	ID	ID
Average		ID	ID	0.7	2.2	0.1	0.4	14.6	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
22/02/2022	1:00	IO	IO	0.31	ZS	-0.2	0.4	16.9	IO	IO	IO	IO
	2:00	IO	IO	0.33	0.6	ZS	ZS	8.4	IO	IO	IO	IO
	3:00	IO	IO	0.37	0.9	0.2	0.3	10.1	IO	IO	IO	IO
	4:00	IO	IO	0.33	0.2	-0.2	0.3	13.1	IO	IO	IO	IO
	5:00	IO	IO	0.33	-0.1	-0.6	0.5	19.1	IO	IO	IO	IO
	6:00	IO	IO	0.34	0.4	-0.3	0.6	13.4	IO	IO	IO	IO
	7:00	IO	IO	0.57	2.9	-0.2	1.1	10.5	IO	IO	IO	IO
	8:00	IO	IO	0.47	9.5	0.4	0.2	9.4	IO	IO	IO	IO
	9:00	IO	IO	0.42	4.3	0.7	0.5	14.4	IO	IO	IO	IO
	10:00	IO	IO	0.37	0.1	0.2	0.4	21.1	IO	IO	IO	IO
	11:00	IO	IO	0.36	-0.1	0.1	0.3	23.1	IO	IO	IO	IO
	12:00	IO	IO	0.35	-0.1	0.1	-0.1	23.3	IO	IO	IO	IO
	13:00	IO	IO	0.36	-0.1	-0.1	0.1	22.4	IO	IO	IO	IO
	14:00	IO	IO	0.46	1.7	0.9	0.1	23.1	IO	IO	IO	IO
	15:00	IO	IO	0.42	0.1	0.3	-0.3	21.5	IO	IO	IO	IO
	16:00	IO	IO	0.39	-0.1	0.1	0.0	21.1	IO	IO	IO	IO
	17:00	IO	IO	0.39	0.1	-0.3	0.1	19.9	IO	IO	IO	IO
	18:00	IO	IO	0.38	0.0	-0.3	0.3	19.3	IO	IO	IO	IO
	19:00	IO	IO	0.40	0.8	-0.3	0.2	16.2	IO	IO	IO	IO
	20:00	IO	IO	0.50	6.1	0.0	0.3	9.9	IO	IO	IO	IO
	21:00	IO	IO	0.44	2.9	-0.1	0.5	12.4	IO	IO	IO	IO
	22:00	IO	IO	0.42	1.3	-0.1	0.4	12.6	IO	IO	IO	IO
	23:00	IO	IO	0.42	0.5	-0.2	0.4	12.0	IO	IO	IO	IO
	0:00	IO	IO	0.46	ZS	ZS	ZS	10.0	IO	IO	IO	IO
Min		ID	ID	0.3	-0.1	-0.6	-0.3	8.4	ID	ID	ID	ID
Max		ID	ID	0.6	9.5	0.9	1.1	23.3	ID	ID	ID	ID
Average		ID	ID	0.4	1.4	0.0	0.3	16.0	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
23/02/2022	1:00	IO	IO	ZS	2.2	ZS	ZS	5.7	IO	IO	IO	IO
	2:00	IO	IO	GEN	GEN	2.2	1.1	9.2	IO	IO	IO	IO
	3:00	IO	IO	0.52	11.0	4.2	0.7	17.3	IO	IO	IO	IO
	4:00	IO	IO	0.42	1.0	1.7	0.6	16.1	IO	IO	IO	IO
	5:00	IO	IO	0.46	1.9	1.0	0.5	16.9	IO	IO	IO	IO
	6:00	IO	IO	0.48	5.7	1.2	1.2	14.0	IO	IO	IO	IO
	7:00	IO	IO	0.50	3.4	0.8	1.1	11.5	IO	IO	IO	IO
	8:00	IO	IO	0.43	0.3	0.3	0.7	20.1	IO	IO	IO	IO
	9:00	IO	IO	0.49	3.5	0.3	0.7	17.4	IO	IO	IO	IO
	10:00	IO	IO	0.55	10.2	0.7	0.8	11.7	IO	IO	IO	IO
	11:00	IO	IO	0.54	7.0	1.1	1.7	13.2	IO	IO	IO	IO
	12:00	IO	IO	0.50	2.0	0.7	0.3	18.6	IO	IO	IO	IO
	13:00	IO	IO	0.46	0.1	0.2	0.3	20.9	IO	IO	IO	IO
	14:00	IO	IO	0.45	-0.2	0.1	0.3	21.0	IO	IO	IO	IO
	15:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	16:00	IO	IO	0.48	0.4	0.2	-0.2	20.7	IO	IO	IO	IO
	17:00	IO	IO	0.46	-0.3	0.0	0.0	20.4	IO	IO	IO	IO
	18:00	IO	IO	0.47	0.4	0.0	-0.1	17.2	IO	IO	IO	IO
	19:00	IO	IO	0.48	1.0	0.0	0.4	13.4	IO	IO	IO	IO
	20:00	IO	IO	0.51	0.9	0.0	0.4	14.4	IO	IO	IO	IO
	21:00	IO	IO	0.50	1.2	0.0	0.7	11.8	IO	IO	IO	IO
	22:00	IO	IO	0.54	2.0	0.1	0.5	10.6	IO	IO	IO	IO
	23:00	IO	IO	0.51	1.7	0.1	0.3	10.6	IO	IO	IO	IO
	0:00	IO	IO	0.56	2.7	ZS	ZS	10.1	IO	IO	IO	IO
Min		ID	ID	0.4	-0.3	0.0	-0.2	5.7	ID	ID	ID	ID
Max		ID	ID	0.6	11.0	4.2	1.7	21.0	ID	ID	ID	ID
Average		ID	ID	0.5	2.6	0.7	0.6	14.9	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
24/02/2022	1:00	IO	IO	0.51	1.5	-0.1	0.8	11.9	IO	IO	IO	IO
	2:00	IO	IO	0.52	ZS	-0.1	0.5	10.2	IO	IO	IO	IO
	3:00	IO	IO	0.52	0.1	0.0	0.3	10.1	IO	IO	IO	IO
	4:00	IO	IO	0.55	0.7	-0.1	0.1	8.8	IO	IO	IO	IO
	5:00	IO	IO	0.54	1.5	-0.2	1.0	8.7	IO	IO	IO	IO
	6:00	IO	IO	0.57	0.7	-0.1	0.7	7.9	IO	IO	IO	IO
	7:00	IO	IO	0.55	0.4	0.3	-0.1	13.8	IO	IO	IO	IO
	8:00	IO	IO	0.55	0.0	0.0	-0.3	15.5	IO	IO	IO	IO
	9:00	IO	IO	0.54	-0.2	-0.2	0.3	17.5	IO	IO	IO	IO
	10:00	IO	IO	0.54	-0.2	-0.2	0.1	17.3	IO	IO	IO	IO
	11:00	IO	IO	0.53	-0.1	-0.3	0.3	18.6	IO	IO	IO	IO
	12:00	IO	IO	0.54	-0.2	-0.4	0.0	19.3	IO	IO	IO	IO
	13:00	IO	IO	0.55	-0.2	-0.3	0.2	19.4	IO	IO	IO	IO
	14:00	IO	IO	0.54	0.0	-0.2	0.1	19.8	IO	IO	IO	IO
	15:00	IO	IO	0.55	-0.1	0.0	-0.3	19.6	IO	IO	IO	IO
	16:00	IO	IO	0.57	0.6	-0.3	0.3	18.8	IO	IO	IO	IO
	17:00	IO	IO	0.59	1.2	-0.2	0.3	17.5	IO	IO	IO	IO
	18:00	IO	IO	0.69	4.8	0.0	0.5	12.9	IO	IO	IO	IO
	19:00	IO	IO	0.57	0.0	-0.1	0.3	17.3	IO	IO	IO	IO
	20:00	IO	IO	0.59	0.2	-0.3	0.5	15.1	IO	IO	IO	IO
	21:00	IO	IO	0.62	1.4	0.1	0.2	10.8	IO	IO	IO	IO
	22:00	IO	IO	0.66	4.1	0.2	0.7	12.4	IO	IO	IO	IO
	23:00	IO	IO	0.59	0.0	-0.1	0.7	14.3	IO	IO	IO	IO
	0:00	IO	IO	0.60	0.0	-0.2	0.4	15.0	IO	IO	IO	IO
Min		ID	ID	0.5	-0.2	-0.4	-0.3	7.9	ID	ID	ID	ID
Max		ID	ID	0.7	4.8	0.3	1.0	19.8	ID	ID	ID	ID
Average		ID	ID	0.6	0.7	-0.1	0.3	14.7	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
25/02/2022	1:00	IO	IO	0.65	ZS	0.1	0.2	5.3	IO	IO	IO	IO
	2:00	IO	IO	0.68	4.9	ZS	ZS	3.7	IO	IO	IO	IO
	3:00	IO	IO	0.75	2.5	0.4	1.8	2.9	IO	IO	IO	IO
	4:00	IO	IO	0.79	2.4	0.0	0.9	3.0	IO	IO	IO	IO
	5:00	IO	IO	0.79	2.9	0.5	2.2	1.8	IO	IO	IO	IO
	6:00	IO	IO	0.75	3.1	0.2	0.9	5.6	IO	IO	IO	IO
	7:00	IO	IO	1.02	8.2	0.7	0.5	2.0	IO	IO	IO	IO
	8:00	IO	IO	1.03	6.3	0.9	0.6	3.7	IO	IO	IO	IO
	9:00	IO	IO	0.75	4.2	0.5	0.3	14.2	IO	IO	IO	IO
	10:00	IO	IO	0.66	0.7	0.1	0.6	19.1	IO	IO	IO	IO
	11:00	IO	IO	0.65	-0.2	0.2	-0.1	19.3	IO	IO	IO	IO
	12:00	IO	IO	0.65	-0.1	-0.2	0.1	19.1	IO	IO	IO	IO
	13:00	IO	IO	0.65	-0.1	-0.2	0.3	19.3	IO	IO	IO	IO
	14:00	IO	IO	0.65	-0.1	-0.1	0.2	19.0	IO	IO	IO	IO
	15:00	IO	IO	0.64	-0.2	-0.2	0.0	18.4	IO	IO	IO	IO
	16:00	IO	IO	0.65	-0.1	-0.2	0.2	18.3	IO	IO	IO	IO
	17:00	IO	IO	0.67	0.0	0.1	0.0	19.5	IO	IO	IO	IO
	18:00	IO	IO	0.66	-0.1	-0.3	0.4	17.9	IO	IO	IO	IO
	19:00	IO	IO	0.67	0.3	-0.3	0.3	15.6	IO	IO	IO	IO
	20:00	IO	IO	0.68	0.1	-0.2	0.5	13.6	IO	IO	IO	IO
	21:00	IO	IO	0.70	0.4	-0.1	0.0	11.5	IO	IO	IO	IO
	22:00	IO	IO	0.73	1.6	-0.2	0.5	10.6	IO	IO	IO	IO
	23:00	IO	IO	0.67	-0.3	-0.1	0.3	19.1	IO	IO	IO	IO
	0:00	IO	IO	0.68	ZS	-0.5	0.8	17.3	IO	IO	IO	IO
Min		ID	ID	0.6	-0.3	-0.5	-0.1	1.8	ID	ID	ID	ID
Max		ID	ID	1.0	8.2	0.9	2.2	19.5	ID	ID	ID	ID
Average		ID	ID	0.7	1.6	0.0	0.5	12.5	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
26/02/2022	1:00	IO	IO	0.67	0.0	ZS	ZS	16.7	IO	IO	IO	IO
	2:00	IO	IO	0.74	2.8	-0.1	0.8	9.6	IO	IO	IO	IO
	3:00	IO	IO	0.71	0.9	-0.1	0.7	10.1	IO	IO	IO	IO
	4:00	IO	IO	0.75	4.8	-0.1	0.9	7.7	IO	IO	IO	IO
	5:00	IO	IO	0.72	0.5	0.1	1.0	8.3	IO	IO	IO	IO
	6:00	IO	IO	0.89	7.5	0.3	0.7	2.5	IO	IO	IO	IO
	7:00	IO	IO	0.72	0.5	0.1	0.6	17.1	IO	IO	IO	IO
	8:00	IO	IO	0.72	-0.2	-0.2	0.3	20.9	IO	IO	IO	IO
	9:00	IO	IO	0.74	-0.2	-0.2	0.5	20.9	IO	IO	IO	IO
	10:00	IO	IO	0.73	-0.2	-0.3	0.4	20.4	IO	IO	IO	IO
	11:00	IO	IO	0.71	-0.2	-0.4	0.4	22.4	IO	IO	IO	IO
	12:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	13:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	14:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	15:00	IO	IO	1.01	-0.2	-0.5	0.4	21.5	IO	IO	IO	IO
	16:00	IO	IO	0.90	-0.2	-0.2	0.4	21.2	IO	IO	IO	IO
	17:00	IO	IO	0.88	-0.3	-0.2	0.0	20.5	IO	IO	IO	IO
	18:00	IO	IO	0.87	-0.1	-0.1	-0.1	20.4	IO	IO	IO	IO
	19:00	IO	IO	0.87	0.0	-0.1	-0.1	17.1	IO	IO	IO	IO
	20:00	IO	IO	0.86	0.1	-0.6	0.3	14.8	IO	IO	IO	IO
	21:00	IO	IO	0.86	0.1	-0.2	0.5	15.1	IO	IO	IO	IO
	22:00	IO	IO	0.86	0.4	-0.3	0.5	15.8	IO	IO	IO	IO
	23:00	IO	IO	0.87	0.9	-0.1	0.1	15.7	IO	IO	IO	IO
	0:00	IO	IO	ZS	1.7	ZS	ZS	13.9	IO	IO	IO	IO
Min		ID	ID	0.7	-0.3	-0.6	-0.1	2.5	ID	ID	ID	ID
Max		ID	ID	1.0	7.5	0.3	1.0	22.4	ID	ID	ID	ID
Average		ID	ID	0.8	0.9	-0.2	0.4	15.8	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
27/02/2022	1:00	IO	IO	ZS	ZS	0.2	0.3	7.7	IO	IO	IO	IO
	2:00	IO	IO	0.97	ZS	0.2	1.3	2.1	IO	IO	IO	IO
	3:00	IO	IO	0.95	5.2	0.0	1.4	2.8	IO	IO	IO	IO
	4:00	IO	IO	0.90	3.6	0.2	0.2	7.0	IO	IO	IO	IO
	5:00	IO	IO	0.92	2.3	0.1	1.1	3.0	IO	IO	IO	IO
	6:00	IO	IO	0.91	1.0	0.3	0.9	2.4	IO	IO	IO	IO
	7:00	IO	IO	0.97	1.4	0.3	0.9	6.4	IO	IO	IO	IO
	8:00	IO	IO	0.89	0.2	0.2	0.1	16.7	IO	IO	IO	IO
	9:00	IO	IO	0.89	-0.1	-0.5	0.5	21.5	IO	IO	IO	IO
	10:00	IO	IO	0.88	-0.2	-0.4	0.5	23.5	IO	IO	IO	IO
	11:00	IO	IO	0.88	-0.2	-0.4	0.5	23.6	IO	IO	IO	IO
	12:00	IO	IO	0.87	-0.2	-0.2	0.4	24.2	IO	IO	IO	IO
	13:00	IO	IO	0.87	-0.2	-0.2	0.0	23.7	IO	IO	IO	IO
	14:00	IO	IO	0.88	-0.1	-0.1	0.2	22.2	IO	IO	IO	IO
	15:00	IO	IO	0.88	-0.1	-0.3	0.5	22.5	IO	IO	IO	IO
	16:00	IO	IO	0.87	-0.1	-0.2	0.2	21.7	IO	IO	IO	IO
	17:00	IO	IO	0.88	0.0	-0.1	0.2	21.6	IO	IO	IO	IO
	18:00	IO	IO	0.91	0.0	0.1	0.2	20.7	IO	IO	IO	IO
	19:00	IO	IO	0.88	-0.1	-0.1	0.2	18.4	IO	IO	IO	IO
	20:00	IO	IO	0.90	0.4	-0.1	0.4	14.5	IO	IO	IO	IO
	21:00	IO	IO	0.90	0.2	0.2	0.3	13.3	IO	IO	IO	IO
	22:00	IO	IO	ZS	0.2	-0.4	0.7	16.5	IO	IO	IO	IO
	23:00	IO	IO	ZS	ZS	0.0	0.4	15.6	IO	IO	IO	IO
	0:00	IO	IO	ZS	ZS	-0.4	0.8	10.2	IO	IO	IO	IO
Min		ID	ID	0.9	-0.2	-0.5	0.0	2.1	ID	ID	ID	ID
Max		ID	ID	1.0	5.2	0.3	1.4	24.2	ID	ID	ID	ID
Average		ID	ID	0.9	0.7	-0.1	0.5	15.1	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
28/02/2022	1:00	IO	IO	0.97	1.4	ZS	ZS	5.2	IO	IO	IO	IO
	2:00	IO	IO	1.14	1.3	-0.1	1.5	2.6	IO	IO	IO	IO
	3:00	IO	IO	1.17	2.3	0.0	1.6	1.8	IO	IO	IO	IO
	4:00	IO	IO	1.31	ZS	0.6	0.9	1.7	IO	IO	IO	IO
	5:00	IO	IO	1.27	3.5	ZS	ZS	4.0	IO	IO	IO	IO
	6:00	IO	IO	GEN	GEN	1.4	0.2	5.8	IO	IO	IO	IO
	7:00	IO	IO	1.39	40.5	5.5	1.4	8.9	IO	IO	IO	IO
	8:00	IO	IO	GEN	GEN	7.1	0.9	12.6	IO	IO	IO	IO
	9:00	IO	IO	GEN	GEN	8.2	1.1	14.3	IO	IO	IO	IO
	10:00	IO	IO	1.12	20.7	5.9	0.6	19.0	IO	IO	IO	IO
	11:00	IO	IO	0.96	0.5	3.8	-0.2	24.3	IO	IO	IO	IO
	12:00	IO	IO	0.94	0.1	2.2	0.1	24.5	IO	IO	IO	IO
	13:00	IO	IO	ZA	0.0	1.3	0.3	23.4	IO	IO	IO	IO
	14:00	IO	IO	ZA	-0.1	1.1	0.3	23.4	IO	IO	IO	IO
	15:00	IO	IO	0.23	-0.1	0.6	0.4	22.8	IO	IO	IO	IO
	16:00	IO	IO	0.23	0.0	0.6	-0.1	23.1	IO	IO	IO	IO
	17:00	IO	IO	0.24	0.0	0.6	0.3	22.9	IO	IO	IO	IO
	18:00	IO	IO	0.26	0.0	0.7	0.1	21.8	IO	IO	IO	IO
	19:00	IO	IO	0.27	0.1	0.1	0.4	17.5	IO	IO	IO	IO
	20:00	IO	IO	0.29	0.3	0.1	0.7	14.9	IO	IO	IO	IO
	21:00	IO	IO	0.34	0.7	0.4	0.6	12.3	IO	IO	IO	IO
	22:00	IO	IO	0.30	1.0	0.3	0.4	12.1	IO	IO	IO	IO
	23:00	IO	IO	0.29	0.7	0.2	0.5	12.7	IO	IO	IO	IO
	0:00	IO	IO	0.30	1.8	0.3	0.4	11.2	IO	IO	IO	IO
Min		ID	ID	0.2	-0.1	-0.1	-0.2	1.7	ID	ID	ID	ID
Max		ID	ID	1.4	40.5	8.2	1.6	24.5	ID	ID	ID	ID
Average		ID	ID	0.7	3.7	1.9	0.6	14.3	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
01/03/2022	1:00	IO	IO	0.39	ZS	0.6	0.7	6.3	IO	IO	IO	IO
	2:00	IO	IO	0.30	1.9	ZS	ZS	10.3	IO	IO	IO	IO
	3:00	IO	IO	0.48	3.5	0.3	0.8	3.3	IO	IO	IO	IO
	4:00	IO	IO	0.45	3.4	0.6	0.7	1.6	IO	IO	IO	IO
	5:00	IO	IO	0.71	2.6	0.8	1.4	2.0	IO	IO	IO	IO
	6:00	IO	IO	1.51	2.7	1.3	0.8	3.3	IO	IO	IO	IO
	7:00	IO	IO	0.99	6.0	1.0	1.2	3.2	IO	IO	IO	IO
	8:00	IO	IO	GEN	GEN	2.6	0.9	5.6	IO	IO	IO	IO
	9:00	IO	IO	0.43	6.0	1.9	0.5	14.7	IO	IO	IO	IO
	10:00	IO	IO	0.37	4.6	1.5	0.6	18.5	IO	IO	IO	IO
	11:00	IO	IO	0.32	0.2	0.4	0.5	23.3	IO	IO	IO	IO
	12:00	IO	IO	0.32	0.2	0.0	0.5	23.0	IO	IO	IO	IO
	13:00	IO	IO	0.33	0.3	0.2	0.2	21.9	IO	IO	IO	IO
	14:00	IO	IO	0.32	0.0	0.0	0.6	21.4	IO	IO	IO	IO
	15:00	IO	IO	0.34	0.9	1.0	0.7	20.6	IO	IO	IO	IO
	16:00	IO	IO	0.33	0.1	0.6	0.0	20.3	IO	IO	IO	IO
	17:00	IO	IO	0.35	0.1	0.1	0.2	19.5	IO	IO	IO	IO
	18:00	IO	IO	0.39	0.6	0.3	-0.1	19.1	IO	IO	IO	IO
	19:00	IO	IO	0.38	0.2	0.3	0.2	16.6	IO	IO	IO	IO
	20:00	IO	IO	0.39	0.3	0.0	0.4	13.1	IO	IO	IO	IO
	21:00	IO	IO	0.38	0.7	0.4	0.1	11.8	IO	IO	IO	IO
	22:00	IO	IO	0.37	0.6	-0.2	0.5	11.3	IO	IO	IO	IO
	23:00	IO	IO	0.37	0.5	-0.2	0.7	10.0	IO	IO	IO	IO
	0:00	IO	IO	0.38	ZS	ZS	ZS	9.0	IO	IO	IO	IO
Min		ID	ID	0.3	0.0	-0.2	-0.1	1.6	ID	ID	ID	ID
Max		ID	ID	1.5	6.0	2.6	1.4	23.3	ID	ID	ID	ID
Average		ID	ID	0.5	1.7	0.6	0.5	12.9	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
02/03/2022	1:00	IO	IO	0.40	1.4	ZS	ZS	6.1	IO	IO	IO	IO
	2:00	IO	IO	ZS	2.2	0.2	0.9	1.9	IO	IO	IO	IO
	3:00	IO	IO	0.48	1.4	0.3	0.8	2.5	IO	IO	IO	IO
	4:00	IO	IO	0.51	1.5	0.5	0.8	1.9	IO	IO	IO	IO
	5:00	IO	IO	0.60	2.9	0.7	0.9	1.6	IO	IO	IO	IO
	6:00	IO	IO	0.72	2.0	0.6	1.0	1.6	IO	IO	IO	IO
	7:00	IO	IO	1.15	2.9	1.1	1.1	2.4	IO	IO	IO	IO
	8:00	IO	IO	0.88	7.2	1.0	0.7	3.5	IO	IO	IO	IO
	9:00	IO	IO	0.46	0.8	0.9	0.5	12.7	IO	IO	IO	IO
	10:00	IO	IO	0.44	0.1	0.1	0.4	14.4	IO	IO	IO	IO
	11:00	IO	IO	0.46	2.5	0.2	0.3	14.3	IO	IO	IO	IO
	12:00	IO	IO	0.46	4.2	0.6	0.6	15.0	IO	IO	IO	IO
	13:00	IO	IO	0.43	-0.1	0.0	0.5	16.3	IO	IO	IO	IO
	14:00	IO	IO	0.44	-0.1	-0.3	0.6	16.5	IO	IO	IO	IO
	15:00	IO	IO	0.45	0.0	-0.2	0.2	16.4	IO	IO	IO	IO
	16:00	IO	IO	0.49	0.6	0.3	1.0	16.0	IO	IO	IO	IO
	17:00	IO	IO	0.46	0.2	-0.1	0.6	15.3	IO	IO	IO	IO
	18:00	IO	IO	0.47	0.1	0.0	0.0	14.6	IO	IO	IO	IO
	19:00	IO	IO	0.49	0.6	-0.2	0.3	13.5	IO	IO	IO	IO
	20:00	IO	IO	0.51	0.9	0.2	0.0	11.1	IO	IO	IO	IO
	21:00	IO	IO	0.48	0.2	0.1	0.4	9.7	IO	IO	IO	IO
	22:00	IO	IO	0.47	-0.2	-0.2	0.2	14.0	IO	IO	IO	IO
	23:00	IO	IO	0.47	-0.2	ZS	ZS	13.4	IO	IO	IO	IO
	0:00	IO	IO	ZS	0.2	ZS	ZS	10.4	IO	IO	IO	IO
Min		ID	ID	0.4	-0.2	-0.3	0.0	1.6	ID	ID	ID	ID
Max		ID	ID	1.1	7.2	1.1	1.1	16.5	ID	ID	ID	ID
Average		ID	ID	0.5	1.3	0.3	0.6	10.2	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
03/03/2022	1:00	IO	IO	0.51	ZS	-0.1	0.5	8.9	IO	IO	IO	IO
	2:00	IO	IO	0.49	ZS	-0.2	0.5	9.6	IO	IO	IO	IO
	3:00	IO	IO	0.59	9.1	0.5	0.8	7.0	IO	IO	IO	IO
	4:00	IO	IO	0.52	0.7	-0.1	1.1	9.3	IO	IO	IO	IO
	5:00	IO	IO	0.50	-0.1	-0.3	0.2	12.9	IO	IO	IO	IO
	6:00	IO	IO	0.51	0.0	-0.4	0.3	11.1	IO	IO	IO	IO
	7:00	IO	IO	0.52	0.0	-0.8	0.6	11.8	IO	IO	IO	IO
	8:00	IO	IO	0.53	-0.1	-0.5	0.4	14.0	IO	IO	IO	IO
	9:00	IO	IO	0.53	-0.2	-0.3	0.2	13.9	IO	IO	IO	IO
	10:00	IO	IO	0.53	-0.2	-0.7	0.2	14.0	IO	IO	IO	IO
	11:00	IO	IO	0.53	-0.2	-0.5	0.2	15.5	IO	IO	IO	IO
	12:00	IO	IO	0.53	-0.2	-0.9	0.7	15.4	IO	IO	IO	IO
	13:00	IO	IO	0.53	-0.2	-1.1	0.5	15.5	IO	IO	IO	IO
	14:00	IO	IO	0.54	-0.2	-1.0	0.5	14.7	IO	IO	IO	IO
	15:00	IO	IO	0.53	-0.2	-1.0	0.1	14.5	IO	IO	IO	IO
	16:00	IO	IO	0.54	-0.2	-1.1	0.5	14.8	IO	IO	IO	IO
	17:00	IO	IO	0.54	-0.3	-1.1	0.3	14.0	IO	IO	IO	IO
	18:00	IO	IO	0.55	-0.2	-0.9	0.2	11.8	IO	IO	IO	IO
	19:00	IO	IO	0.54	-0.3	-0.8	0.1	11.3	IO	IO	IO	IO
	20:00	IO	IO	0.55	-0.2	-0.5	0.5	11.3	IO	IO	IO	IO
	21:00	IO	IO	0.56	0.1	-0.2	0.3	9.4	IO	IO	IO	IO
	22:00	IO	IO	0.55	-0.2	-0.1	0.0	11.0	IO	IO	IO	IO
	23:00	IO	IO	0.55	-0.1	-0.4	0.4	11.0	IO	IO	IO	IO
	0:00	IO	IO	ZS	ZS	-0.3	0.4	10.7	IO	IO	IO	IO
Min		ID	ID	0.5	-0.3	-1.1	0.0	7.0	ID	ID	ID	ID
Max		ID	ID	0.6	9.1	0.5	1.1	15.5	ID	ID	ID	ID
Average		ID	ID	0.5	0.3	-0.5	0.4	12.2	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
04/03/2022	1:00	IO	IO	0.59	ZS	-0.2	0.4	7.8	IO	IO	IO	IO
	2:00	IO	IO	0.67	9.1	ZS	ZS	11.2	IO	IO	IO	IO
	3:00	IO	IO	0.56	-0.2	-0.3	0.5	17.4	IO	IO	IO	IO
	4:00	IO	IO	0.55	-0.3	-0.4	0.3	17.6	IO	IO	IO	IO
	5:00	IO	IO	0.57	0.5	-0.4	0.7	14.5	IO	IO	IO	IO
	6:00	IO	IO	0.58	0.6	-0.2	0.4	15.1	IO	IO	IO	IO
	7:00	IO	IO	0.59	0.2	-0.3	0.4	15.8	IO	IO	IO	IO
	8:00	IO	IO	0.58	-0.2	-0.2	0.4	17.0	IO	IO	IO	IO
	9:00	IO	IO	0.58	-0.3	0.1	-0.1	19.6	IO	IO	IO	IO
	10:00	IO	IO	0.58	-0.2	-0.3	0.5	22.2	IO	IO	IO	IO
	11:00	IO	IO	0.59	-0.2	-0.3	0.5	21.7	IO	IO	IO	IO
	12:00	IO	IO	0.59	-0.2	-0.4	0.2	22.1	IO	IO	IO	IO
	13:00	IO	IO	0.60	-0.2	-0.3	0.1	21.5	IO	IO	IO	IO
	14:00	IO	IO	0.60	-0.2	-0.5	0.4	22.1	IO	IO	IO	IO
	15:00	IO	IO	0.60	-0.1	0.0	0.2	22.1	IO	IO	IO	IO
	16:00	IO	IO	0.60	-0.1	-0.5	0.2	22.5	IO	IO	IO	IO
	17:00	IO	IO	0.60	-0.2	-0.5	0.4	22.4	IO	IO	IO	IO
	18:00	IO	IO	0.61	-0.1	-0.7	0.4	22.8	IO	IO	IO	IO
	19:00	IO	IO	0.63	0.1	-0.6	0.2	20.9	IO	IO	IO	IO
	20:00	IO	IO	0.61	-0.1	-0.4	0.6	19.8	IO	IO	IO	IO
	21:00	IO	IO	0.61	-0.1	-0.6	0.7	19.2	IO	IO	IO	IO
	22:00	IO	IO	0.62	-0.1	-0.5	0.4	17.5	IO	IO	IO	IO
	23:00	IO	IO	0.63	ZS	-0.4	0.4	15.8	IO	IO	IO	IO
	0:00	IO	IO	0.66	ZS	ZS	ZS	10.5	IO	IO	IO	IO
Min		ID	ID	0.6	-0.3	-0.7	-0.1	7.8	ID	ID	ID	ID
Max		ID	ID	0.7	9.1	0.1	0.7	22.8	ID	ID	ID	ID
Average		ID	ID	0.6	0.4	-0.4	0.4	18.3	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
05/03/2022	1:00	IO	IO	0.66	0.7	ZS	ZS	8.8	IO	IO	IO	IO
	2:00	IO	IO	0.64	0.4	-0.2	0.6	6.7	IO	IO	IO	IO
	3:00	IO	IO	0.65	0.6	-0.3	0.6	9.0	IO	IO	IO	IO
	4:00	IO	IO	0.66	0.9	-0.2	1.1	5.8	IO	IO	IO	IO
	5:00	IO	IO	0.67	1.3	-0.1	0.9	3.2	IO	IO	IO	IO
	6:00	IO	IO	0.76	2.2	0.1	0.8	2.0	IO	IO	IO	IO
	7:00	IO	IO	0.86	1.7	0.5	1.2	2.0	IO	IO	IO	IO
	8:00	IO	IO	0.82	2.2	0.2	1.1	6.6	IO	IO	IO	IO
	9:00	IO	IO	0.68	-0.1	0.1	0.5	15.5	IO	IO	IO	IO
	10:00	IO	IO	0.67	-0.1	-0.2	0.0	20.3	IO	IO	IO	IO
	11:00	IO	IO	0.67	-0.2	-0.2	0.1	22.5	IO	IO	IO	IO
	12:00	IO	IO	0.66	0.1	-0.3	0.2	22.8	IO	IO	IO	IO
	13:00	IO	IO	0.66	-0.2	-0.2	0.1	23.5	IO	IO	IO	IO
	14:00	IO	IO	0.69	-0.1	-0.3	0.6	22.3	IO	IO	IO	IO
	15:00	IO	IO	0.70	-0.2	-0.1	-0.1	20.6	IO	IO	IO	IO
	16:00	IO	IO	0.69	-0.1	-0.4	0.2	19.4	IO	IO	IO	IO
	17:00	IO	IO	0.69	-0.2	-0.3	0.1	19.4	IO	IO	IO	IO
	18:00	IO	IO	0.69	-0.2	-0.4	0.4	20.3	IO	IO	IO	IO
	19:00	IO	IO	0.70	-0.1	-0.2	0.3	18.8	IO	IO	IO	IO
	20:00	IO	IO	0.70	-0.1	-0.3	0.2	16.1	IO	IO	IO	IO
	21:00	IO	IO	0.71	0.0	-0.2	0.1	15.1	IO	IO	IO	IO
	22:00	IO	IO	0.73	0.2	-0.4	0.5	12.1	IO	IO	IO	IO
	23:00	IO	IO	0.75	0.6	ZS	ZS	9.1	IO	IO	IO	IO
	0:00	IO	IO	ZS	0.3	ZS	ZS	8.7	IO	IO	IO	IO
Min		ID	ID	0.6	-0.2	-0.4	-0.1	2.0	ID	ID	ID	ID
Max		ID	ID	0.9	2.2	0.5	1.2	23.5	ID	ID	ID	ID
Average		ID	ID	0.7	0.4	-0.2	0.4	13.8	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
06/03/2022	1:00	IO	IO	0.75	0.9	-0.3	0.4	7.6	IO	IO	IO	IO
	2:00	IO	IO	0.76	ZS	-0.1	0.7	5.4	IO	IO	IO	IO
	3:00	IO	IO	0.78	1.3	0.0	0.6	5.9	IO	IO	IO	IO
	4:00	IO	IO	0.77	1.1	0.0	0.4	5.9	IO	IO	IO	IO
	5:00	IO	IO	0.93	2.6	-0.3	0.9	5.6	IO	IO	IO	IO
	6:00	IO	IO	0.90	4.4	0.1	0.2	4.6	IO	IO	IO	IO
	7:00	IO	IO	0.94	4.5	0.3	0.2	6.0	IO	IO	IO	IO
	8:00	IO	IO	0.94	13.1	2.6	0.7	8.2	IO	IO	IO	IO
	9:00	IO	IO	GEN	GEN	6.7	-1.3	11.2	IO	IO	IO	IO
	10:00	IO	IO	0.87	7.9	3.7	0.2	13.0	IO	IO	IO	IO
	11:00	IO	IO	0.77	0.2	0.6	0.5	17.7	IO	IO	IO	IO
	12:00	IO	IO	0.77	-0.2	0.5	0.1	17.6	IO	IO	IO	IO
	13:00	IO	IO	0.77	-0.2	0.3	0.0	17.7	IO	IO	IO	IO
	14:00	IO	IO	0.79	0.2	0.0	0.0	17.9	IO	IO	IO	IO
	15:00	IO	IO	0.82	1.9	0.0	0.3	17.7	IO	IO	IO	IO
	16:00	IO	IO	0.82	2.6	0.4	0.0	17.3	IO	IO	IO	IO
	17:00	IO	IO	0.86	5.9	0.4	0.5	13.7	IO	IO	IO	IO
	18:00	IO	IO	0.78	0.0	0.3	0.0	18.8	IO	IO	IO	IO
	19:00	IO	IO	0.79	-0.1	0.1	0.2	15.8	IO	IO	IO	IO
	20:00	IO	IO	0.90	2.8	-0.2	0.5	12.2	IO	IO	IO	IO
	21:00	IO	IO	0.80	-0.1	-0.8	0.4	17.3	IO	IO	IO	IO
	22:00	IO	IO	0.80	-0.2	-0.6	0.6	18.1	IO	IO	IO	IO
	23:00	IO	IO	0.80	-0.3	-0.6	0.3	19.7	IO	IO	IO	IO
	0:00	IO	IO	0.79	ZS	ZS	ZS	19.7	IO	IO	IO	IO
Min		ID	ID	0.8	-0.3	-0.8	-1.3	4.6	ID	ID	ID	ID
Max		ID	ID	0.9	13.1	6.7	0.9	19.7	ID	ID	ID	ID
Average		ID	ID	0.8	2.3	0.6	0.3	13.1	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
07/03/2022	1:00	IO	IO	0.79	-0.2	ZS	ZS	20.4	IO	IO	IO	IO
	2:00	IO	IO	0.79	-0.2	-0.5	0.5	19.5	IO	IO	IO	IO
	3:00	IO	IO	0.79	-0.2	ZS	ZS	17.5	IO	IO	IO	IO
	4:00	IO	IO	0.81	0.6	-0.6	0.7	12.0	IO	IO	IO	IO
	5:00	IO	IO	0.85	7.1	ZS	ZS	11.7	IO	IO	IO	IO
	6:00	IO	IO	0.81	-0.1	-0.5	0.6	16.0	IO	IO	IO	IO
	7:00	IO	IO	1.27	33.0	2.5	0.9	10.9	IO	IO	IO	IO
	8:00	IO	IO	0.93	8.5	2.6	-0.2	14.5	IO	IO	IO	IO
	9:00	IO	IO	0.90	7.0	1.2	0.4	18.6	IO	IO	IO	IO
	10:00	IO	IO	0.97	13.0	3.4	-0.2	19.4	IO	IO	IO	IO
	11:00	IO	IO	0.84	-0.2	0.6	0.0	21.3	IO	IO	IO	IO
	12:00	IO	IO	0.84	-0.1	0.6	0.0	22.3	IO	IO	IO	IO
	13:00	IO	IO	0.85	CAL	0.2	0.5	21.3	IO	IO	IO	IO
	14:00	IO	IO	0.83	CAL	0.2	0.3	21.0	IO	IO	IO	IO
	15:00	IO	IO	0.84	CAL	0.0	0.2	12.6	IO	IO	IO	IO
	16:00	IO	IO	CAL	CAL	0.2	0.1	8.7	IO	IO	IO	IO
	17:00	IO	IO	CAL	-0.2	0.1	0.2	12.4	IO	IO	IO	IO
	18:00	IO	IO	CAL	-0.1	0.2	-0.1	11.5	IO	IO	IO	IO
	19:00	IO	IO	0.55	0.6	-0.3	0.5	11.5	IO	IO	IO	IO
	20:00	IO	IO	0.56	0.6	0.0	0.1	11.3	IO	IO	IO	IO
	21:00	IO	IO	0.57	0.3	0.0	0.6	11.1	IO	IO	IO	IO
	22:00	IO	IO	0.58	0.9	-0.1	0.6	9.8	IO	IO	IO	IO
	23:00	IO	IO	0.57	0.0	0.1	-0.4	10.6	IO	IO	IO	IO
	0:00	IO	IO	0.57	0.1	-0.4	0.4	9.3	IO	IO	IO	IO
Min		ID	ID	0.6	-0.2	-0.6	-0.4	8.7	ID	ID	ID	ID
Max		ID	ID	1.3	33.0	3.4	0.9	22.3	ID	ID	ID	ID
Average		ID	ID	0.8	3.5	0.4	0.3	14.8	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
08/03/2022	1:00	IO	IO	0.57	ZS	-0.1	0.1	10.9	IO	IO	IO	IO
	2:00	IO	IO	0.57	0.1	ZS	ZS	11.0	IO	IO	IO	IO
	3:00	IO	IO	0.57	0.1	-0.4	0.7	11.9	IO	IO	IO	IO
	4:00	IO	IO	0.59	0.5	0.1	0.2	11.7	IO	IO	IO	IO
	5:00	IO	IO	0.59	0.3	0.0	0.4	11.4	IO	IO	IO	IO
	6:00	IO	IO	0.63	1.6	-0.1	0.3	11.6	IO	IO	IO	IO
	7:00	IO	IO	0.70	3.0	-0.1	0.9	10.2	IO	IO	IO	IO
	8:00	IO	IO	0.64	0.7	-0.1	0.4	9.0	IO	IO	IO	IO
	9:00	IO	IO	0.61	-0.1	-0.4	0.2	9.3	IO	IO	IO	IO
	10:00	IO	IO	0.61	0.0	-0.7	0.5	9.5	IO	IO	IO	IO
	11:00	IO	IO	0.60	CAL	-1.1	0.6	8.8	IO	IO	IO	IO
	12:00	IO	IO	0.61	CAL	-1.1	0.4	10.9	IO	IO	IO	IO
	13:00	IO	IO	0.62	CAL	-0.9	0.3	9.8	IO	IO	IO	IO
	14:00	IO	IO	0.61	CAL	-1.0	0.2	10.5	IO	IO	IO	IO
	15:00	IO	IO	CAL	0.2	-0.9	0.1	9.4	IO	IO	IO	IO
	16:00	IO	IO	CAL	0.1	CAL	CAL	7.7	IO	IO	IO	IO
	17:00	IO	IO	0.26	0.0	CAL	CAL	7.0	IO	IO	IO	IO
	18:00	IO	IO	0.26	0.0	CAL	CAL	7.3	IO	IO	IO	IO
	19:00	IO	IO	0.26	0.1	-0.5	0.4	8.2	IO	IO	IO	IO
	20:00	IO	IO	0.27	0.2	-0.4	0.2	7.7	IO	IO	IO	IO
	21:00	IO	IO	0.28	0.5	-0.7	0.3	7.4	IO	IO	IO	IO
	22:00	IO	IO	0.32	1.2	-1.0	0.6	6.9	IO	IO	IO	IO
	23:00	IO	IO	0.30	0.6	-1.0	0.4	6.2	IO	IO	IO	IO
	0:00	IO	IO	0.29	ZS	ZS	ZS	8.3	IO	IO	IO	IO
Min		ID	ID	0.3	-0.1	-1.1	0.1	6.2	ID	ID	ID	ID
Max		ID	ID	0.7	3.0	0.1	0.9	11.9	ID	ID	ID	ID
Average		ID	ID	0.5	0.5	-0.5	0.4	9.3	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
09/03/2022	1:00	IO	IO	0.28	0.1	ZS	ZS	8.8	IO	IO	IO	IO
	2:00	IO	IO	ZS	0.2	-1.0	0.4	9.9	IO	IO	IO	IO
	3:00	IO	IO	0.29	0.9	-0.8	0.0	10.3	IO	IO	IO	IO
	4:00	IO	IO	0.32	3.3	-0.4	0.3	8.5	IO	IO	IO	IO
	5:00	IO	IO	0.29	0.0	-0.7	0.1	9.3	IO	IO	IO	IO
	6:00	IO	IO	0.29	0.2	-1.1	0.5	9.7	IO	IO	IO	IO
	7:00	IO	IO	0.31	0.4	-0.9	0.4	9.3	IO	IO	IO	IO
	8:00	IO	IO	0.31	0.5	-0.9	0.3	9.5	IO	IO	IO	IO
	9:00	IO	IO	0.31	0.2	-1.0	0.8	9.8	IO	IO	IO	IO
	10:00	IO	IO	0.32	0.5	-1.0	0.3	10.0	IO	IO	IO	IO
	11:00	IO	IO	0.32	0.3	-0.8	0.5	9.4	IO	IO	IO	IO
	12:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	13:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	14:00	IO	IO	0.33	0.1	CAL	CAL	7.7	IO	IO	IO	IO
	15:00	IO	IO	0.32	-0.1	CAL	CAL	8.2	IO	IO	IO	IO
	16:00	IO	IO	0.32	-0.1	CAL	CAL	7.1	IO	IO	IO	IO
	17:00	IO	IO	0.32	-0.1	-1.2	0.8	7.7	IO	IO	IO	IO
	18:00	IO	IO	0.33	-0.1	-1.2	0.7	7.3	IO	IO	IO	IO
	19:00	IO	IO	0.37	1.0	-1.0	0.6	6.7	IO	IO	IO	IO
	20:00	IO	IO	0.44	1.8	-0.8	0.8	6.2	IO	IO	IO	IO
	21:00	IO	IO	0.42	4.9	-0.1	0.4	6.8	IO	IO	IO	IO
	22:00	IO	IO	0.36	0.9	-0.6	1.0	8.3	IO	IO	IO	IO
	23:00	IO	IO	0.41	5.1	-0.5	0.9	9.4	IO	IO	IO	IO
	0:00	IO	IO	0.42	4.7	ZS	ZS	7.0	IO	IO	IO	IO
Min		ID	ID	0.3	-0.1	ID	ID	6.2	ID	ID	ID	ID
Max		ID	ID	0.4	5.1	ID	ID	10.3	ID	ID	ID	ID
Average		ID	ID	0.3	1.1	ID	ID	8.5	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
10/03/2022	1:00	IO	IO	0.55	3.3	-0.2	1.7	7.1	IO	IO	IO	IO
	2:00	IO	IO	0.51	ZS	0.9	1.4	7.6	IO	IO	IO	IO
	3:00	IO	IO	GEN	GEN	5.5	0.6	6.3	IO	IO	IO	IO
	4:00	IO	IO	0.45	6.7	1.5	0.8	12.5	IO	IO	IO	IO
	5:00	IO	IO	0.52	14.5	1.3	1.1	12.9	IO	IO	IO	IO
	6:00	IO	IO	0.44	5.4	1.0	0.9	11.1	IO	IO	IO	IO
	7:00	IO	IO	GEN	GEN	2.2	1.1	11.5	IO	IO	IO	IO
	8:00	IO	IO	0.63	14.7	4.3	1.5	5.9	IO	IO	IO	IO
	9:00	IO	IO	0.48	7.4	2.2	0.9	6.4	IO	IO	IO	IO
	10:00	IO	IO	0.41	0.3	0.4	1.0	9.8	IO	IO	IO	IO
	11:00	IO	IO	0.41	0.1	0.5	0.6	CAL	IO	IO	IO	IO
	12:00	IO	IO	0.40	0.1	0.6	0.6	CAL	IO	IO	IO	IO
	13:00	IO	IO	CAL	0.1	0.5	0.8	13.7	IO	IO	IO	IO
	14:00	IO	IO	CAL	0.0	0.4	0.9	3.1	IO	IO	IO	IO
	15:00	IO	IO	CAL	0.0	0.2	0.8	12.3	IO	IO	IO	IO
	16:00	IO	IO	0.32	0.0	-0.1	0.5	14.7	IO	IO	IO	IO
	17:00	IO	IO	0.28	-0.1	-1.0	1.0	13.1	IO	IO	IO	IO
	18:00	IO	IO	0.26	-0.1	-1.1	0.8	13.2	IO	IO	IO	IO
	19:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	20:00	IO	IO	0.39	0.6	-0.7	0.6	10.8	IO	IO	IO	IO
	21:00	IO	IO	0.35	0.7	-0.2	0.7	8.2	IO	IO	IO	IO
	22:00	IO	IO	0.33	0.4	-0.5	1.0	9.3	IO	IO	IO	IO
	23:00	IO	IO	0.32	1.4	-0.8	0.9	7.5	IO	IO	IO	IO
	0:00	IO	IO	0.39	3.1	-0.8	1.4	3.6	IO	IO	IO	IO
Min		ID	ID	0.3	-0.1	-1.1	0.5	3.1	ID	ID	ID	ID
Max		ID	ID	0.6	14.7	5.5	1.7	14.7	ID	ID	ID	ID
Average		ID	ID	0.4	2.9	0.7	0.9	9.6	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
11/03/2022	1:00	IO	IO	0.40	ZS	0.4	0.6	2.6	IO	IO	IO	IO
	2:00	IO	IO	0.41	8.3	ZS	ZS	2.0	IO	IO	IO	IO
	3:00	IO	IO	0.34	5.3	0.4	1.2	1.7	IO	IO	IO	IO
	4:00	IO	IO	0.35	3.4	-0.3	1.6	1.8	IO	IO	IO	IO
	5:00	IO	IO	0.63	3.4	0.0	1.9	2.3	IO	IO	IO	IO
	6:00	IO	IO	0.36	2.5	-0.4	1.0	4.8	IO	IO	IO	IO
	7:00	IO	IO	0.35	2.0	-0.6	1.5	4.5	IO	IO	IO	IO
	8:00	IO	IO	0.34	4.4	-0.3	1.2	6.7	IO	IO	IO	IO
	9:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	10:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	11:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	12:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	13:00	IO	IO	PO	PO	PO	PO	PO	IO	IO	IO	IO
	14:00	IO	IO	0.50	0.0	-0.8	1.0	14.0	IO	IO	IO	IO
	15:00	IO	IO	0.32	0.0	-0.5	0.5	15.4	IO	IO	IO	IO
	16:00	IO	IO	0.28	0.0	-0.2	0.7	14.3	IO	IO	IO	IO
	17:00	IO	IO	0.23	0.0	-0.5	0.9	14.2	IO	IO	IO	IO
	18:00	IO	IO	0.21	0.1	-0.4	0.7	14.5	IO	IO	IO	IO
	19:00	IO	IO	0.22	0.3	-0.4	0.5	12.8	IO	IO	IO	IO
	20:00	IO	IO	0.23	0.6	-0.3	0.9	10.8	IO	IO	IO	IO
	21:00	IO	IO	0.23	1.1	-0.1	0.3	9.5	IO	IO	IO	IO
	22:00	IO	IO	0.22	0.5	-0.4	0.8	10.1	IO	IO	IO	IO
	23:00	IO	IO	0.20	ZS	-0.1	0.7	10.4	IO	IO	IO	IO
	0:00	IO	IO	0.18	ZS	-0.4	1.3	9.6	IO	IO	IO	IO
Min		ID	ID	0.2	ID	-0.8	0.3	1.7	ID	ID	ID	ID
Max		ID	ID	0.6	ID	0.4	1.9	15.4	ID	ID	ID	ID
Average		ID	ID	0.3	ID	-0.3	1.0	8.5	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
12/03/2022	1:00	IO	IO	0.26	2.0	ZS	ZS	3.2	IO	IO	IO	IO
	2:00	IO	IO	0.28	1.8	0.0	1.4	2.2	IO	IO	IO	IO
	3:00	IO	IO	0.33	2.2	0.5	1.6	2.2	IO	IO	IO	IO
	4:00	IO	IO	0.24	2.7	0.4	2.7	2.1	IO	IO	IO	IO
	5:00	IO	IO	0.38	5.7	0.4	1.9	2.3	IO	IO	IO	IO
	6:00	IO	IO	0.39	9.0	0.2	1.7	2.6	IO	IO	IO	IO
	7:00	IO	IO	0.47	2.5	0.7	1.9	2.2	IO	IO	IO	IO
	8:00	IO	IO	0.26	1.8	0.6	1.0	9.2	IO	IO	IO	IO
	9:00	IO	IO	0.16	0.0	-0.2	0.7	12.6	IO	IO	IO	IO
	10:00	IO	IO	0.14	0.0	-0.3	0.7	13.6	IO	IO	IO	IO
	11:00	IO	IO	0.11	0.0	-0.3	0.8	15.2	IO	IO	IO	IO
	12:00	IO	IO	0.11	0.0	-0.2	0.6	15.8	IO	IO	IO	IO
	13:00	IO	IO	0.09	0.0	-0.5	0.8	15.1	IO	IO	IO	IO
	14:00	IO	IO	0.08	0.0	-0.5	0.5	15.3	IO	IO	IO	IO
	15:00	IO	IO	0.07	0.1	-0.6	0.9	14.9	IO	IO	IO	IO
	16:00	IO	IO	0.07	0.0	-0.7	0.7	14.1	IO	IO	IO	IO
	17:00	IO	IO	0.06	-0.1	-0.5	0.9	14.1	IO	IO	IO	IO
	18:00	IO	IO	0.06	0.0	-0.6	0.9	14.0	IO	IO	IO	IO
	19:00	IO	IO	0.07	0.0	-0.3	0.2	13.0	IO	IO	IO	IO
	20:00	IO	IO	0.07	0.2	-0.9	0.8	12.0	IO	IO	IO	IO
	21:00	IO	IO	0.07	0.1	-0.9	0.9	11.8	IO	IO	IO	IO
	22:00	IO	IO	0.07	0.1	-0.9	0.9	12.4	IO	IO	IO	IO
	23:00	IO	IO	0.07	0.5	ZS	ZS	10.5	IO	IO	IO	IO
	0:00	IO	IO	0.05	0.2	ZS	ZS	10.6	IO	IO	IO	IO
Min		ID	ID	0.1	-0.1	-0.9	0.2	2.1	ID	ID	ID	ID
Max		ID	ID	0.5	9.0	0.7	2.7	15.8	ID	ID	ID	ID
Average		ID	ID	0.2	1.2	-0.2	1.1	10.0	ID	ID	ID	ID

Date	Ending At	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	CO ppm	NO_2 ppb	SO_2 ppb	H_2S ppb	O_3 ppb	Benzene ppb	Toluene ppb	Ethylbenzene ppb	Xylene ppb
13/03/2022	1:00	IO	IO	0.04	0.4	-0.2	0.7	9.2	IO	IO	IO	IO
	2:00	IO	IO	0.06	ZS	-0.4	0.8	9.0	IO	IO	IO	IO
	3:00	IO	IO	0.04	0.1	-0.5	1.0	12.7	IO	IO	IO	IO
	4:00	IO	IO	0.05	0.7	-0.2	0.8	9.0	IO	IO	IO	IO
	5:00	IO	IO	0.09	2.7	-0.4	1.5	4.6	IO	IO	IO	IO
	6:00	IO	IO	0.11	2.8	0.5	0.3	5.9	IO	IO	IO	IO
	7:00	IO	IO	0.06	0.6	-0.5	0.6	10.1	IO	IO	IO	IO
	8:00	IO	IO	0.05	0.1	-0.4	0.9	13.5	IO	IO	IO	IO
	9:00	IO	IO	0.09	5.7	0.0	1.0	12.2	IO	IO	IO	IO
	10:00	IO	IO	0.14	13.9	1.3	0.2	14.8	IO	IO	IO	IO
	11:00	IO	IO	0.21	19.1	4.3	0.0	13.2	IO	IO	IO	IO
	12:00	IO	IO	GEN	GEN	4.1	1.5	13.9	IO	IO	IO	IO
	13:00	IO	IO	GEN	GEN	4.6	0.3	10.2	IO	IO	IO	IO
	14:00	IO	IO	0.19	17.1	3.4	1.3	11.3	IO	IO	IO	IO
	15:00	IO	IO	GEN	GEN	4.3	1.4	11.5	IO	IO	IO	IO
	16:00	IO	IO	0.32	27.3	6.4	0.5	9.8	IO	IO	IO	IO
	17:00	IO	IO	0.04	1.2	2.1	0.8	11.3	IO	IO	IO	IO
	18:00	IO	IO	0.03	1.0	1.2	0.7	10.0	IO	IO	IO	IO
	19:00	IO	IO	0.03	0.5	0.7	0.9	10.8	IO	IO	IO	IO
	20:00	IO	IO	0.04	1.3	0.2	1.4	11.8	IO	IO	IO	IO
	21:00	IO	IO	0.04	1.3	-0.1	0.7	12.6	IO	IO	IO	IO
	22:00	IO	IO	ZS	2.4	-0.3	1.0	11.3	IO	IO	IO	IO
	23:00	IO	IO	0.09	4.8	0.2	0.8	8.3	IO	IO	IO	IO
	0:00	IO	IO	0.03	ZS	0.0	1.1	8.3	IO	IO	IO	IO
Min		ID	ID	0.0	0.1	-0.5	0.0	4.6	ID	ID	ID	ID
Max		ID	ID	0.3	27.3	6.4	1.5	14.8	ID	ID	ID	ID
Average		ID	ID	0.1	5.4	1.3	0.8	10.6	ID	ID	ID	ID

Notes: Negative values result when ambient concentrations are very low and normal instrument drift results in a negative value. This is consistent with accepted reporting convention. If drift is excessive—usually due to instrument malfunction—negative values are invalidated.
IO = Instrument inoperative
GEN = Data invalid due to bias from generator exhaust
ZS = Data invalid due to zero/span quality control check
ID = Invalid data
PO = Power outage
IV = Instrument verification

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APPENDIX L

Emissions Inventory and Air Quality Modeling Report

Submitted with changes

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Esso Exploration and Production Guyana Limited

Emissions Inventory and Air Quality Modeling Report

Gas To Energy Project

November 2022

The business of sustainability

ERM

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Acronyms and Abbreviations

Name	Description
µg/m^3	micrograms per cubic meter
ŋ	eta
3D	three dimensional
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AERMAP	AERMOD Mapping Program
AERSCREEN	screening-level air quality model based on AERMOD
Btu	British thermal unit
Btu/scf	British thermal units per standard cubic foot
cal/sec	calories per second
CALPUFF	California Puff model
CFR	Code of Federal Regulations
CO	carbon monoxide
DEM	digital elevation model
FPSO	Floating Production, Storage, and Offloading (vessel)
EEPGL	Esso Exploration and Production Guyana Limited
EIA	Environmental Impact Assessment
FDDA	four-dimensional data assimilation
FNL	final analysis
GEOGRID	utility within the WRF model preprocessing system (WPS) to define the land surface model grid and relevant geospatial data
GHG	greenhouse gas
HHV	higher heating value
lb	pound
lb/MMBtu	pounds per million British thermal unit
LSBC	land-sea breeze circulation
m/s	meters per second
mb	millibar
MMBtu/hr	million British thermal units per hour
MMIF	Mesoscale Model InterFace
MMscfd	million standard cubic feet per day
MMscf/hr	million standard cubic feet per hour
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NCAR	National Center for Atmospheric Research
NGL	natural gas liquids
NGL Plant	natural gas liquids processing plant
NO	nitric oxide
NO_2	nitrogen dioxide
NOx	nitrogen oxides
PBL	planetary boundary layer
PM	particulate matter
PM_{10}	particulate matter (aerodynamic diameter less than 10 microns)
$PM_{2.5}$	particulate matter (aerodynamic diameter less than 2.5 microns)
Power Plant	Government of Guyana power plant
ppb	parts per billion
ppm	parts per million
PRIME	Plume Rise Model Enhancements
Project	Gas to Energy Project
PUFF	Puff dispersion model

Name	Description
PVMRM	Plume Volume Molar Ratio Method
scf	standard cubic feet
SIL	Significant Impact Level
SO2	sulfur dioxide
USEPA	U.S. Environmental Protection Agency
UTM	Universal Transverse Mercator (East or North)
VOC	volatile organic compound
WHO	World Health Organization
WRF	Weather Research and Forecasting (meteorological model)
YSU	Yonsei University

1. INTRODUCTION

This report describes the emissions inventory and modeling of emissions to air completed in support of the Environmental Impact Assessment (EIA) for the Gas to Energy Project (the Project). The Project comprises a pipeline that will transport an average of approximately 50 million standard cubic feet per day (MMscfd) of dry gas from the Liza Phase 1 and 2 Floating Production, Storage, and Offloading (FPSO) vessels to a natural gas and natural gas liquids (NGL) processing plant (NGL Plant). The NGL Plant will drop the pressure of the gas; dehydrate the gas; separate out propane, butane, and pentanes; and treat the remaining gas (methane and ethane) to the required specification to fuel a planned Government of Guyana power plant (Power Plant).

The purpose of the modeling described herein was to estimate maximum Operations stage Project-generated ground-level concentrations of criteria pollutants at locations where community receptors could potentially be exposed to these concentrations. The sources reflected in the modeling for what is referred to herein as the Project-only case include those at the NGL Plant; references herein to “Project sources” or “Project emissions,” refer to the NGL Plant Operations stage sources unless otherwise specified. Additionally, in support of the cumulative impact analysis for the Project EIA, combined Operations stage emissions from the Project; the planned Power Plant; and other existing, permitted, or planned Esso Exploration and Production Guyana Limited (EEPGL) offshore activities potentially coinciding with the Project were also evaluated as part of what is referred to herein as the cumulative case.

This report describes (1) the modeling methodology, including model selection, potential receptor locations, and meteorological data development; (2) the Project source characteristics and estimated emissions for the Project and other non-Project sources included in the cumulative analysis; and (3) the maximum predicted ground-level concentrations, including comparison to ambient air quality guidelines for both the Project-only case and the cumulative case. In some cases, elements of the modeling methodology are presented together for the Project and planned Power Plant, as these sources were modeled together for the cumulative case; it is noted, however, that the Project-only case does not reflect the Power Plant sources.

Figure 1-1 shows a preliminary layout of the NGL Plant. While the location of the Power Plant had not been finalized at the time modeling was completed, it was assumed for the purpose of the assessment that the Power Plant will be integrated with the NGL Plant, with the Power Plant equipment and facilities located immediately adjacent to the NGL Plant equipment and facilities. The assumed location of the Power Plant turbines is shown in Figure 1-1.

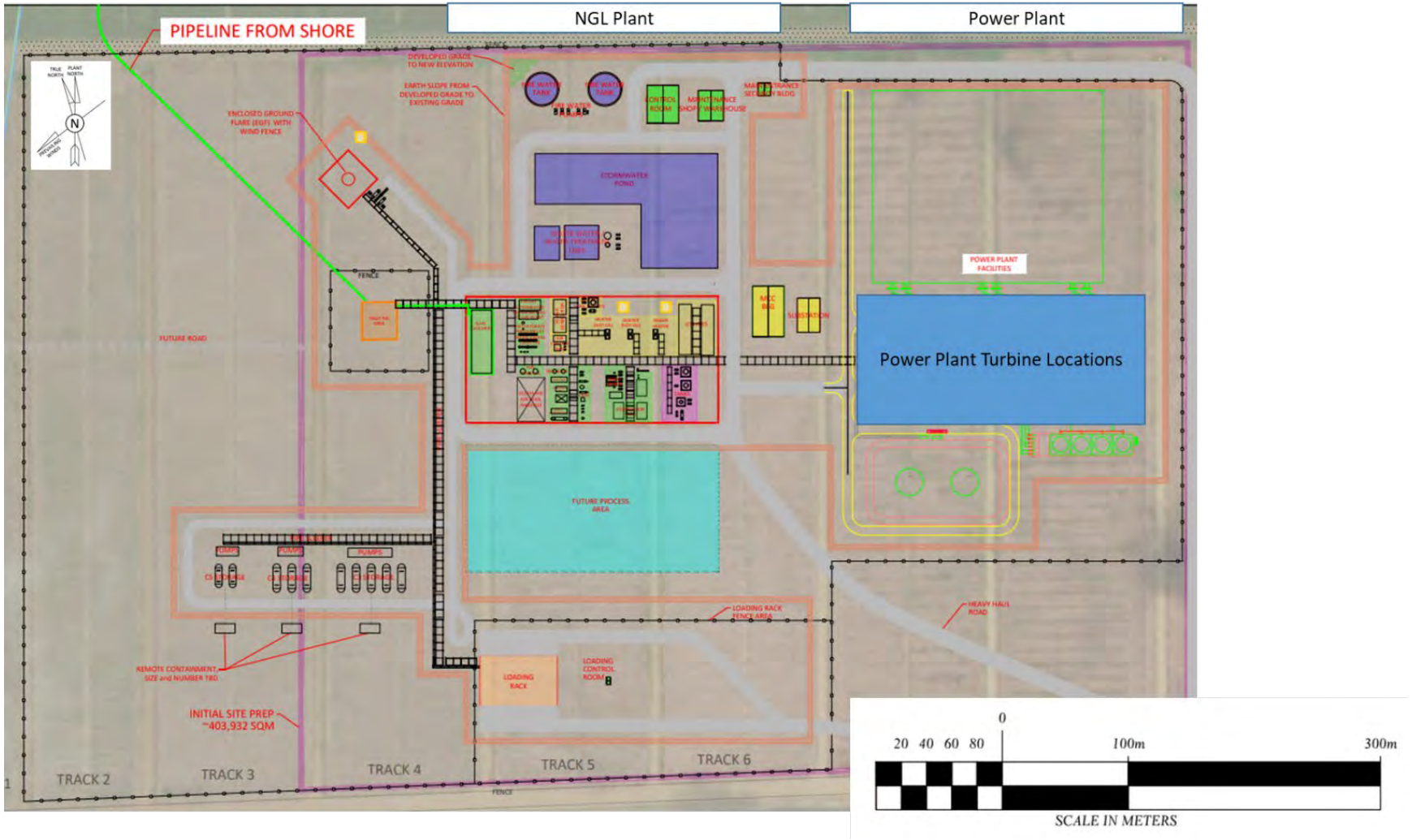


Figure 1-1: Notional NGL Plant Layout and Assumed Power Plant Turbine Locations

2. AIR QUALITY MODELING METHODOLOGY

2.1 Model Selection

Modeling of emissions from stationary land-based sources, like the Project and the planned Power Plant (for the cumulative case) was performed using the latest version of the AERMOD modeling system (version 21112). AERMOD is the U.S. Environmental Protection Agency's (USEPA) recommended air dispersion model for near-field (within 50 kilometers) application, AERMOD calculates concentrations in a manner that accounts for changes in dispersion rate with height, allows for a non-Gaussian plume in convective conditions, and accounts for a dispersion rate that is a continuous function of meteorology. AERMOD also contains advanced algorithms for estimating plume dispersion in the convective and stable boundary layers, plume rise, and buoyancy. Characteristic wind speeds and directions through the plume thickness are estimated to account for the effect of wind shear on pollutant transport. AERMOD was run with the USEPA's regulatory default options.

For the EEPGL offshore activities included in the cumulative case, modeling was performed using The California PUFF model (CALPUFF) (version 7.3.2, level 200113), a non-steady-state model used in the United States and around the globe for long-range transport and complex wind modeling. The selection of CALPUFF for modeling of these activities was based on the relatively large distance between the offshore sources and the potential onshore receptor locations. At the distance from the offshore activities to the coastline of Georgetown (over 200 kilometers), emission plumes released from the point sources modeled would travel for approximately 10 hours before reaching the Guyana shoreline, assuming an average wind speed of 5 meters per second (m/s) (typical for the area). During this transport time, winds can change direction and speed. Accordingly, prediction of plume dispersion is most appropriately accomplished with a non-steady state model. Additionally, due to the vast differences in surface characteristics between open water and land, coastal areas frequently experience a classic meteorological phenomenon known as the land-sea breeze circulation (LSBC). This phenomenon is due to the diurnal surface temperature differences that develop between the land and the open water. LSBC effects can play an important role in the dispersion modeling analysis of emission sources as plumes interact with onshore receptors. CALPUFF, combined with gridded meteorological data, is capable of accounting for the LSBC phenomenon.

2.2 Building Downwash Analysis

The emission sources at the Project and (for the cumulative case) the Power Plant were evaluated in terms of their proximity to nearby structures to determine if emissions from sources might become caught in the turbulent wakes of these structures. This is referred to as a building downwash analysis. The building downwash analysis was conducted utilizing the Plume Rise Model Enhancements (PRIME) algorithms implemented in AERMOD. The direction-specific building dimensions were calculated using the USEPA Building Profile Input Program PRIME (version 04274). Figure 2-1 shows the modeled point sources for the Project and Power Plant, and the modeled structure locations and heights that were used for the building downwash analysis.

Due to lack of information related to the Power Plant layout, a generic layout of a typical combined cycle power plant was used for this analysis, specifically the turbine and heat recovery unit structures' heights and layout. Additionally, for the purpose of modeling, the locations of the Power Plant turbines and ancillary equipment (auxiliary boiler, emergency generator, and firewater pump) were arranged so as to avoid building downwash and to maximize the distance to the closest potential receptor.

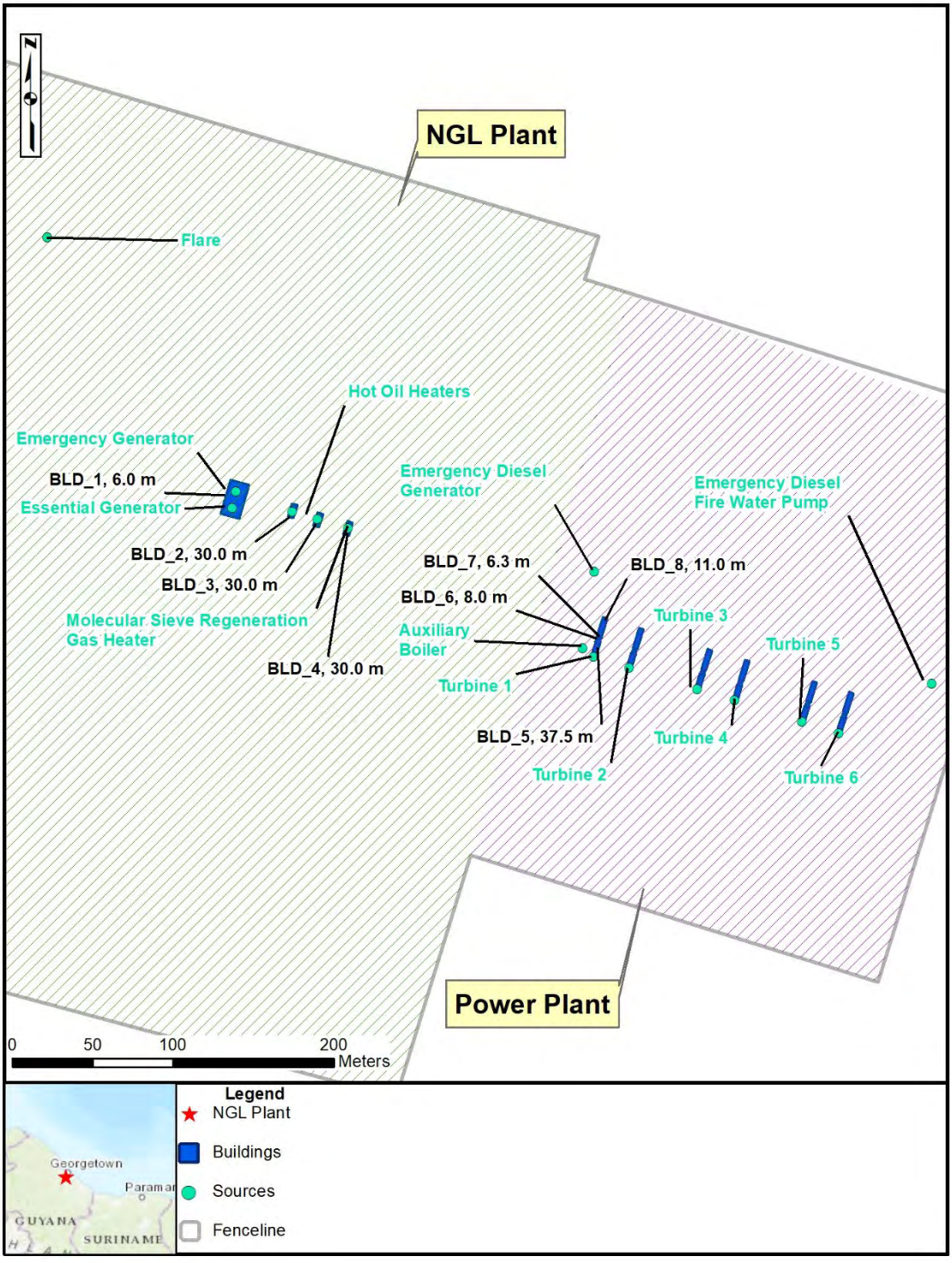


Figure 2-1: Modeled Locations of Sources and Buildings and Heights of Buildings Used in Building Downwash Analysis

2.3 Receptors

A receptor[1] grid was established for the area surrounding the NGL Plant and Power Plant, with a denser grid closer to the Project and Power Plant sources and a coarser grid in areas farther from the Project and Power Plant sources. Figure 2-2 illustrates the near-field receptor grid for the Project-only case. Figure 2-3 illustrates the near-field receptor grid for the cumulative case. For the Project-only case, no receptors were placed inside the NGL Plant boundaries, and for the cumulative case, no receptors were placed inside the NGL Plant or Power Plant boundaries. This is on the basis that community receptors will not have access to either the NGL Plant site or the Power Plant site. Figure 2-4 shows the far-field receptor grid, which extends out to 50 kilometers.

The receptor grid consisted of the following receptor spacing:

- 25-meter spacing along the Project and Power Plant fencelines;
- 50-meter spacing extending from the fencelines to 1 kilometer;
- 100-meter spacing extending from 1 to 2 kilometer from the fencelines;
- 250-meter spacing extending from 2 to 5 kilometer from the fencelines;
- 500-meter spacing extending from 5 to 10 kilometer from the fencelines;
- 1,000-meter spacing extending from 10 to 20 kilometer from the fencelines, and
- 2,000-meter spacing extending from 20 to 50 kilometer from the fencelines.

Terrain elevations from the GTOPO30 digital elevation model (DEM) with a horizontal grid spacing of 30 arc seconds (approximately 1 kilometer) were processed using the most recent version of AERMAP (terrain pre-processor, Version18081) to develop the receptor terrain elevations for model input.

[1] For the purpose of modeling, a “receptor” refers to a location where an individual other than a worker at the facility could be exposed to emissions from the facility.

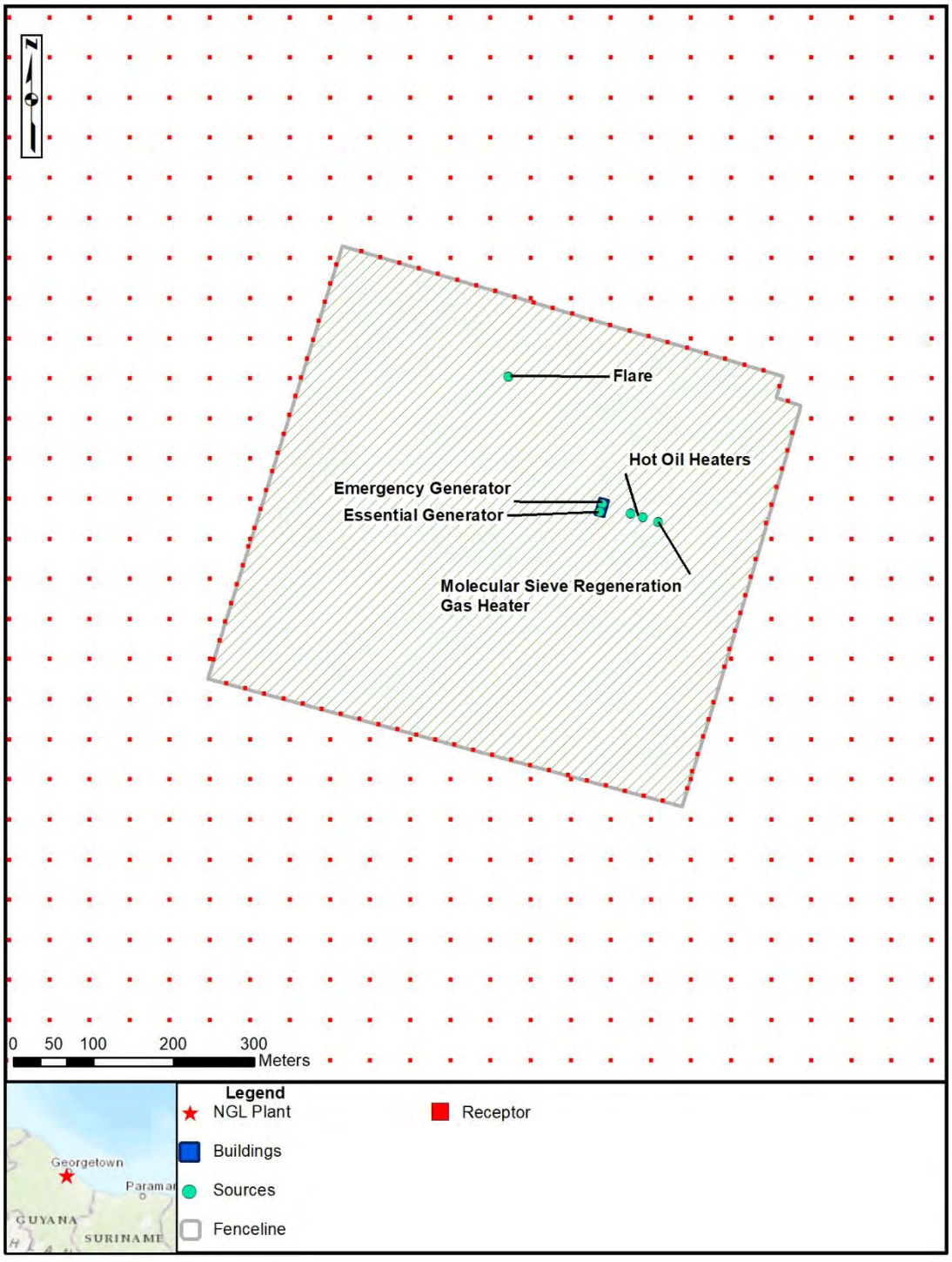


Figure 2-2: Near-Field Receptor Grid (Project-only Case)

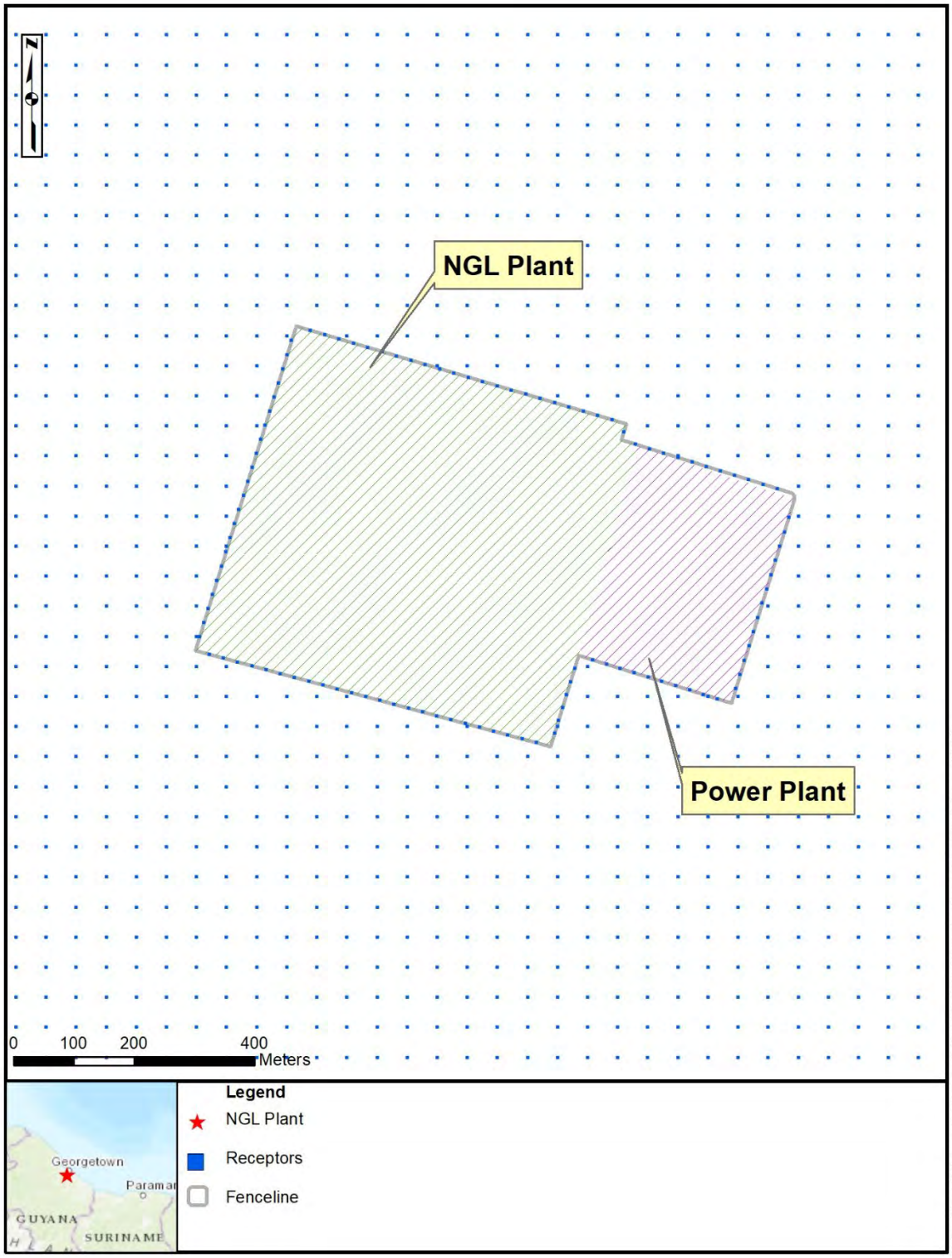


Figure 2-3: Near-Field Receptor Grid (Cumulative Case)

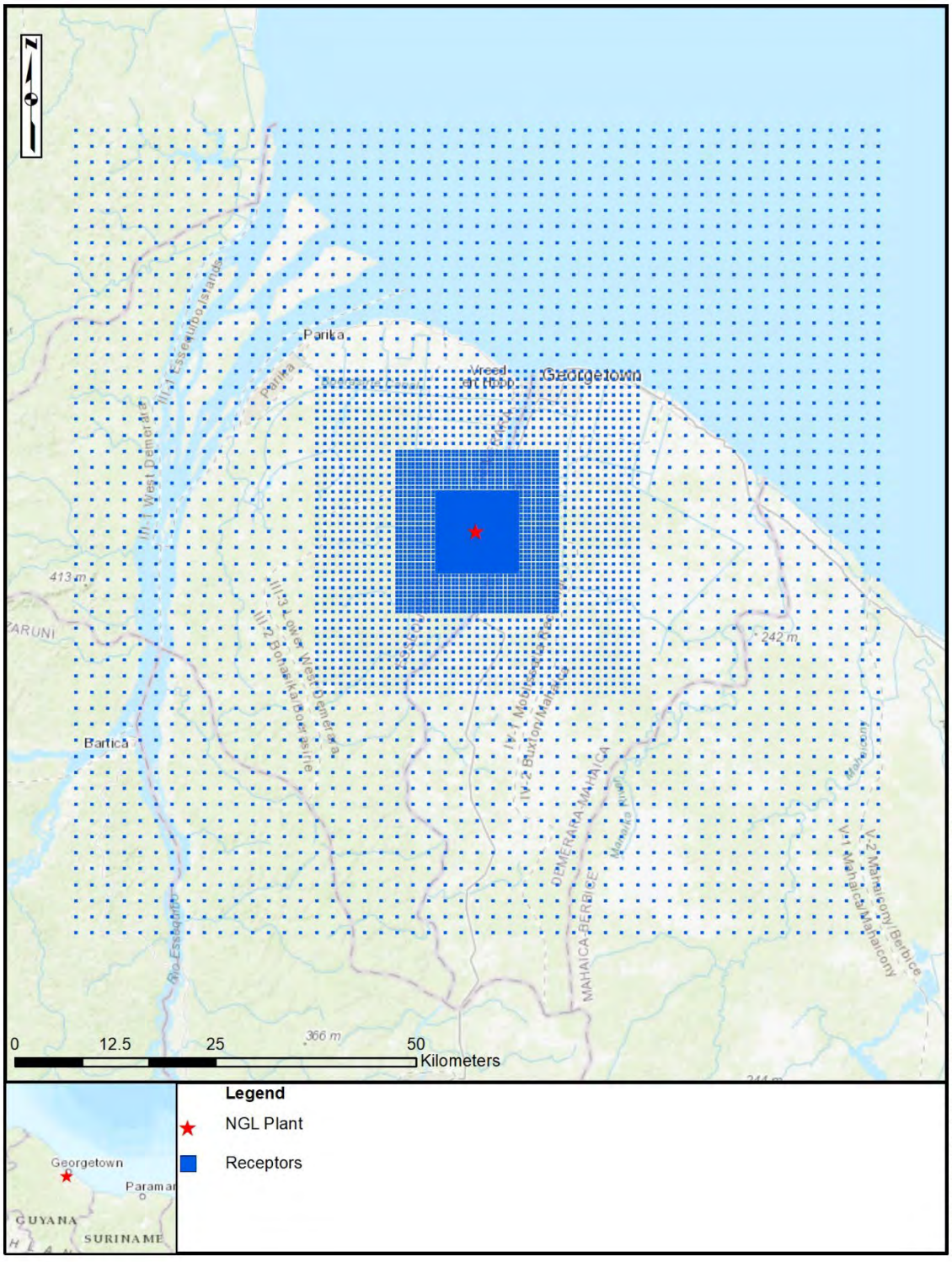


Figure 2-4: Far-Field Receptor Grid

2.4 NOx to NO_2 Conversion

The Plume Volume Molar Ratio Method (PVMRM) was utilized for modeling nitrogen dioxide (NO_2) given the need to accurately model NO_2 concentrations in order to determine compliance with the stringent 1-hour and 24-hour NO_2 guideline concentrations. The PVMRM is an AERMOD option designed to consider the conversion of nitrogen oxides (NOx) emissions to NO_2 in the atmosphere on an hour-by-hour basis. For each hour, the volume of the source-specific plume is calculated for that hour's meteorological conditions. Emissions of NOx predominantly consist of nitric oxide (NO), which is oxidized into NO_2. The limiting factor in this reaction is an equilibrium state that is usually established among NO, NO_2, and ozone concentrations in the atmosphere. The modeling accounts for the finite amount of ozone ("ozone-limited atmosphere"), which limits the amount of conversion of NO to NO_2. The amount of available NOx, NO, and ozone as well as the eventual conversion to NO_2 is determine by the plume volume.

2.4.1 PVMRM Input Parameters

The use of the PVMRM requires the development and implementation of additional model input parameters beyond those typically required for AERMOD, including in-stack NO_2/NOx ratios for all modeled sources, the ambient NO_2/NOx equilibrium ratio, and background ozone concentrations.

A model default NO_2/NOx ambient equilibrium ratio of 0.9 was used. In the absence of representative in-stack NO_2 and NOx concentration data, the USEPA suggests a default in-stack NO_2/NOx ratio of 0.5; this value was used for flares and oil heaters. For the cumulative case, an in-stack ratio of 0.4 was used for the gas-fired combined cycle turbines and the auxiliary boiler at the Power Plant. An in-stack ratio of 0.2 was used for diesel-fired engines. The non–default values of 0.4 and 0.2 were obtained from the USEPA in-stack ratio database,[2] taking the maximum of the measured values for similar size engines.

2.4.2 Ozone Background Concentration

The PVMRM requires background ozone concentration data to establish the amount of ozone available for titration of NO to NO_2 (i.e., as the level of ozone available for titration increases, the rate of conversion of NO to NO_2 increases). AERMOD is capable of reading background ozone concentrations as either a single value or a set of hourly values to account for diurnal and/or seasonal variations in ambient ozone levels throughout the day. This is critical since sunlight is the primary driver in ozone formation processes.

Ozone values for each hour of the day were computed from monitoring data collected by the ERM at the Friendship Education Department ambient air quality monitoring site between 5 February 2022 and 1 March 2022. Table 2-1 summarizes the hourly values that were used as input to the PVMRM in AERMOD. Each value was determined by taking the maximum measured value for each hour over the referenced period.

Table 2-1: Hourly Ozone Concentrations Used for PVMRM Analysis

Hour	0	1	2	3	4	5	6	7	8	9	10	11
Ozone (ppb)	20.2	20.2	20.4	18.9	25.5	24.0	23.2	22.2	22.3	25.0	29.3	29.5

Hour	12	13	14	15	16	17	18	19	20	21	22	23
Ozone (ppb)	31.5	30.4	28.3	27.1	25.3	24.8	23.7	22.4	20.1	20.3	20.9	22.7

ppb = parts per billion

[2] https://www.epa.gov/sites/production/files/2020-11/no2_isr_database.xlsx

2.5 Meteorological Data

2.5.1 WRF Model Configuration

The Weather Research and Forecasting (WRF) model (WRF-ARW, Version 4.0; Skamarock et al. 2019) was used to develop a simulated meteorological data set for the air quality modeling because there is limited suitable observational data available for the region. A full three-dimensional (3D) grid of WRF-simulated meteorological data was developed. These data include simulated meteorological conditions across the modeling domain at a resolution of 9 kilometers. Observational data from 2017 through 2019 were used as input for the WRF model. This period was simulated to identify the worst-case dispersion conditions (i.e., leading to the maximum predicted concentrations) that would be expected. The WRF model is a state-of-the-science numerical meteorological model that is designed to simulate atmospheric systems on a wide range of spatial and temporal scales.

WRF is a widely used 3D numerical meteorological model with a terrain-following, vertical coordinate system. The model contains a variety of physics options to take into account cloud physics, the planetary boundary layer (PBL) turbulence physics, atmospheric radiation, and land-atmosphere interaction. The model is designed for simulating atmospheric phenomena across scales ranging from very fine scale (approximately 100 meters) to mesoscale circulations and waves (from approximately 100 meters) to large-scale weather systems (greater than 1,000 kilometers). It is also used to generate 3D gridded meteorological data (such as hourly wind and temperature fields) in a modeling domain through the treatment and assimilation of available surface and upper air observations. The methodology that was followed for the WRF modeling is described below.

The WRF static geophysical data are available from the National Center for Atmospheric Research (NCAR) for terrain, vegetation/land use, land mask, soil moisture, and soil type. The NCAR distributes various resolutions of global terrain and land-use databases to support WRF simulations. The data resolutions include:

- 5-minute (about 9.25 kilometers in mid-latitudes)
- 2-minute (about 4.00 kilometers in mid-latitudes)
- 30-second (about 0.900 kilometers in mid-latitudes)

These data are assigned to WRF simulations based on the resolution of the simulation domain. These data were used to develop the GEOGRID files on static terrain and land use data for the model simulations.

The WRF-ARW model was configured with multiple nested grids to achieve a grid resolution capable of resolving the land use and terrain characteristics of the Guyana region as well as the meteorology over the ocean. A Mercator projection was used, which is suitable for simulations in the low-latitude tropics. The Mercator projection uses a reference latitude/longitude of 6.71 degrees north and 55.00 degrees west. Figure 2-5 shows the complete domain configuration used in the WRF simulations. The model used a large outer domain (Domain 1) at a grid resolution of 27 kilometers spanning the central and eastern portions of northern South America and over the Atlantic Ocean. This domain extent is necessary to properly simulate the evolution of larger-scale atmospheric features. Domain 2 consists of a smaller domain with a grid resolution of 9 kilometers. This domain extends over the northeast portion of South America and east over the tropical Atlantic Ocean, encompassing the area offshore Guyana in which offshore sources modeled in the cumulative case are located. Domains 3 and 4 used a grid resolution of 3 kilometers and 1 kilometer, roughly centered over the NGL Plant site. The WRF data for the 1-kilometer resolution domain were used to create AERMOD-ready meteorological data for the Project.

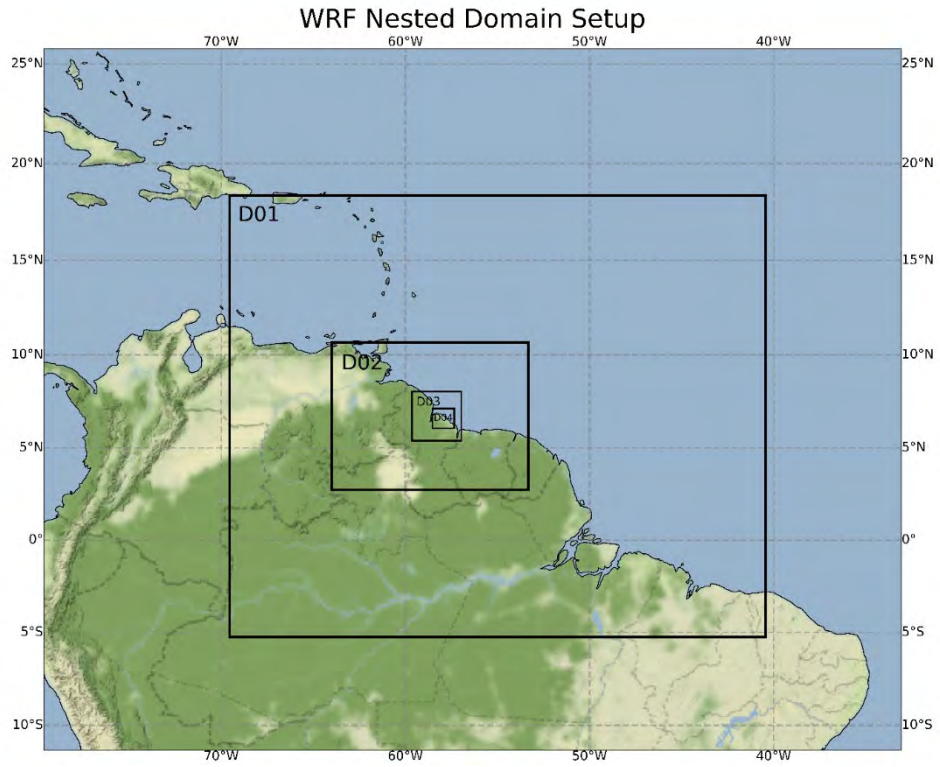


Figure 2-5: WRF Model Domain Configuration

To properly depict the vertical structure of the atmosphere, WRF uses a mass-based terrain-following vertical coordinate system referred to as the eta (ŋ) coordinate system. This coordinate system is essentially the same as the sigma terrain-following coordinate used in WRF's predecessor model (MM5). The WRF simulations employed 40 eta vertical levels from the surface up to 50 millibars (mb). The vertical levels used in the WRF modeling are also shown in Table 2-2. Table 2-2 shows the WRF eta layer values and the layer and mid-layer heights.

Table 2-2: Vertical Layers Used in the WRF Simulations

Level No.	ETA Level	Layer Height (m)	ETA Half-Level	Mid Layer Height (m)		Level No.	ETA Level	Layer Height (m)	ETA Half-Level	Mid Layer Height (m)
1	1	0.00	1.000	0		21	0.3431	8047.66	0.365	7645
2	0.9938	52.87	0.997	26		22	0.3032	8835.04	0.323	8441
3	0.9860	120.47	0.990	87		23	0.2674	9603.52	0.285	9219
4	0.9760	206.46	0.981	163		24	0.2351	10351.69	0.251	9978
5	0.9636	315.15	0.970	261		25	0.2061	11078.77	0.221	10715
6	0.9481	451.48	0.956	383		26	0.1801	11785.28	0.193	11432
7	0.9291	620.89	0.939	536		27	0.1566	12473.29	0.168	12129
8	0.9062	829.25	0.918	725		28	0.1356	13144.25	0.146	12809
9	0.8789	1082.25	0.893	956		29	0.1166	13798.82	0.126	13472
10	0.8472	1384.78	0.863	1234		30	0.0996	14437.73	0.108	14118
11	0.8111	1740.26	0.829	1563		31	0.0842	15062.70	0.092	14750
12	0.7709	2149.99	0.791	1945		32	0.0704	15676.43	0.077	15370
13	0.7275	2612.62	0.749	2381		33	0.0580	16281.69	0.064	15979
14	0.6818	3123.92	0.705	2868		34	0.0469	16882.15	0.052	16582
15	0.6345	3679.82	0.658	3402		35	0.0369	17485.48	0.042	17184
16	0.5860	4283.09	0.610	3981		36	0.0278	18093.18	0.032	17789
17	0.5367	4938.59	0.561	4611		37	0.0197	18705.49	0.024	18399
18	0.4867	5649.25	0.512	5294		38	0.0125	19324.30	0.016	19015
19	0.4367	6418.58	0.462	6034		39	0.0059	19950.31	0.009	19637
20	0.3874	7241.94	0.412	6830		40	0.0000	20583.13	0.003	20267

m = meter

Initial and lateral meteorological boundary conditions are provided to the WRF Preprocessing System as the initial data, both spatially and temporally, at the start of the WRF simulation. In general, initialization data sets are assimilated with a great deal of observational data, which include surface pressure, sea level pressure, geopotential height, temperature, sea surface temperature, soil values, ice cover, relative humidity, u and v wind components, vertical motion, vorticity, winds and *in situ* data such as moisture from radiosondes and pressure from surface observations. Also included in these data sets are precipitation data, profiler data, dropsondes, pibals, aircraft temperatures and winds, land surface and moisture data, and cloud drift winds from geostationary satellites. There are numerous analysis datasets available to use with WRF at various spatial and temporal resolutions.

The WRF simulations for the modeling used the National Oceanic and Atmospheric Administration Global Forecast System Data Assimilation System 6-hourly final analysis (FNL) files at 0.25-degree resolution. The skin temperature data contained in the 0.25-degree resolution FNL data were used to define sea surface temperatures.

2.5.2 Selected WRF Physics Suite

The WRF model was run using the Thompson microphysics scheme to account for cloud microphysical processes. The Thompson scheme accounts for snow, ice, and graupel processes and is suitable for high-resolution simulations. Atmospheric radiation processes for both short-wave and long-wave radiation are handled with the Rapid Radiative Transfer Model for Global Climate Models scheme. Land surface processes were presented using the MM5 Monin-Obhukov surface layer physics, the Noah unified land surface model, and the Yonsie University (YSU) PBL scheme physics. Both the 27-kilometer and 9-kilometer resolution domains (Domains 1 and 2) used the Tiedtke cumulus physics scheme to parameterize moist convection. The Tiedtke scheme was chosen since modeling studies using this scheme have shown good overall performance over the tropical latitude belt globally. Convection is

explicitly simulated on the 3-kilometer and 1-kilometer resolution domains. The land surface physics and PBL schemes chosen are generally well tested over many simulations in different geographical regions.

2.5.3 Four-Dimensional Data Assimilation

The WRF modeling system also has four-dimensional data assimilation (FDDA) capabilities. FDDA is a method of performing WRF simulations with the full-physics model while blending local observations. By doing so, model equations maintain dynamic consistency while at the same time restraining the model's solutions from deviating too strongly from observations or a gridded analysis and make up for errors and gaps in the initial analysis and deficiencies in model physics. There are two types of what is known as "FDDA nudging" in WRF:

- **Analysis nudging**—which gently forces the model solution toward gridded fields and also makes use of 3D analyses and surface analyses.
- **Observation nudging ("obs nudging")**—which gently forces the model solution toward individual observations, with the influence of the observations spread in space and time.

Meteorological observations from both upper air and the surface were included in the WRF FDDA simulation. Upper Air Observational Weather Data are composed of weather reports from radiosondes, pibals, and aircraft reports from the Global Telecommunications System, and satellite data from the National Environmental Satellite Data and Information Service.[3] This dataset includes pressure, geopotential height, air temperature, dew point temperature, wind direction, and speed. Data may be available at up to 20 mandatory levels ranging from 1,000 mb to 1 mb, plus a few significant levels. Report intervals range from hourly to every 12 hours. Surface meteorological data[4] include variables such as pressure, air temperature, dew point temperature, and wind direction and speed at the ground level. Report intervals range from hourly to every 3 hours.

The WRF simulations implemented both analysis nudging and observation nudging on the outer domain (Domain 1) and observation nudging only on Domain 2. The analysis nudging was performed using the FNL 0.25-degree analysis data. Additionally, nudging of moisture and temperature in the PBL was not performed. This is a common practice to prevent the nudging process from eroding important simulated temperature and moisture profiles within the PBL.

2.5.4 WRF Analysis

Inspection of the WRF 10-meter wind fields was performed at various points during the WRF simulations to ensure reasonable representation of the meteorology by the model. Overall, the WRF model represented the meteorology and the diurnal cycle reasonably well.

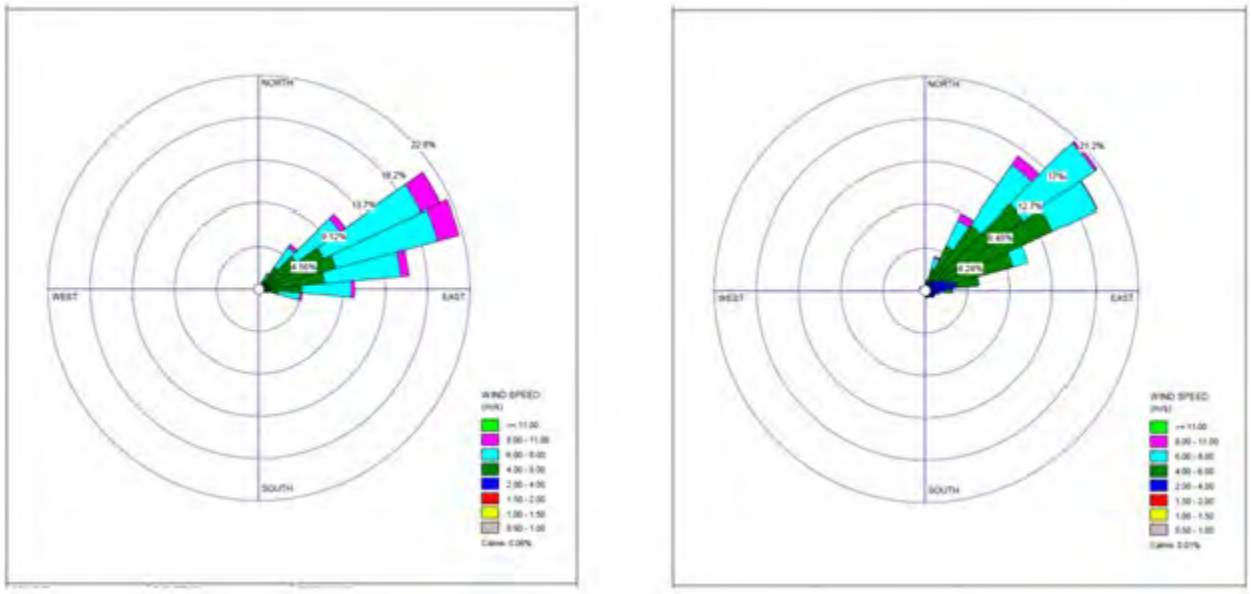
To develop more specific climate information regarding onshore climate conditions, EEPGL commissioned deployment of a meteorological station at a site in Carifesta (Georgetown) where ambient onshore monitoring air quality data were being collected. A second meteorological monitoring station was deployed to the southeast at New Amsterdam, Guyana. The meteorological station at Georgetown is relatively close to the NGL Plant site as compared to New Amsterdam, which is on the order of 94 kilometers southeast of the NGL Plant site. An additional meteorological station at the Cheddi Jagan airport is the closest station to the NGL Plant site. Data from these stations were used to assess the characteristics of the WRF data. Figure 2-6 shows the locations of these three sites of observed meteorological data and the location of the NGL Plant site.

[3] http://rda.ucar.edu/datasets/ds351.0/index.html

[4] http://rda.ucar.edu/datasets/ds461.0/index.html

Figure 2-6: Location of Meteorological Stations Considered

The Carifesta station collected hourly meteorological data from February 2018 through April 2019. This site was situated on the immediate shoreline. The initial wind roses showed that the WRF model had a negative wind bias at the station location (i.e., simulated winds speeds were lower than observed). However, the wind directions are dominated by northeast flow, characteristic of the northeast trade winds. As a result, a grid cell slightly offshore was selected and this showed simulated wind speeds more similar to the observed data at the Carifesta station. Figure 2-7 shows two wind roses showing a comparison of the WRF-predicted and observed data; for the WRF-predicted wind rose, there are somewhat higher wind speeds than observed. This appears to be due to the lower surface roughness in the offshore grid cell selected. The actual meteorological station sits on land adjacent to the coastline. These discrepancies are related to how well the coastal boundary and associated surface roughness is represented in the WRF grid resolution used. The wind roses show a relatively small wind direction bias such that WRF has a bit more northeast and east-northeast winds than was observed at Carifesta. Overall, this wind rose shows that the WRF simulations are representing the overall wind distribution reasonably well.



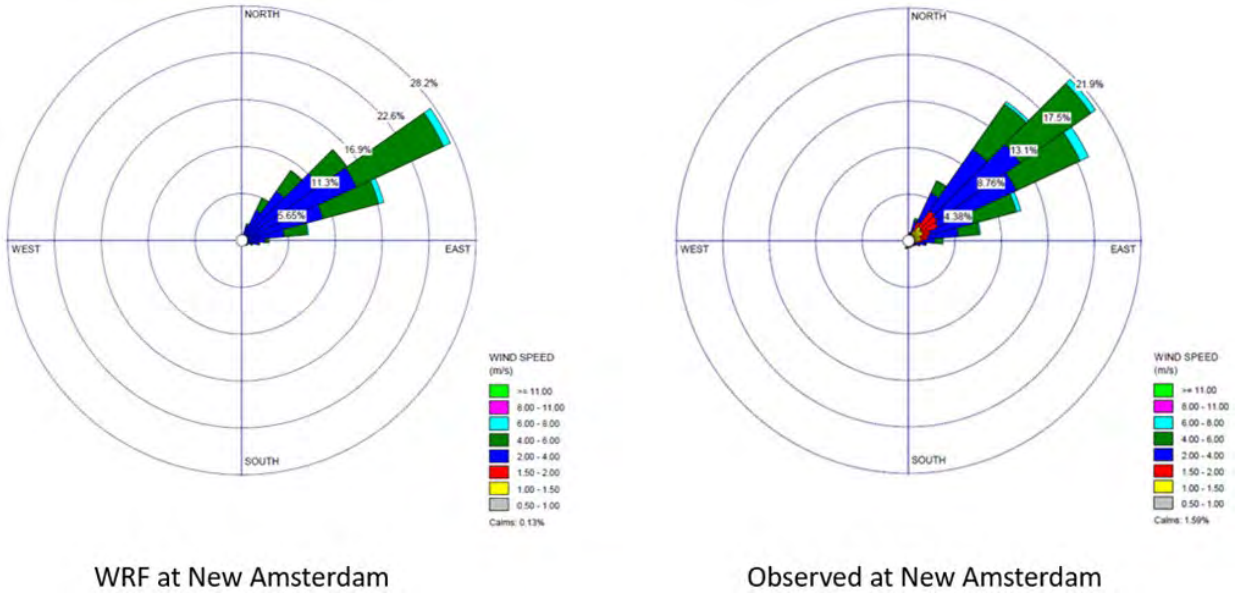
WRF at offshore grid cell

Observed Winds at Carifesta

Figure 2-7: WRF-Predicted and Observed Wind Roses at Carifesta

The wind roses at New Amsterdam (Figure 2-8) show better agreement with WRF data as compared to the Carifesta meteorological station. This is because the New Amsterdam meteorological station is about 10 kilometers inland from the coastline and experiences larger surface roughness lengths and at least partially reduced impacts from the over water flow. Figure 2-8 shows the WRF 10-meter wind rose compared against the observed wind rose at New Amsterdam. WRF clearly shows the dominant northeasterly winds. Also evident is a positive wind speed bias in WRF at this station, with a lower frequency of wind speeds under 1.5 m/s in the WRF-predicted wind speed compared to the observed data. Figure 2-9 shows the wind roses predicted by WRF compared to observed data at Cheddi Jagan Airport. The Cheddi Jagan meteorological station is situated in fairly close proximity to the NGL Plant site; however, the data quality for the Cheddi Jagan station has some apparent limitations. Data recovery is around 84 percent, and the wind speed data appears binned at specific wind speed values. Additionally, the wind speed data cuts off at 1 m/s, and anything less than 1 m/s is set to zero. The WRF wind rose compares well with observed data at this site with respect to wind direction, although the wind direction distribution shows more limited wind directions in the wind rose compared to the observed data. The

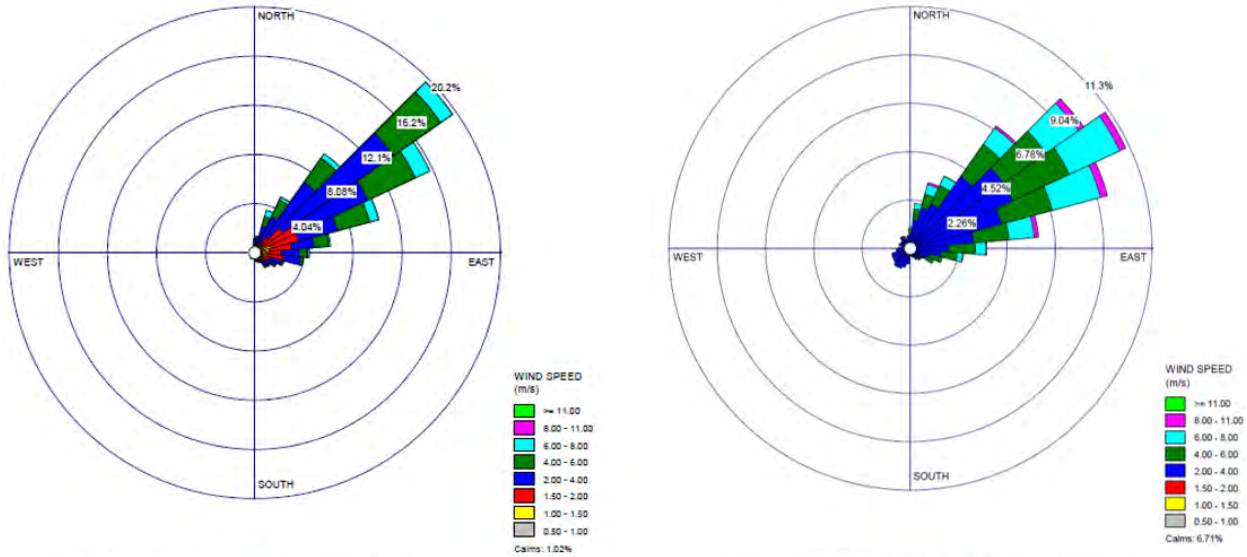
dominant northeast tradewind flow is clearly depicted by the WRF data and compares well with the observed data. The WRF data suggest a somewhat negative wind speed bias at this station, where the upper end of the wind speeds is not always captured by WRF and there is a higher percentage of low wind speeds in the WRF data. The higher frequency of lower wind speeds in WRF may be at least partially due to the 1 m/s wind speed cutoff in the recorded wind speeds at Cheddi Jagan.



WRF at New Amsterdam

Observed at New Amsterdam

Figure 2-8: WRF-Predicted and Observed Wind Roses at New Amsterdam

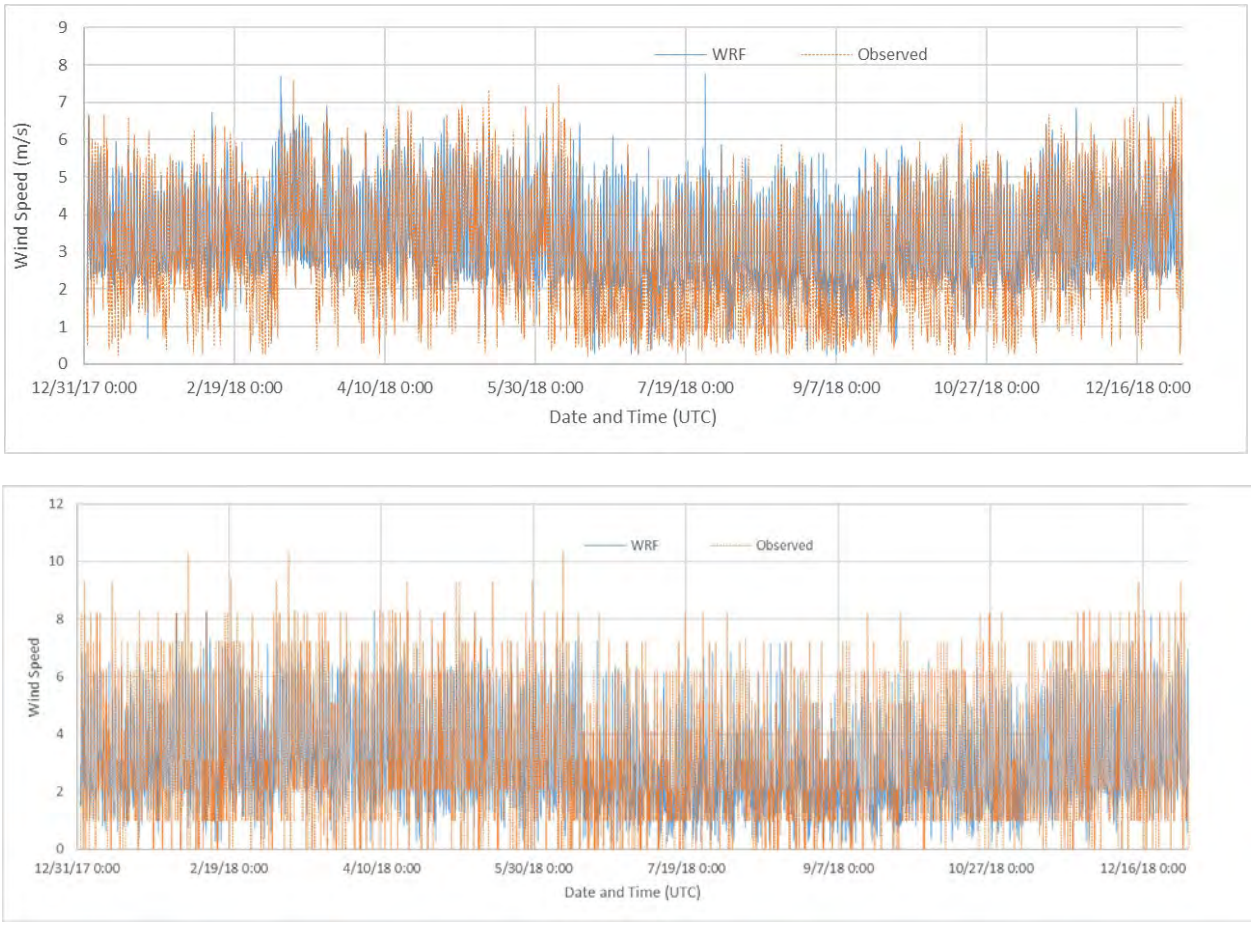


WRF Wind Rose at Cheddi Jagan

Observed wind rose at Cheddi Jagan

Figure 2-9: WRF-Predicted and Observed Wind Roses at Cheddi Jagan Airport

To understand the WRF characteristics, better time series plots of meteorological parameters can be used. Figure 2-10 shows a time series plot of the WRF-predicted wind speeds at the New Amsterdam and Cheddi Jagan Airport sites compared with the observed wind speeds at these locations. Overall, the WRF-predicted wind speeds track fairly closely to the observed data at both stations. At New Amsterdam, there is clearly a positive wind speed bias at night (at the lowest wind speeds). This is likely associated with the YSU PBL scheme, which can result in over-mixing during the nighttime PBL. This bias does not occur or is much weaker at Cheddi Jagan, which shows better agreement with the lowest wind speeds. At the Cheddi Jagan site, WRF shows a tendency to not capture the highest observed wind speeds, resulting in a somewhat low wind speed bias in the WRF data. The reason for this is unclear and may in part be due to the wind speed data quality at Cheddi Jagan.



UTC = Coordinated Universal Time

Figure 2-10: Time Series of Wind Speed at New Amsterdam and Cheddi Jagan Airport Monitoring Sites

The time series plot of 10-meter wind speed predicted by the WRF model simulations compared with the observed wind speeds at the New Amsterdam station shows that the WRF-predicted wind speed tracks closely to the observed data. However, the time series plot clearly shows positive wind speed bias in the WRF data at night, during relatively low wind speed conditions. This may be due to the YSU PBL scheme, which has a history of overmixing during nighttime hours, resulting in higher model predicted wind speeds compared to observed data. The lack of sufficient observational data prohibits a robust spatial assessment of this bias.

Figure 2-11 shows time series plots of WRF-predicted and observed wind direction for New Amsterdam and Cheddi Jagan Airport. These plots show good overall agreement between WRF and observed wind direction data. This plot shows clearly the dominant northeasterly wind direction in both the modeled and observed data.

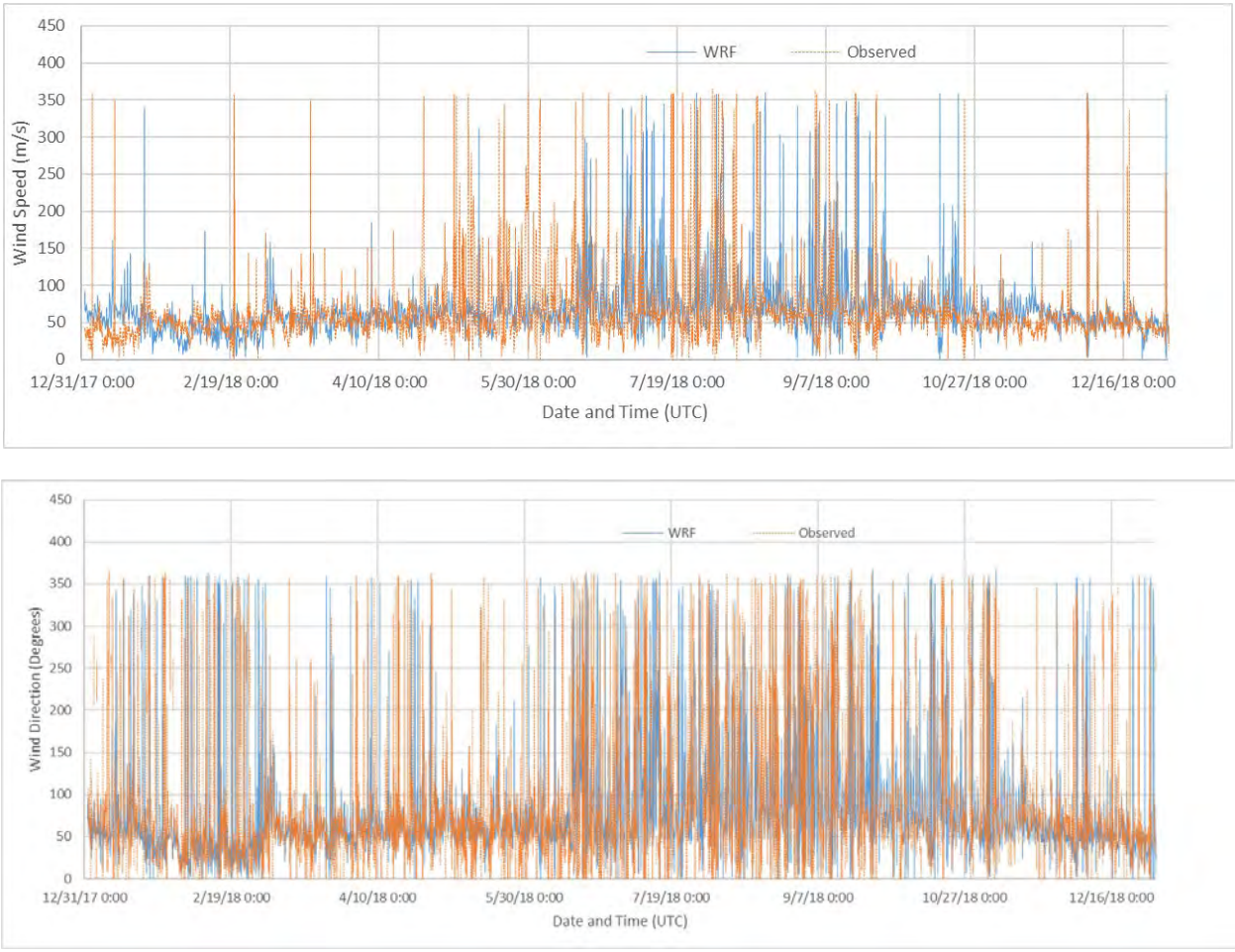


Figure 2-11: Time Series of Wind Direction at New Amsterdam and Cheddi Jagan Airport Monitoring Sites

Figure 2-12 shows similar plots of 2-meter temperature from WRF and the observed data. Again, good overall agreement is shown for 2018. The data at New Amsterdam show that WRF displays a wider diurnal range of temperature, but the overall temperature tracks well with the observed data. Generally good overall agreement between WRF and the observed temperature at Cheddi Jagan Airport is shown.

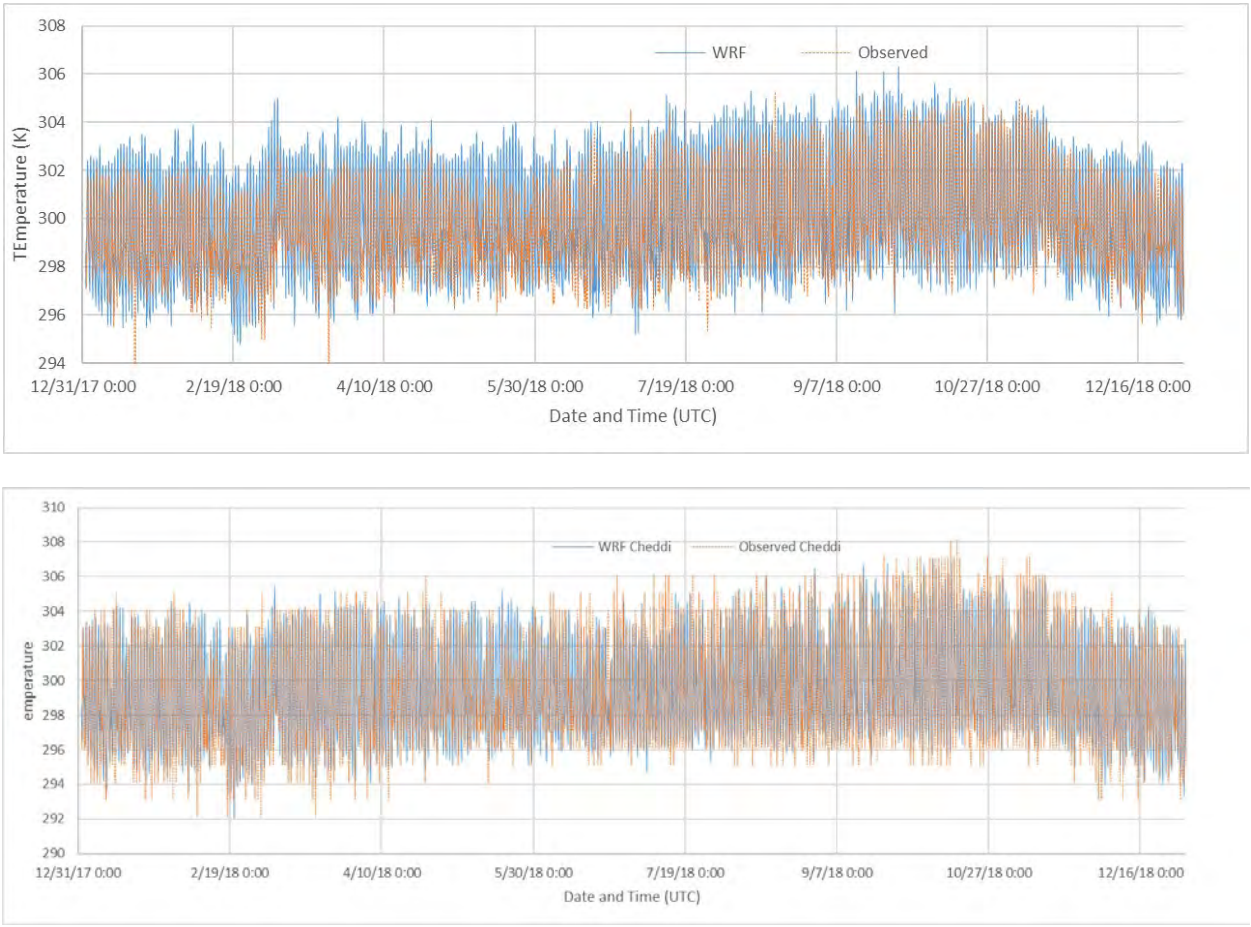


Figure 2-12: Time Series Plots Temperature at New Amsterdam and Cheddi Jagan Airport Monitoring Sites

Figure 2-13 shows two wind field plots on the 1-kilometer domain at two different dates. These plots show an example of the WRF-simulated 10-meter wind field. The northeast tradewind flow is clearly shown, with speeds on the order of 6 to 10 m/s over the ocean. This is consistent with tradewind climatology. Also notable is the reduction of wind speed as the flow crosses the coastline due to increased surface roughness and associated surface drag.

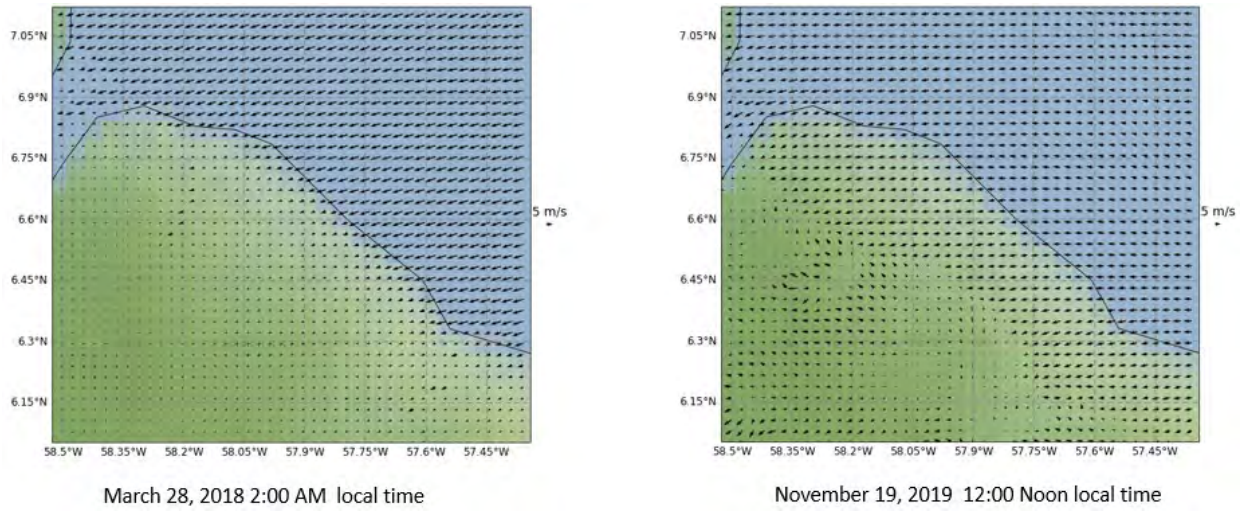


Figure 2-13: WRF-simulated Wind Fields

2.5.5 WRF-based Meteorological Data for AERMOD

The hourly meteorological data for the AERMOD model were developed from the WRF data using the Mesoscale Model InterFace (MMIF, version 3.4.2) program. This program extracts the meteorological fields from the WRF model output and processes this data into a format that can be used by the AERMET meteorological processor. AERMET version 21112 was run to develop AERMOD-formatted meteorological files (surface and vertical profile data). The extraction of WRF data using MMIF was performed at the coordinate 6.641826 degrees north, 58.234280 degrees west for the WRF data period 2017 to 2019.

Figure 2-14 shows a 3-year 10-meter wind rose at a location near the NGL Plant site. This wind rose clearly shows the dominant northeasterly wind flow, consistent with the characteristics of the tradewind belt. This wind rose shows that the higher wind speeds have a lower frequency compared to the Cheddi Jagan wind rose. Otherwise, the wind characteristics are generally consistent with the wind statistics from Cheddi Jagan Airport and the New Amsterdam monitoring station.

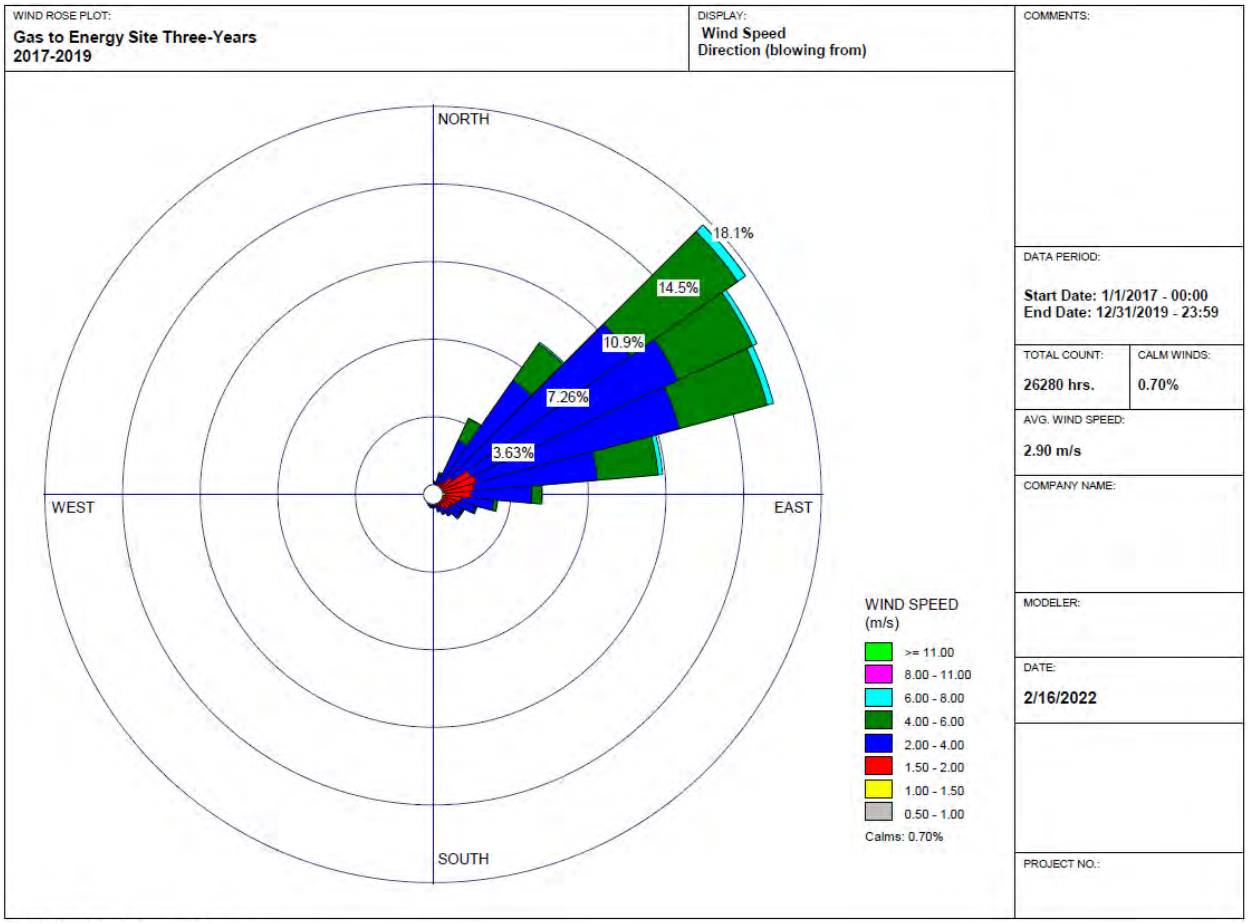


Figure 2-14: Wind Rose for 2017–2019 at the NGL Plant Site

3. EMISSIONS INVENTORY AND SOURCE CHARACTERISTICS

This section describes the emissions and source characteristics used to create the Project's emissions inventory and to conduct air quality modeling. In addition, as part of the cumulative case, this section contains assumed and estimated emissions from Power Plant sources. Emissions and source characteristics for the offshore sources modeled as part of the cumulative case are described in detail in Appendix G, Emissions Inventory and Air Quality Modeling Report, of the Yellowtail Development Project EIA.

3.1 Estimated Project Emissions

Project emissions will be generated by the following sources at the NGL Plant:

- Hot oil heaters
- Molecular sieve regeneration gas heater
- Cold flare
- Wet flare
- Essential generator
- Emergency generator

Figure 3-1 shows the modeled locations for these Project sources.

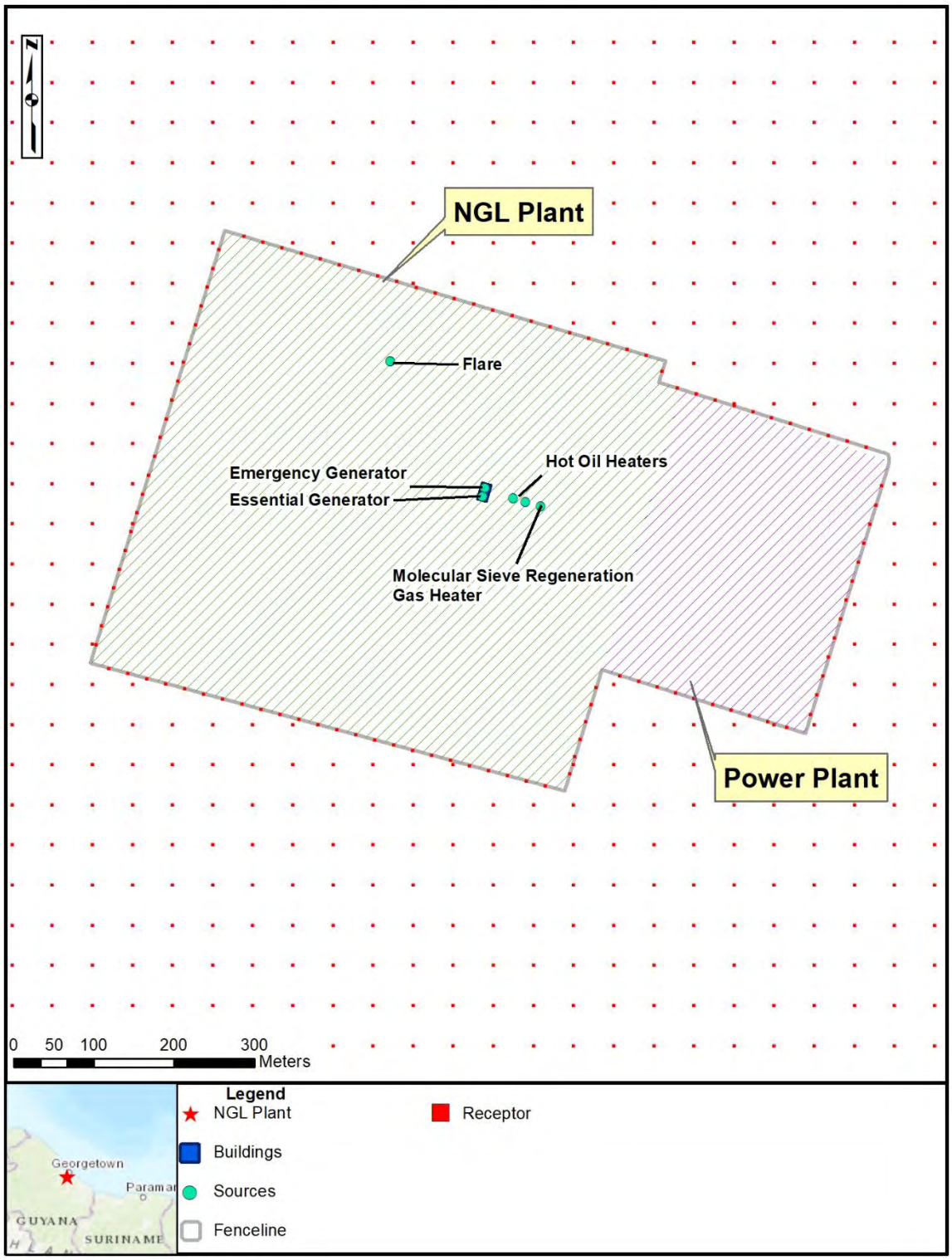


Figure 3-1: Modeled Project Source Locations

The main sources of routine emissions for the NGL Plant are the hot oil heaters and the molecular sieve regeneration gas heater. The hot oil heaters are part of the hot oil system, which provides the heat required by the NGL Plant and the inlet facilities. The hot oil heaters are supplied by fuel gas before sending the heating medium to hot oil users. Preliminary provision is to have a redundant configuration of two hot oil heaters to allow for an increase in reliability to ensure that the heating medium is available more consistently. The current design includes the ability for one hot oil heater to provide sufficient heating duty to send rich gas directly to the Power Plant. The hot oil heaters are expected to run constantly (8,760 hours per year). Emissions were calculated based on the NGL Plant operating at 60 MMscfd and associated fuel gas consumption from all continuous hot oil heater users and one major intermittent user. The overall heater efficiency used in calculations was 75 percent. Emission factors from AP-42, *Compilation of Air Pollutant Emissions Factors*, Chapter 1.4, Natural Gas Combustion (USEPA 2008), were utilized for emission calculations as summarized in Table 3-1. Because low NOx burners will be used as controls for the hot oil heater, the emission factors representative of this technology were applied.

The molecular sieve regeneration gas heater is part of the gas dehydration unit, which serves to remove water from the gas to avoid freezing in the NGL recovery unit. A two-bed configuration of the molecular sieve vessels allows for one bed to remain in normal operation by adsorbing the wet gas, while the other is being thermally regenerated to desorb the compounds which were loaded during the adsorption steps. The desorption stage requires a fuel gas supply from the NGL Plant's fuel gas system and heat from the molecular sieve regeneration gas heater. It is anticipated that the molecular sieve regeneration gas heater will only operate during the initial switch-out of one bed to the other. However, for the purposes of modelling, a conservative estimate is to assume that the molecular sieve regeneration gas heater will operate constantly (8,760 hours per year). A 10 percent design contingency with 75 percent overall heater efficiency was added for emission calculations. Similar to the hot oil heater, emission factors from AP-42 Chapter 1.4, Natural Gas Combustion (USEPA 2008), for low NOx burners were used, as summarized in Table 3-1.

Other sources of emissions from the NGL Plant include the combustion of flare pilot and purge gas that is required to maintain the flares in a safe operational state. The purpose of the flare pilot and purge gas is to prevent oxygen from potentially entering the flare if there is not a constant supply of gas. For this purpose, the hours of operation for flare pilot and purge gas considered for modeling was 8,760 hours per year. Pilot and purge gas will be supplied by the fuel gas system and will be routed to both the wet and cold flares. Emission factors from AP-42 Chapter 13.5, Industrial Flares (USEPA 2018), were used for emission calculations, as summarized in Table 3-1.

An estimated quantity of intermittent emission sources as well as potential non-routine flaring emissions was accounted for in the emissions inventory. Potential intermittent sources to the flare include vapors from storage bullets and loading racks. Potential non-routine emissions include flaring of gas from initial start-up; maintenance purging; maintenance pigging; and gas-freeing of process equipment during maintenance events (e.g., vessel inspections and molecular sieve change-outs), Power Plant turbine trips, power demand swings, and NGL Plant process upsets. The emissions sources and estimates reflect the conceptual stage of Project definition and are subject to updates during Front-end Engineering Design (FEED) and detailed design.

The essential and emergency generators are also considered sources of non-routine emissions, as they are expected to operate only intermittently. The essential generator will supply power during start-up or when the power supply from the Power Plant is not available. The emergency generator will have black-start capabilities. This generator will provide power to the electric firewater pumps; emergency/egress lighting; control room heating, ventilating, and air-conditioning (HVAC) systems; uninterruptible power supply (UPS) systems; and any other emergency power users. The essential generators are designed for a driver rating of 7,500 kilowatts, and the emergency generators are designed for 500 kilowatts. The

primary fuel for the generators will be diesel, which will be pumped from the diesel storage tank by the diesel pump during a non-routine event. For emission calculations, the volume of diesel required was estimated based on a generator efficiency of 35 percent and a 46 megajoule/kilogram heating value. The sulfur content of fuel was assumed to be 0.1 percent (weight basis). For the purpose of modeling, both generators are estimated to operate for 72 hours per year. Emission factors from AP-42 Chapter 3.3, Gasoline and Diesel Industrial Engines, and Chapter 3.4, Large Stationary Diesel and All Stationary Dual-Fuel Engines (USEPA 1996), were used, as summarized in Table 3-1.

Flaring during a blowdown event was also considered. A blowdown event is considered non-routine, as it will only happen during an emergency event such as hydration formation in the pipeline or when a potential leak requires a complete inventory blowdown. Based on a preliminary flow assurance analysis, a full blowdown of the pipeline inventory will result in an average flare rate of 36 million standard cubic feet per day over a duration of approximately 5 days, or 120 hours. Emission factors from AP-42 Chapter 13.5, Industrial Flares (USEPA 2018), were used for the blowdown event emissions calculations, as summarized in Table 3-1.

Table 3-1: Emission Factors Used for the NGL Plant Emissions Calculations

Source	Pollutant	Emission Factors	Reference
Hot oil heater	NOx	Small boilers (<100 MMBtu/hr): 50 lb/10^6 scf	AP-42 Table 1.4-1
	PM	PM (Total): 7.6 lb/10^6 scf	AP-42 Table 1.4-2
	CO	Small Boilers (<100 MMBtu/hr): 84 lb/10^6 scf	AP-42 Table 1.4-1
	SO_2	None. Based on 100% conversion of fuel sulfur to SO_2	None
Molecular sieve regeneration gas heater	NOx	Small boilers (<100 MMBtu/hr): 50 lb/10^6 scf	AP-42 Table 1.4-1
	PM	PM (Total): 7.6 lb/10^6 scf	AP-42 Table 1.4-2
	CO	Small Boilers (<100 MMBtu/hr): 84 lb/10^6 scf	AP-42 Table 1.4-1
	SO_2	None. Based on 100% of fuel sulfur to SO_2	None
Flare tips, purge gas, blanketing, & miscellaneous duties	NOx	Nitrogen oxides, elevated flares: 0.068 lb/10^6 Btu	AP-42 Table 13.5-1
	CO	Carbon monoxide: 0.31 lb/10^6 Btu	AP-42 Table 13.5-2
	SO_2	None. Based on 100% conversion of fuel sulfur to SO_2	None
Essential generator	NOx	Uncontrolled Large Diesel Engine: 3.2 lb/MMBtu	AP-42 Table 3.4-1
	PM	Large diesel engine: 0.1 lb/MMBtu	AP-42 Table 3.4-1
	CO	Large diesel engine: 0.85 lb/MMBtu	AP-42 Table 3.4-1
	SO_2	None. Based on 100% conversion of fuel sulfur to SO_2	None

Source	Pollutant	Emission Factors	Reference
Emergency generator	NOx	Small diesel engine: 4.41 lb/MMBtu	AP-42 Table 3.3-1
	PM	Small diesel engine: 0.31 lb/MMBtu	AP-42 Table 3.3-1
	CO	Small diesel engine: 0.95 lb/MMBtu	AP-42 Table 3.3-1
	SO_2	None. Based on 100% conversion of fuel sulfur to SO_2	None
Blowdown flaring	NOx	Nitrogen oxides, elevated flares: 0.068 lb/10^6 Btu	AP-42 Table 13.5-1
	CO	Carbon monoxide: 0.31 lb/10^6 Btu	AP-42 Table 13.5-2
	SO_2	None. Based on 100% conversion of fuel sulfur to SO_2	None

Btu = British thermal unit; hr = hour; lb = pound; MMBtu = million British thermal unit; scf = standard cubic foot

Table 3-2 provides a summary of the estimated annual Project emissions across a range, with two scenarios representing the range: a “lower-end” scenario (including operation of the heaters, cold and wet flares, estimated safety and other flaring [see above for potential sources of flaring taken into account], and intermittent operation of the essential and emergency generators); and a “higher-end” scenario (based on an additional amount of non-routine flaring including an assumed single annual occurrence of a flaring event involving a full blowdown of the pipeline and NGL Plant inventory). For these scenarios, emissions from the following sources were modeled:

- Lower-end: hot oil and molecular sieve regeneration gas heaters, cold and wet flares (inclusive of an assumed amount of flaring as described above), and essential and emergency generators (intermittent, with assumed total operating time); and
- Higher-end: hot oil and molecular sieve regeneration gas heaters, cold and wet flare (inclusive of an assumed amount of flaring as described above), essential and emergency generators (intermittent, with assumed total operating time), and emergency flaring through a wet flare (single annual blowdown event assumed).

Based on the intermittent nature of their operations (as shown in Table 3-2), the emergency generator, essential generator, and emergency flaring were modeled with annualized emission rates for comparison to all averaging period thresholds. All other sources were modeled at peak emission rates for comparison to short-term averaging period thresholds (10-minute, 15-minute, 1-hour, 8-hour, 24-hour) and at annualized emission rates for comparison to annual averaging period thresholds.

Table 3-2: Summary of Estimated Project Annual Air Emissions [5]

Pollutant	Source Category	Hours of Operation per Year	Lower-end Scenario	Higher-end Scenario
			Estimated Range of Annual Emissions (tonnes)	
Nitrogen oxides (NOx)	Hot Oil Heaters	8,760	1.31E+01	1.31E+01
	Molecular Sieve Regeneration Gas Heater	8,760	6.70E-01	6.70E-01
	Flaring [b]	8,760	1.97E+01	2.70E+01
	Essential Generator [b]	72	7.17E+00	7.17E+00
	Emergency Generator [b]	72	6.59E-01	6.59E-01
	Total		4.13E+01	4.86E+01
Sulfur dioxide (SO_2)	Hot Oil Heaters	8,760	3.00E-01	3.00E-01
	Molecular Sieve Regeneration Gas Heater	8,760	2.00E-02	2.00E-02
	Flaring [b]	8,760	2.28E+00	3.74E+00
	Essential Generator [b]	72	2.41E-01	2.41E-01
	Emergency Generator [b]	72	1.60E-02	1.60E-02
	Total		2.86E+00	4.31E+00
Particulate matter (PM) [a]	Hot Oil Heaters	8,760	2.01E+00	2.01E+00
	Molecular Sieve Regeneration Gas Heater	8,760	1.00E-01	1.00E-01
	Flaring [b]	8,760	0.00E+00	0.00E+00
	Essential Generator [b]	72	1.35E-01	1.35E-01
	Emergency Generator [b]	72	4.87E-02	4.87E-02
	Total		2.29E+00	2.29E+00
Carbon monoxide (CO)	Hot Oil Heaters	8,760	2.20E+01	2.20E+01
	Molecular Sieve Regeneration Gas Heater	8,760	1.12E+00	1.12E+00
	Flaring [b]	8,760	8.30E+01	1.13E+02
	Essential Generator [b]	72	1.91E+00	1.91E+00
	Emergency Generator [b]	72	1.42E-01	1.42E-01

[5] The emissions sources and estimates reflect the conceptual stage of Project definition and are subject to updates during FEED and detailed design. If during the detailed design stage of the NGL Plant equipment sizing or design changes cause a major impact to the emissions estimates, the Project will document the change and provide an updated basis.

Pollutant	Source Category	Hours of Operation per Year	Lower-end Scenario Estimated Range of Annual Emissions (tonnes)	Higher-end Scenario Estimated Range of Annual Emissions (tonnes)
	Total		1.08E+02	1.38E+02
Greenhouse gases (GHGs) (kilotonnes carbon dioxide-equivalents) [c]	Hot Oil Heaters	8,760	2.46E+01	2.46E+01
	Molecular Sieve Regeneration Gas Heater	8,760	1.62E+00	1.62E+00
	Flaring [b]	8,760	3.95E+01	5.39E+01
	Essential Generator [b]	72	8.20E-04	8.20E-04
	Emergency Generator [b]	72	1.50E-07	1.50E-07
	Total		6.57E+01	8.00E+01
Non-methane volatile organic compounds (VOCs) [c]	All Sources	8,760	1.53E+02	1.91E+02

NA = not applicable; $PM_{2.5}$ = particulate matter (aerodynamic diameter less than 2.5 microns); PM_{10} = particulate matter (aerodynamic diameter less than 10 microns); VOC = volatile organic compounds

[a] PM emissions represent total PM; for the purpose of the impact assessment, the results from modeling of total PM values were used for comparison to both PM_{10} standards and $PM_{2.5}$ standards (a conservative assumption).

[b] The emission rates in this table reflect estimated annual totals. Emissions for intermittent sources, such as emergency flaring and generators, were annualized.

[c] Total non-methane VOC and GHG emissions are shown in this table but were not modeled, as there are no ambient air quality criteria for these parameters.

3.2 Estimated Power Plant Emissions (for Cumulative Case Modeling)

The assumption basis for cumulative case modeling includes a Power Plant with a predicted net nominal output of 300 megawatts, with the Power Plant located immediately adjacent to the NGL Plant (see Figure 1-1). The Power Plant will be fired with natural gas from the NGL Plant, with an assumed consumption rate of 51.93 MMscfd of lean gas. Emission factors from AP-42 Chapter 3.1, Stationary Gas Turbines, were utilized for emission calculations (USEPA 2000).

It is assumed that the proposed Power Plant will consist of six natural gas-fired combined cycle gas turbines with a heat recovery steam generator equipped with duct burners and a steam turbine in a three by two configuration. The combined cycle gas turbine units will be exclusively natural gas-fired and will operate 8,760 hours per year. NOx emissions are assumed to be controlled with a selective catalytic reduction control technology. Assumed ancillary equipment associated with the Power Plant includes an air-cooled condenser, small air-cooling tower, emergency diesel generator, emergency diesel firewater pump, and auxiliary boiler. The latter three sources were included in the modeling analysis, together with four turbines operating in a normal mode.

Table 3-3 provides a summary of estimated annual emissions from assumed normal operations of the Power Plant. Based on the intermittent nature of their operations (as shown in Table 3-1), the emergency engine and firewater pump were modeled with annualized emission rates for comparison to all averaging period thresholds. All other sources were modeled at peak emission rates for comparison to short-term averaging period thresholds (10-minute, 15-minute, 1-hour, 8-hour, 24-hour) and at annualized emission rates for comparison to annual averaging period thresholds

Table 3-3: Summary of Estimated Power Plant Annual Air Emissions

			Normal Operations
Pollutant	Source Category	Hours of Operation per Year	Maximum Annual Emissions (tonnes)
Nitrogen oxides (NOx)	Combustion Turbines	8,760	1.43E+02
	Auxiliary Boiler	8,760	3.18E+00
	Emergency Diesel Generator	100	2.39E-01
	Emergency Diesel Fire Water Pump	100	5.97E-02
	Total		1.46E+02
Sulfur dioxide (SO_2)	Combustion Turbines	8,760	0.00E+00
	Auxiliary Boiler	8,760	5.52E-01
	Emergency Diesel Generator	100	2.41E-04
	Emergency Diesel Fire Water Pump	100	9.65E-05
	Total		5.52E-01
Particulate matter (PM) [a]	Combustion Turbines	8,760	2.13E+01
	Auxiliary Boiler	8,760	2.36E+00
	Emergency Diesel Generator	100	7.46E-03
	Emergency Diesel Fire Water Pump	100	2.99E-03
	Total		2.37E+01
Carbon monoxide (CO)	Combustion Turbines	8,760	1.68E+02
	Auxiliary Boiler	8,760	1.59E+01
	Emergency Diesel Generator	100	1.31E-01

Pollutant	Source Category	Hours of Operation per Year	Normal Operations Maximum Annual Emissions (tonnes)
	Emergency Diesel Fire Water Pump	100	5.22E-02
	Total		1.84E+02
Greenhouse gases (GHGs) (kilotonnes carbon dioxide-equivalents) [c]	Combustion Turbines	8,760	1.40E+03
	Auxiliary Boiler	8,760	3.72E+01
	Emergency Diesel Generator	100	2.60E-02
	Emergency Diesel Fire Water Pump	100	1.04E-02
	Total		1.44E+03
Non-methane volatile organic compounds (VOCs) [c]	All Sources		5.23E+01

[a] PM emissions represent total PM; for the purpose of the impact assessment, the results from modeling of total PM values were used for comparison to both PM_{10} standards and $PM_{2.5}$ standards (a conservative assumption).

[b] The emission rates in this table reflect annual totals. Emissions for intermittent sources, such as emergency flaring and generators, were annualized.

[c] Total non-methane VOC and GHG emissions are shown in this table but were not modeled, as there are no ambient air quality criteria for these parameters.

3.3 Source Characteristics

Dispersion models allows for emission units to be represented as point, area, or volume sources. In this analysis, point sources were utilized for all emission sources in the Project-only case and all emissions sources except for some offshore sources (which were modeled as area sources) for the cumulative case. For point sources with unobstructed vertical releases, it is appropriate to use actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity) in the modeling analyses. All stationary emission sources at the NGL Plant and Power Plant have an unobstructed vertical release and were therefore modeled as point sources.

Table 3-4 summarizes the stack parameters used for modeling of the NGL Plant and Power Plant sources, along with the stack locations in Universal Transverse Mercator (UTM) coordinates.

Two ground flares located next to each other with a common enclosure were modeled as a modified single point source, with adjustments made to account for and maintain buoyancy of the hot plume in accordance with the procedures outlined in USEPA's *AERSCREEN User's Guide* (USEPA 2011). The temperature (1,273 degrees Kelvin) and stack exit velocity (20 m/s) were modeled using the AERSCREEN default values and the stack height and diameter were modeled using the effective stack height and diameter calculated using the formulas in the *AERSCREEN User's Guide* (USEPA 2011) and as shown in Table 3-5. Specifically, effective height and diameter were calculated using the following equations:

Equation 1:

$$D_{eff} = 9.88 \times 10^{-1} \times \sqrt{HR \times (1 - HL)}$$

Equation 2:

$$H_{eff} = H_s + 4.56 \times 10^{-3} \times HR^{0.478}$$

Where:

D_{eff}	=	Effective stack diameter	(meters)
HR	=	Heat release rate	(cal/sec)
HL	=	Heat loss fraction (default = 0.55)	(decimal fraction)
H_{eff}	=	Effective stack height	(feet)
H_s	=	Actual flare height	(feet)

Table 3-4: Assumed NGL Plant and Power Plant Stack Parameters for Modeling

Name	UTM-E meters	UTM-N meters	Base Elevation meters	Height Above Base Elevation meters	Exhaust Temp Kelvin	Diameter meters	Exhaust Velocity m/s
NGL Plant							
Hot Oil Heater 1	363602.39	734347.71	6.00	35.00	624.00	1.96	19.39
Hot Oil Heater 2	363618.16	734343.00	6.00	35.00	624.00	1.96	19.39
Molecular Sieve Regeneration Gas Heater	363636.97	734337.26	6.00	35.00	624.00	1.96	19.39
Non-Blowdown Flaring	363449.91	734518.36	6.00	6.55 [a]	1273.00 [b]	1.33 [a]	20.00 [b]
Blowdown Flaring	363449.91	734518.36	6.00	7.85 [a]	1273.00 [b]	1.61 [a]	20.00 [b]
Essential Generator	363564.92	734349.79	6.00	15.50	578.15	0.31	56.23
Emergency Generator	363567.33	734360.05	6.00	3.20	719.15	0.30	59.85
Power Plant							
Turbine 1	363789.77	734257.37	5.00	30.48	355.37	3.28	15.54
Turbine 2	363812.08	734250.49	5.00	30.48	355.37	3.28	15.54
Turbine 3	363854.32	734237.23	5.00	30.48	355.37	3.28	15.54
Turbine 4	363877.38	734230.21	5.00	30.48	355.37	3.28	15.54
Turbine 5	363919.52	734216.89	5.00	30.48	355.37	3.28	15.54
Turbine 6	363942.44	734209.5	5.00	30.48	355.37	3.28	15.54
Auxiliary Boiler	363783.14	734262.70	5.00	48.73	343.15	0.86	20.96
Emergency Diesel Generator	363790.41	734310.09	5.00	3.20	719.15	0.30	59.85
Emergency Diesel Fire Water Pump	364000.20	734240.55	5.00	4.27	869.82	0.15	55.19

UTM-E = Universal Transverse Mercator East; UTM-N = Universal Transverse Mercator North, Zone 21N, North American Datum 1983

[a] Effective height/diameter calculated based on heat release to maintain buoyancy flux as shown in Table 3-5.

[b] Default parameters for flares of 20 m/s exit velocity and 1,273 degrees Kelvin exhaust temperature.

Table 3-5: Flare Effective Parameters Calculations

Description	Gas Usage MMscf/hr	Gas HHV Btu/scf	Total Heat Release MMBtu/hr	Total Heat Release cal/sec	Sensible Heat Release cal/sec	Effective Stack Diameter [a] meters	Physical Stack Height meters	Effective Stack Height [a] meters
Non-Blowdown Flaring	4.48E-02	1284.6	57.6	4.03E+06	1.81E+06	1.33	0.00	6.55
Blowdown Flaring [b]	6.54E-02	1284.6	84.1	5.88E+06	2.65E+06	1.61	0.00	7.85

Btu/scf = British thermal units per standard cubic foot; cal/sec = calories per second; HHV = higher heating value; MMBtu/hr = million British thermal units per hour; MMscf/hr = million standard cubic feet per hour

[a] Effective diameter and effective stack height calculated based on USEPA (2011) guidance, using 20 meters per second exit velocity and 1,273 degrees Kelvin exhaust temperature.

[b] Blowdown flaring values include gas from the intermittent and non-routine flaring reflected in the lower-end scenario plus gas associated with a blowdown event.

3.4 Estimated EEPGL Offshore Activities Emissions (for Cumulative Case Modeling)

Estimated emissions from the existing and planned EEPGL offshore activities were included in the cumulative case modeling along with the NGL Plant and Power Plant emissions. The offshore sources are shown on Figure 3-2 and include the following activities:

- Exploration drilling through end of 2028;
- Liza Phase 1 Development Project (FPSO operation);
- Liza Phase 2 Development Project (FPSO operation);
- Payara Development Project (development well drilling; installation, commissioning, and start-up; and FPSO operation);
- Yellowtail Development Project (development well drilling; installation, commissioning, and start-up; and FPSO operation);
- Uaru Development Project (development well drilling; installation, commissioning, and start-up; and FPSO operation); and
- A sixth development project (referred to herein as “FPSO #6”; development well drilling; installation, commissioning, and start-up; and FPSO operation).

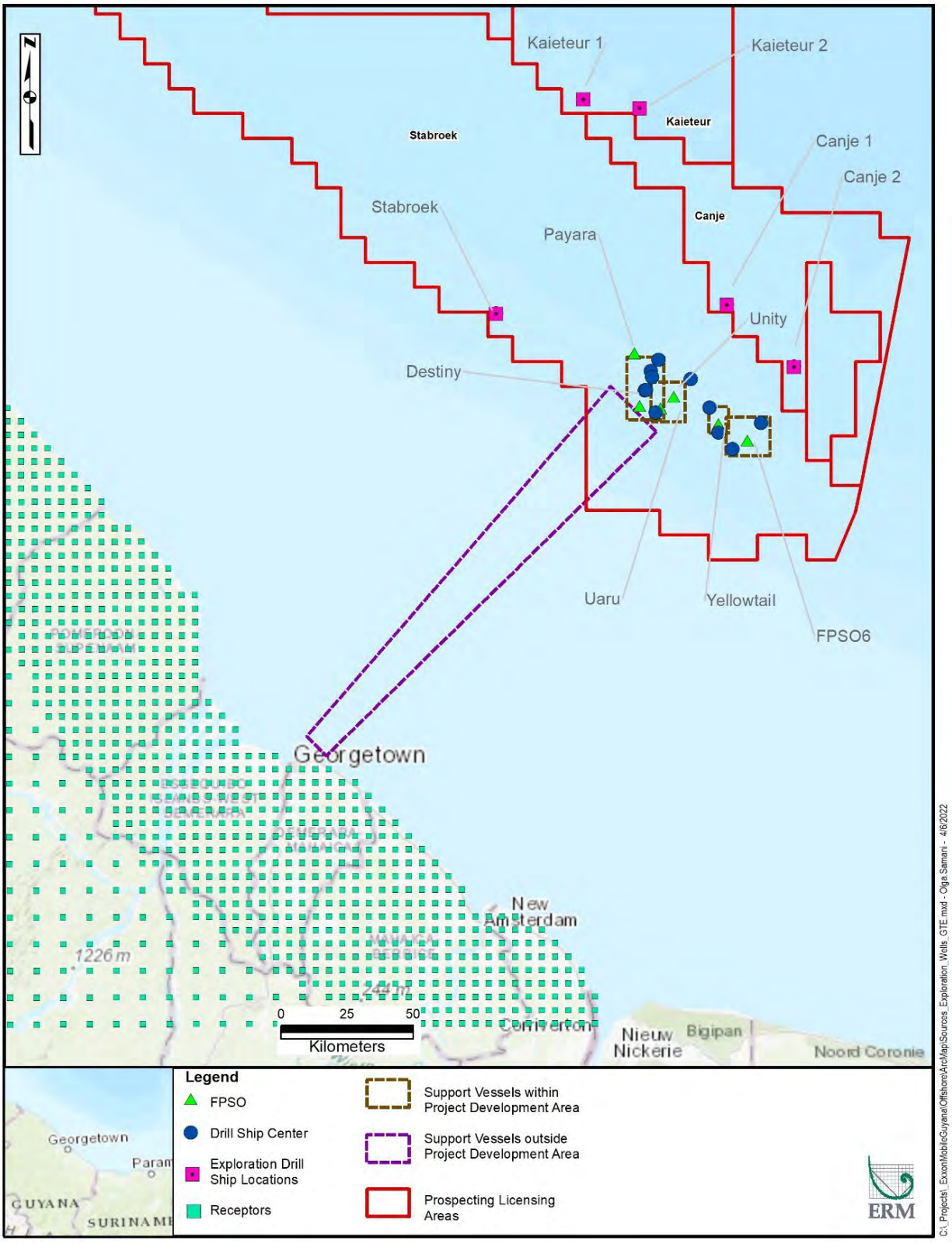


Figure 3-2: Offshore Sources Included in the Cumulative Modeling

Table 3-6 summarizes the estimated maximum annual emissions from the above offshore activities for the year 2025. Considering the full scope of activities cumulative case described above, 2025 is the year resulting in the highest total predicted onshore ground-level concentrations for all criteria pollutants.

Because the offshore sources considered are located outside of the limit of the AERMOD model (50-kilometer limit), modeling them together with the onshore cumulative case components using AERMOD would result in unreliable predictions. Instead, the predicted concentrations used to represent contribution from the offshore projects were taken from the nearest receptor from the receptor grid established for the Yellowtail Development Project EIA cumulative case modeling. This modeling was conducted with the long-transport model CALPUFF. As a conservative measure, the peak concentration from the offshore activities for each pollutant and averaging period from this location was used as addition to the NGL Plant and Power Plant cumulative case emissions predicted using AERMOD. This is a conservative measure because the maximum concentrations for the various pollutants and averaging periods do not occur at the same time or location as predicted maximum concentrations from onshore sources in the cumulative case.

3.5 Summary of Estimated Emissions for Cumulative Case Modeling

Table 3-6 summarizes the estimated annual emissions for the cumulative case (NGL Plant, Power Plant, and EEPGL offshore development projects). These emissions were used for the cumulative case modeling.

Table 3-6: Summary of Estimated Cumulative Case Annual Air Emissions

	Annual Emissions (tonnes)		
Pollutant	**NGL Plant [b]**	**Power Plant [b]**	**Offshore Sources 2025 [d]**
Nitrogen oxides (NOx)	41.3	146	21,451
Sulfur dioxide (SO_2)	2.9	0.6	1,266
Particulate matter (PM) [a]	2.3	23.7	992
Carbon monoxide (CO)	108.2	184	8,163
Total non-methane volatile organic compounds (VOCs) [c]	153.2	52.3	24,514
Greenhouse gases (GHGs) (kilotonnes carbon dioxide-equivalents) [c]	65.7	1,440	7,417

[a] PM emissions represent total PM; for the purpose of the impact assessment, the results from modeling of total PM values were used for comparison to both PM_{10} standards and $PM_{2.5}$ standards (a conservative assumption).

[b] The emission rates in this table reflect annual totals from continuous and intermittent sources. Emissions for intermittent sources, such as emergency flaring generators, and firewater pumps were annualized.

[c] Total non-methane VOC and GHG emissions are shown in this table but were not modeled, as there are no ambient air quality criteria for these parameters.

[d] Offshore sources include six FPSOs (Liza Phase 1, Liza Phase 2, Payara, Yellowtail, Uaru, FPSO #6), export tankers, drill ships, exploration drilling, support vessels, and helicopters.

3.6 Construction Emissions

While Construction stage emissions were not subjected to dispersion modeling, a Construction stage emissions inventory was prepared. The emission inventory for the Project's Construction stage was developed based on consideration of emissions from estimated fuel usage by non-road construction equipment that will be used for construction of the onshore and offshore components of the Project. As is often the case at the EIA phase for a project, a detailed construction plan and schedule for the Project has not been finalized at this time, but a conceptual plan has been developed, and the emissions

inventory presented herein for the Construction stage is based on a preliminary estimate of the types of equipment that will be used for construction, the estimated operating time for these types of equipment, and the estimated fuel consumption rates. Table 3-7 summarizes the key activities, preliminary equipment types supporting those activities, and operating days for construction of the three primary Project components. These preliminary estimates form the basis of the estimated Construction stage emissions inventory.

Table 3-7: Preliminary Summary of Fuel Usage by Construction Equipment during Project Construction Stage

Project Component	Activity	Total Fuel Usage (liters)
Offshore Pipeline	Deliveries for SURF installation	1,590
	SURF installation	37,188
	Deliveries for offshore pipeline installation	1,590
	Offshore pipeline installation	420,000
Onshore Pipeline	Clearing / RoW preparation	9,825,000
	Pipeline construction	420,000
	Trenching / backfill	14,144,000
	HDD operations	696,330
NGL Plant, Heavy Haul Road, Temporary MOF	Clearing	213,138
	Dewatering	250,560
	Cut	150,960
	Fill	102,540
	Deliveries from shorebases to temporary MOF	119,280
	Site Power	383,040
	Underground installation	1,903,140
	Aboveground installation	540,800
	Drainage / finish grade	2,197,560
	Dredging	33,5970
	Temporary MOF installation	622,924
	Deliveries from temporary MOF to NGL Plant site	165,960

Based on the preliminary information summarized in Table 3-7, the estimated total emissions of criteria pollutants for the approximately 3-year Construction stage are summarized in Table 3-8.

Table 3-8: Summary of Estimated Construction Stage Emissions from Fuel Combustion

Pollutant	Project Component	Estimated Emissions (tonnes)
Nitrogen oxides (NO_x)	Offshore Pipeline	3.81
	Onshore Pipeline	0.33
	NGL Plant, Heavy Haul Road, Temporary MOF	1.28
	Total	5.42
Sulfur dioxide (SO_2)	Offshore Pipeline	39.63
	Onshore Pipeline	21.43
	NGL Plant, Heavy Haul Road, Temporary MOF	72.68
	Total	133.73
Particulate matter (PM)	Offshore Pipeline	15.89
	Onshore Pipeline	2.21
	NGL Plant, Heavy Haul Road, Temporary MOF	11.94
	Total	30.05
Carbon monoxide (CO)	Offshore Pipeline	1.95
	Onshore Pipeline	0.47
	NGL Plant, Heavy Haul Road, Temporary MOF	1.46
	Total	3.88
Non-methane volatile organic compounds (VOCs)	Offshore Pipeline	47.75
	Onshore Pipeline	25.82
	NGL Plant, Heavy Haul Road, Temporary MOF	87.57
	Total	161.13
GHGs (kilotonnes carbon dioxide-equivalents)	Offshore Pipeline	45.46
	Onshore Pipeline	1.62
	NGL Plant, Heavy Haul Road, Temporary MOF	10.17
	Total	57.25

4. RESULTS

4.1 Ambient Air Quality Guidelines

Ambient air quality guidelines are concentration levels in air that are established to protect human health in locations where exposure can potentially occur. These generally include a margin of safety to ensure that vulnerable individuals are also protected. Guyana has not established specific ambient air quality standards; therefore, the guidelines used for reference in this assessment are those established by the World Health Organization (WHO) and the USEPA. WHO guidelines can be found in the *WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide—Global Update 2005* (WHO 2005) and the more recent WHO *Global Air Quality Guidelines* (WHO 2021). The current USEPA National Ambient Air Quality Standards (NAAQS) as of 1 October 2021 are summarized in the Code of Federal Regulations, Title 40, Part 50 (40 CFR Part 50) (USEPA 1990). The ambient air quality guidelines considered for the purpose of the assessment described herein are summarized in Table 4-1.

The WHO 2005 guidelines do not specify a "ranking" for values to be compared to short-term (10-minute to 8-hour) guidelines (e.g., the highest value, the second highest value, etc.); accordingly, the maximum observed or modeled concentration is used for comparison to WHO 2005 guidelines. Modeling for 1-hour standards involves predicting concentrations for every hour of each modeled year; this means that out of 8,760 concentration predictions per modeled year, the single highest value is used for comparison to a WHO 2005 1-hour guideline. By contrast, the WHO 2021 guidelines and USEPA NAAQS guidelines employ a statistically based metric for comparison to some guidelines (e.g., the 98th percentile value for 1-hour NO_2; the 99th percentile value for 24-hour NO_2; the 99th percentile value for 1-hour SO_2). For the air quality modeling presented herein, the WHO 2005 guideline and the 40 CFR Part 50 guideline for 1-hour NO_2 are both used for comparison purposes; the USEPA NAAQS guideline provides a more robust comparison that does not assess the single highest hourly value, while the WHO 2005 guideline considers the single highest hourly value—effectively representing an extreme upper bound estimate. Similarly, the WHO guideline and the USEPA NAAQS guideline for 24-hour PM with aerodynamic diameter less than 10 microns (PM_{10}) and PM with aerodynamic diameter less than 2.5 microns ($PM_{2.5}$) are both considered. For each pollutant and averaging time, if more than one guideline for a given averaging period is listed in the table below (e.g., annual average NO_2 and $PM_{2.5}$), the lowest was used in the assessment for conservatism.

Table 4-1: Ambient Air Quality Guidelines Considered in the Assessment

Pollutant	Averaging Period	Guideline Concentration (µg/m³ except as noted)		
		WHO 2005	WHO 2021	USEPA NAAQS
Nitrogen dioxide (NO_2)	1-hour [a]	200	-	-
	1-hour (98th percentile) [b]	-	-	188 (100 ppb)
	24-hour (99th percentile) [c]	-	25	-
	Annual [d]	-	10	100 (53 ppb)
Sulfur dioxide (SO_2)	10-minute [e]	500	-	-
	1-hour (99th percentile) [f]	-	-	196 (75 ppb)
	24-hour (99th percentile) [c]	-	40	-
Particulate matter (PM_{10})	24-hour (99th percentile) [c]	-	45	-
	24-hour (second high) [g]	-	-	150
	Annual [d]	-	15	-

Pollutant	Averaging Period	Guideline Concentration (µg/m³ except as noted)		
		WHO 2005	WHO 2021	USEPA NAAQS
Particulate matter ($PM_{2.5}$)	24-hour (99th percentile) [c]	-	15	-
	24-hour (98th percentile) [h]	-	-	35
	Annual	-	5 [d]	12 [i]
Carbon monoxide (CO)	15-minute [j]	100,000	-	-
	1-hour	35,000 [a]	-	40,000 (35 ppm) [k]
	8-hour	10,000 [l]	-	10,000 (9 ppm) [m]
	24-hour (99th percentile) [c]	-	4,000	

µg/m³ = micrograms per cubic meter; ppb = parts per billion; ppm = parts per million

[a] Maximum of the 1-hour average concentrations across all modeled years.

[b] Average of the 98th percentile 1-hour average concentrations for each of the modeled years.

[c] Maximum of the 99th percentile 24-hour average concentrations across all modeled years.

[d] Maximum of the annual average concentrations across all modeled years.

[e] Maximum of the 10-minute average concentrations across all modeled years.

[f] Average of the 99th percentile 1-hour average concentrations for each of the modeled years.

[g] Maximum of the second-highest 24-hour average concentrations across all modeled years.

[h] Average of the 98th percentile 24-hour average concentrations for each of the modeled years.

[i] Average of the annual average concentrations for each of the modeled years.

[j] Maximum of the 15-minute average concentrations across all modeled years.

[k] Maximum of the second-highest 1-hour average concentrations across all modeled years.

[l] Maximum of the 8-hour average concentrations across all modeled years.

[m] Maximum of the second-highest 8-hour average concentrations across all modeled years.

4.2 Assessment of Existing Airshed

To support interpretation of the result of air dispersion modeling, the guideline values shown in Table 4-1 were used to review existing conditions in the ambient airshed. To date, EEPGL has facilitated measurement of ambient onshore air concentrations of various pollutants at four locations in Guyana (i.e., Carifesta, New Amsterdam, New Guyana School, and Friendship Education Department). For each of the parameters subjected to modeling and each of the averaging periods for which a guideline is provided in Table 4-1, Table 4-2 shows the maximum measured concentrations for the same averaging periods based on consideration of the data from Carifesta, New Guyana School, and Friendship Education Department. The data from New Amsterdam were excluded from consideration for this assessment because the New Amsterdam monitoring site is significantly farther (approximately 90 kilometers) from the NGL Plant site as compared to the other three sites. The maximum measured concentrations were developed based on combining the separate monitoring campaigns for the three sites into a single data set. For $PM_{2.5}$ and PM_{10}, data for the ongoing program at the Friendship Education Department site were not available for the monitoring period to date because the PM measurement equipment was not operational for this period. Accordingly, the maximum concentrations for these parameters are based on consideration of only the Carifesta and New Guyana School monitoring sites. These maximum measured concentrations were used to represent the existing ambient air concentrations where a receptor could potentially be located.

The monitoring data suggest that the airshed is non-degraded for NOx, SO_2, and carbon monoxide (CO) and degraded (baseline existing concentrations exceed guideline concentrations) for PM_{10} and $PM_{2.5}$.

Table 4-2: Summary of Maximum Measured Baseline Ambient Air Concentrations from Combined Carifesta, New Guyana School, and Friendship Education Department Monitoring Sites

Pollutant	Averaging Period	Ranking	Maximum Concentration (µg/m^3)	Guideline Concentration (µg/m^3)	Airshed Designation
Nitrogen dioxide (NO_2)	1-hour	Max / 98th percentile	43.8 / 35.5	200 / 188	Non-degraded
	24-hour	99th percentile	10.3	25	Non-degraded
	Full Period [a] (314 days)	Max	1.7	10	Non-degraded
Sulfur dioxide (SO_2)	10-minute	Max	43.3	500	Non-degraded
	1-hour	99th percentile	21.5	196	Non-degraded
	24-hour	99th percentile	5	40	Non-degraded
Particulate matter (PM_{10}) [b]	24-Hour	99th percentile/2nd high	154.3 / 140.4	45 / 150	Degraded
	Full Period [a] (270 days)	Max	26.9	15	Degraded
Particulate matter ($PM_{2.5}$) [b]	24-Hour	99th percentile	53.1 / 58.8	15 / 35	Degraded
	Full Period [a] (270 days)	Max	10.1	5	Degraded
Carbon monoxide (CO)	15-minute	Max	2,767	100,000	Non-degraded
	1-hour	Max / 2nd high	1,726 / 1,660	35,000 / 40,000	Non-degraded
	8-hour	Max / 2nd high	1,385 / 1,317	10,000 / 10,000	Non-degraded
	24-hour	99th percentile	939	4,000	Non-degraded

[a] The maximum measured concentration across the aggregate number of monitoring days for the three monitoring sites (270 to 314 days depending on parameter) was compared to the annual guideline concentration.

[b] Maximum concentration based on consideration of Carifesta and New Guyana school monitoring data only.

The method used herein to consider existing background concentrations along with the results of modeling is based on the approach followed under the USEPA's New Source Review Prevention of Significant Deterioration program. Under this program, the USEPA establishes a screening level (referred to in the program as the Significant Impact Level [SIL]) to determine whether a source's modeled ambient impact is "significant" such that it warrants what the USEPA refers to as a "cumulative air quality analysis" to demonstrate compliance with guidelines. Where a proposed source's modeled impact is deemed "insignificant or *de minimis*" using the SIL as a threshold for significance, the proponent is not required to model anything besides its own proposed emissions increase to show that the proposed source will not result in an exceedance of a guideline. If the source's modeled impact is found to be "significant" (i.e., exceeding a SIL), the proponent is required to complete a comprehensive, cumulative air quality impact analysis to demonstrate that the source's emissions will not cause or contribute to an exceedance of a guideline. The cumulative air quality impact analysis in this use includes modeling impacts of other sources to account for the cumulative air quality impacts that are predicted to occur, as well as potential inclusion of ambient monitoring data. This approach is based on the USEPA's position that when a proposed source's impact by itself is not considered "significant," any further effort on the part of the proponent to complete a cumulative source impact analysis involving other source impacts would only yield information of trivial or no value with respect to the required evaluation of the proposed source.

Consistent with the approach described above, a value equal to 10 percent of the applicable guideline for each pollutant and averaging period was adopted as the screening criterion (i.e., the equivalent of the USEPA SIL). The EIA already models from the outset both a Project-only case and a cumulative case (involving modeling of Project emissions, Power Plant emissions, and other EEPGL offshore project emission). Therefore, the screening criterion was used solely to determine whether ambient background concentrations were added to the modeled concentrations for each case (i.e., Project-only and cumulative). Accordingly, for any pollutant with modeled impacts (not considering ambient background concentrations) greater than 10 percent of an applicable guideline for an averaging period, this report provides the predicted concentration (without ambient background) as well as the predicted concentration including ambient background.

4.3 Predicted Concentrations and Comparison to Guidelines

4.3.1 Project-only Case

Using the methodology described above, modeling was conducted with AERMOD to predict maximum ground-level concentrations of each pollutant as a result of emissions from Project sources for the normal operations (lower-end) and blowdown + normal operations (higher-end) scenarios. Modeling results were developed for each modeled pollutant and for each averaging period with an associated guideline concentration listed in Table 4-1.

The modeling results of the Project-only concentrations are summarized in Table 4-3. For the Project-only modeling, maximum predicted concentrations (without background) at any potential receptor location are predicted to be no more than 7.4 percent (corresponding to the 24-hour average NO_2 concentration for the higher-end scenario) of the applicable guideline for all pollutants and averaging periods. Accordingly, as per the methodology described above, since the predicted Project-only impacts are below the screening criterion of 10 percent for all constituents and averaging periods, ambient background concentrations were not added to the predicted Project-only concentrations.

Table 4-3: Summary of Modeling Results—Maximum Predicted Project (NGL Plant Operations) Impacts

Pollutant	Averaging Period	Ranking [a]	Guideline Concentration (µg/m³) [b]	Maximum Predicted Concentration (µg/m³) [b]		Percent of Guideline	
				Lower-end Scenario	Higher-end Scenario	Lower-end Scenario	Higher-end Scenario
Nitrogen dioxide (NO_2) [c]	1-hour	Max	200	12.72	14.48	6.4%	7.2%
	1-hour	98th percentile	188	8.16	7.90	4.3%	4.2%
	24-hour	99th percentile	25	1.81	1.85	7.2%	7.4%
	Annual	Max	10	0.70	0.70	7.0%	7.0%
Sulfur dioxide (SO_2)	10-minute	Max	500	2.12	2.75	0.4%	0.6%
	1-hour	99th percentile	196	0.91	1.16	0.5%	0.6%
	24-hour	99th percentile	40	0.14	0.20	0.4%	0.5%
Particulate matter (PM_{10}) [d]	24-hour	99th percentile	45	0.11	0.11	0.2%	0.2%
	24-hour	Second high	150	0.11	0.11	0.1%	0.1%
	Annual	Max	15	0.04	0.04	0.2%	0.3%

Pollutant	Averaging Period	Ranking [a]	Guideline Concentration (µg/m³) [b]	Maximum Predicted Concentration (µg/m³) [b]		Percent of Guideline	
				Lower-end Scenario	Higher-end Scenario	Lower-end Scenario	Higher-end Scenario
Particulate matter ($PM_{2.5}$) [d]	24-hour	99th percentile	15	0.11	0.11	0.7%	0.7%
	24-hour	98th percentile	35	0.10	0.10	0.3%	0.3%
	Annual	Max	5	0.04	0.04	0.7%	0.8%
Carbon monoxide (CO)	15-minute	Max	100,000	71.03	76.78	0.1%	0.1%
	1-hour	Max	35,000	53.83	58.19	0.2%	0.2%
	1-hour	Second high	40,000	36.81	40.80	0.1%	0.1%
	8-hour	Max	10,000	12.74	15.10	0.1%	0.2%
	8-hour	Second high	10,000	12.40	14.67	0.1%	0.1%
	24-hour	99th percentile	4,000	5.16	5.93	0.1%	0.1%

[a] The ranking of the modeled concentration was computed across the modeled meteorological years (2017–2019).

[b] WHO 2005; WHO 2021; 40 CFR 50

[c] NO_x to NO_2 conversion for AERMOD model-predicted concentrations was based on Plume Volume Molar Ratio Method.

[d] PM emissions represent total PM. A breakdown between PM_{10} and $PM_{2.5}$ is not available, so the full PM concentration was conservatively assigned to both PM_{10} and $PM_{2.5}$ for the purpose of comparison to guideline concentrations.

4.3.2 Cumulative Case

For the cumulative case, impacts from the following activities were considered:

- Project and Power Plant: These sources were modeled together with the AERMOD model, and predicted concentrations are thus paired in time and space. Modeling was conducted to predict maximum ground-level concentrations of each pollutant as a result of combined emissions (at the same time) from Project sources (lower-end scenario) and Power Plant sources. Table 4-4 summarizes the maximum AERMOD-predicted concentrations at any potential receptor location (without background) for the cumulative case.
- Offshore operations: These sources were modeled with the CALPUFF model, and thus are not paired in time and space with the Project and Power Plant sources modeled with the AERMOD model. The CALPUFF-predicted maximum concentrations for the CALPUFF receptor nearest to the NGL Plant were added to the AERMOD-predicted maximum ground level concentrations to produce estimated maximum ground-level concentrations for the cumulative case. Table 4-5 summarizes the maximum predicted concentrations at any potential receptor location (without background) for the cumulative case. To show the breakdown of contributions to these maximum predicted concentrations, Table 4-4 and Table 4-5 show concentrations separately for the Project, Power Plant, and EEPGL offshore sources.

Table 4-4 and Table 4-5 illustrate that the predicted cumulative case concentrations for NO_2 (all averaging periods and rankings) exceed 10 percent of the applicable guidelines. Accordingly, the measured ambient baseline concentrations from Table 4-2 (corresponding to the same averaging periods and rankings) for NO_2 were added to the predicted maximum concentrations for the cumulative case, with the resulting total (including ambient background) concentrations summarized in Table 4-6.

The total predicted concentrations (i.e., cumulative case sources plus ambient background concentrations) are below the guideline concentrations for NO_2 for all averaging periods and rankings.

Table 4-4: Summary of Modeling Results—Maximum Predicted Cumulative Case (NGL Plant and Power Plant) Impacts

Pollutant	Averaging Period	Ranking [a]	Guideline Concentration (µg/m³) [b]	Concentration from Project (NGL Plant) (µg/m³) [c]	Concentration from Power Plant (µg/m³) [c]	Total Maximum Predicted Concentration (µg/m³) [d]	Percent of Guideline
Nitrogen dioxide (NO_2) [e]	1-hour	Max	200	0.75	78.31	79.07	40%
	1-hour	98th percentile	188	0.05	19.82	19.87	11%
	24-hour	99th percentile	25	0.03	4.63	4.65	19%
	Annual	Max	10	0.11	2.30	2.41	24%
Sulfur dioxide (SO_2)	10-minute	Max	500	2.12	0.0005	2.12	0.4%
	1-hour	99th percentile	196	0.91	0.02	0.93	0.5%
	24-hour	99th percentile	40	0.14	0.002	0.15	0.4%
Particulate matter (PM_{10}) [f]	24-hour	99th percentile	45	0.002	0.86	0.86	2%
	24-hour	Second high	150	0.002	0.87	0.87	1%
	Annual	Max	15	0.007	0.43	0.44	3%
Particulate matter ($PM_{2.5}$) [f]	24-hour	99th percentile	15	0.002	0.86	0.86	6%
	24-hour	98th percentile	35	0.003	0.84	0.87	2%
	Annual	Max	5	0.007	0.43	0.44	9%
Carbon monoxide (CO)	15-minute	Max	100,000	1.17	136.17	137.34	0.1%
	1-hour	Max	35,000	0.89	103.20	104.09	0.3%
	1-hour	Second high	40,000	0.04	57.89	57.93	0.1%
	8-hour	Max	10,000	0.11	15.31	15.42	0.2%
	8-hour	Second high	10,000	0.11	15.03	15.15	0.2%
	24-hour	99th percentile	4,000	0.06	6.58	6.64	0.2%

[a] The ranking of the modeled concentration was computed across the modeled meteorological years (2017–2019).

[b] WHO 2005; WHO 2021; USEPA 1990

[c] Concentrations are the maximum predicted concentrations across the modeled meteorological conditions.

[d] Total maximum predicted concentration is a sum of the AERMOD-predicted impacts from the NGL Plant and Power Plant (paired in time and space).

[e] NOx to NO_2 conversion for AERMOD model-predicted concentrations was based on PVMRM.

[f] PM emissions represent total PM. A breakdown between PM_{10} and $PM_{2.5}$ is not available, so the full PM concentration was conservatively assigned to both PM_{10} and $PM_{2.5}$ for the purpose of comparison to guideline concentrations.

Table 4-5: Summary of Modeling Results—Maximum Predicted Cumulative Case (NGL Plant, Power Plant, and EEPGL Offshore Sources) Impacts

Pollutant	Averaging Period	Ranking [a]	Guideline Concentration (µg/m³) [b]	Total Maximum Predicted Concentration from Project (NGL Plant) and Power Plant (µg/m³) [c]	Maximum Predicted Concentration from EEPGL Offshore Activities (µg/m³) [d]	Total Maximum Predicted Concentration (µg/m³) [d]	Percent of Guideline
Nitrogen dioxide (NO_2) [e]	1-hour	Max	200	79.07	33.01	112.08	56%
	1-hour	98th percentile	188	19.87	9.52	29.39	16%
	24-hour	99th percentile	25	4.65	3.33	7.98	32%
	Annual	Max	10	2.41	0.23	2.64	26%
Sulfur dioxide (SO_2)	10-minute	Max	500	2.12	2.75	4.88	1%
	1-hour	99th percentile	196	0.93	1.62	2.55	1%
	24-hour	99th percentile	40	0.15	0.19	0.33	1%
Particulate matter (PM_{10}) [f]	24-hour	99th percentile	45	0.86	0.27	1.13	3%
	24-hour	Second high	150	0.87	0.47	1.35	1%
	Annual	Max	15	0.44	0.02	0.46	3%
Particulate matter ($PM_{2.5}$) [f]	24-hour	99th percentile	15	0.86	0.27	1.13	8%
	24-hour	98th percentile	35	0.87	0.47	1.31	4%
	Annual	Max	5	0.44	0.02	0.46	9%
Carbon monoxide (CO)	15-minute	Max	100,000	137.34	13.37	150.71	0.2%
	1-hour	Max	35,000	104.09	10.13	114.22	0.3%
	1-hour	Second high	40,000	57.93	9.63	67.56	0.2%
	8-hour	Max	10,000	15.42	7.96	23.39	0.2%
	8-hour	Second high	10,000	15.15	4.13	19.28	0.2%
	24-hour	99th percentile	4,000	6.64	1.04	7.68	0.2%

[a] The ranking of the modeled concentration was computed across the modeled meteorological years (2017–2019).

[b] WHO 2005; WHO 2021; USEPA 1990

[c] Total maximum predicted concentration is a sum of the AERMOD-predicted impacts from the NGL Plant and Power Plant (paired in time and space).

[d] CALPUFF-predicted concentrations from the offshore activities, not paired in time or space with the AERMOD-predicted impacts.

[e] NOx to NO_2 conversion for AERMOD model-predicted concentrations was based on PVMRM.

[f] PM emissions represent total PM. A breakdown between PM_{10} and $PM_{2.5}$ is not available, so the full PM concentration was conservatively assigned to both PM_{10} and $PM_{2.5}$ for the purpose of comparison to guideline concentrations.

Table 4-6: Summary of Modeling Results—Maximum Predicted Cumulative Case (NGL Plant, Power Plant, and EEPGL Offshore Sources) Impacts including Background Concentrations

Pollutant	Averaging Period	Ranking [a]	Guideline Concentration (µg/m^3) [b]	Total Maximum Predicted Concentration (µg/m^3) [c]	Ambient Background Concentration (µg/m^3)	Total Maximum Predicted Concentration + Background (µg/m^3) [d]	Percent of Guideline
Nitrogen dioxide (NO_2) [d]	1-hour	Max	200	112.08	43.8	155.88	78%
	1-hour	98th percentile	188	29.39	35.5	64.89	35%
	24-hour	99th percentile	25	7.98	10.3	18.28	73%
	Annual	Max	10	2.64	1.7	4.34	43%

[a] The ranking of the modeled concentration was computed across the modeled meteorological years (2017–2019).

[b] WHO 2005; WHO 2021; USEPA 1990

[c] Total maximum predicted concentration is a sum of the AERMOD-predicted impacts from the NGL Plant and Power Plant (paired in time and space), and CALPUFF-predicted concentrations from the offshore activities (not paired in time or space).

[d] NOx to NO_2 conversion for AERMOD model-predicted concentrations was based on PVMRM.

5. REFERENCES

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APPENDIX M

Pipeline Alignment and Vegetation Mapbook

Submitted with changes

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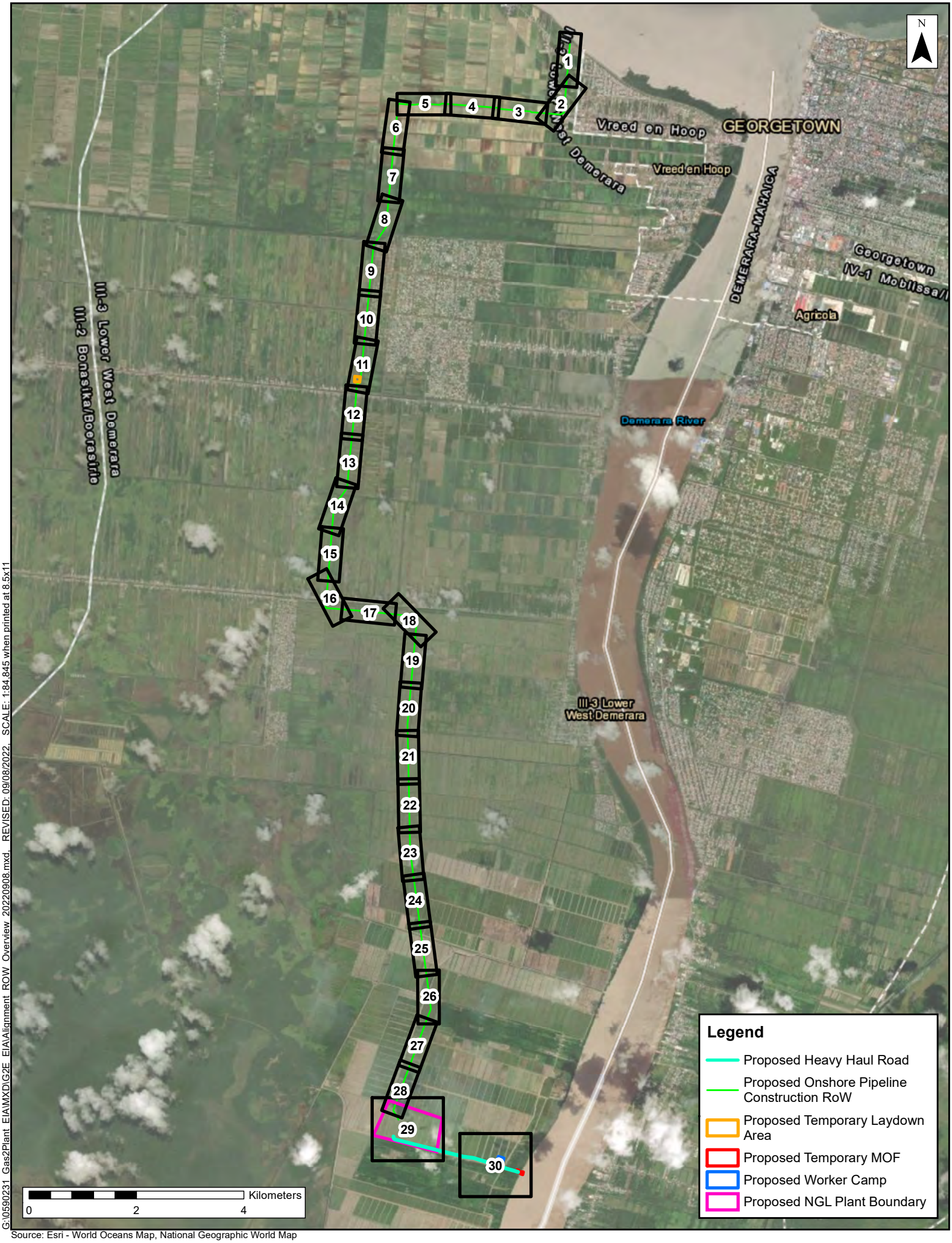
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III-3 Lower West Demerara
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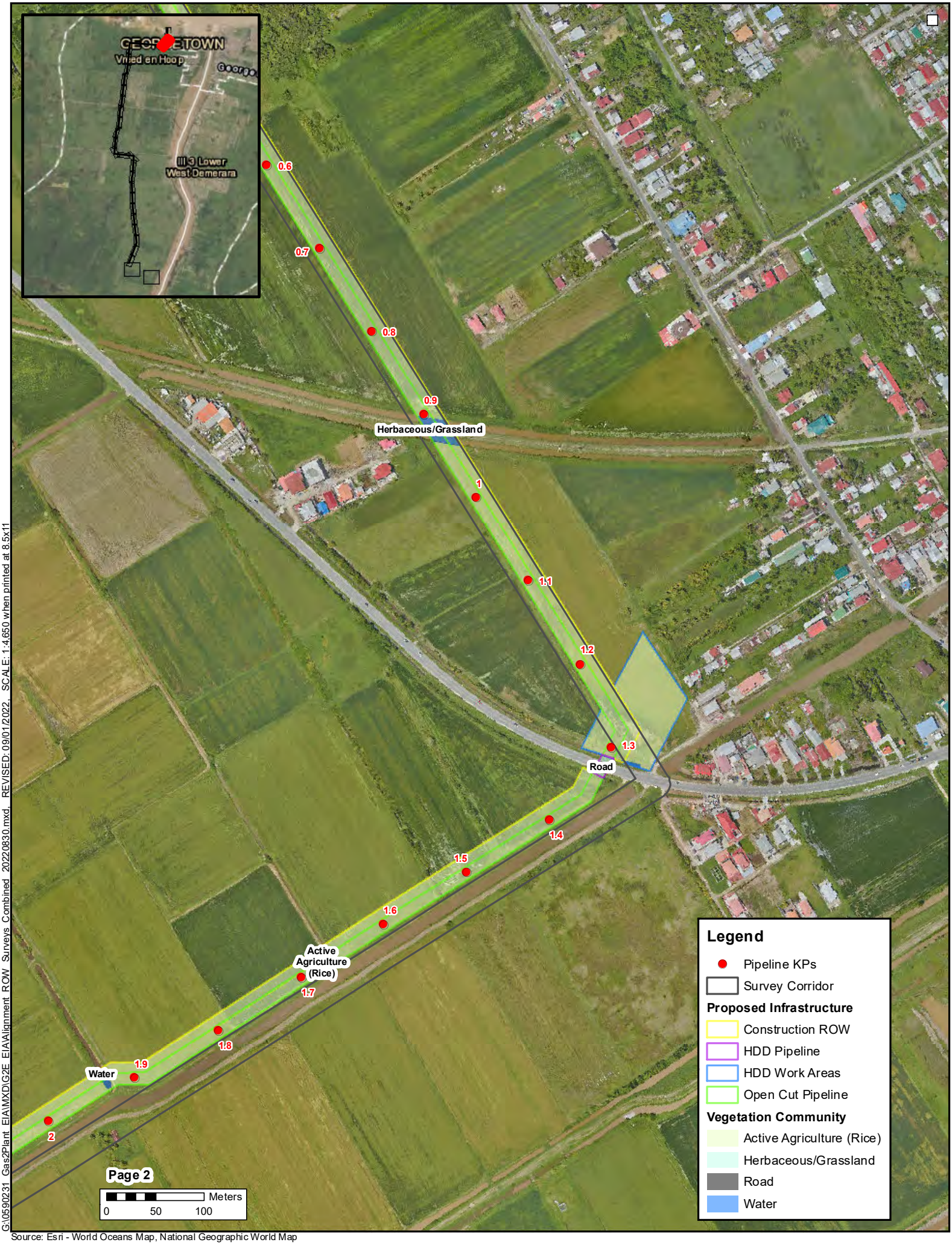

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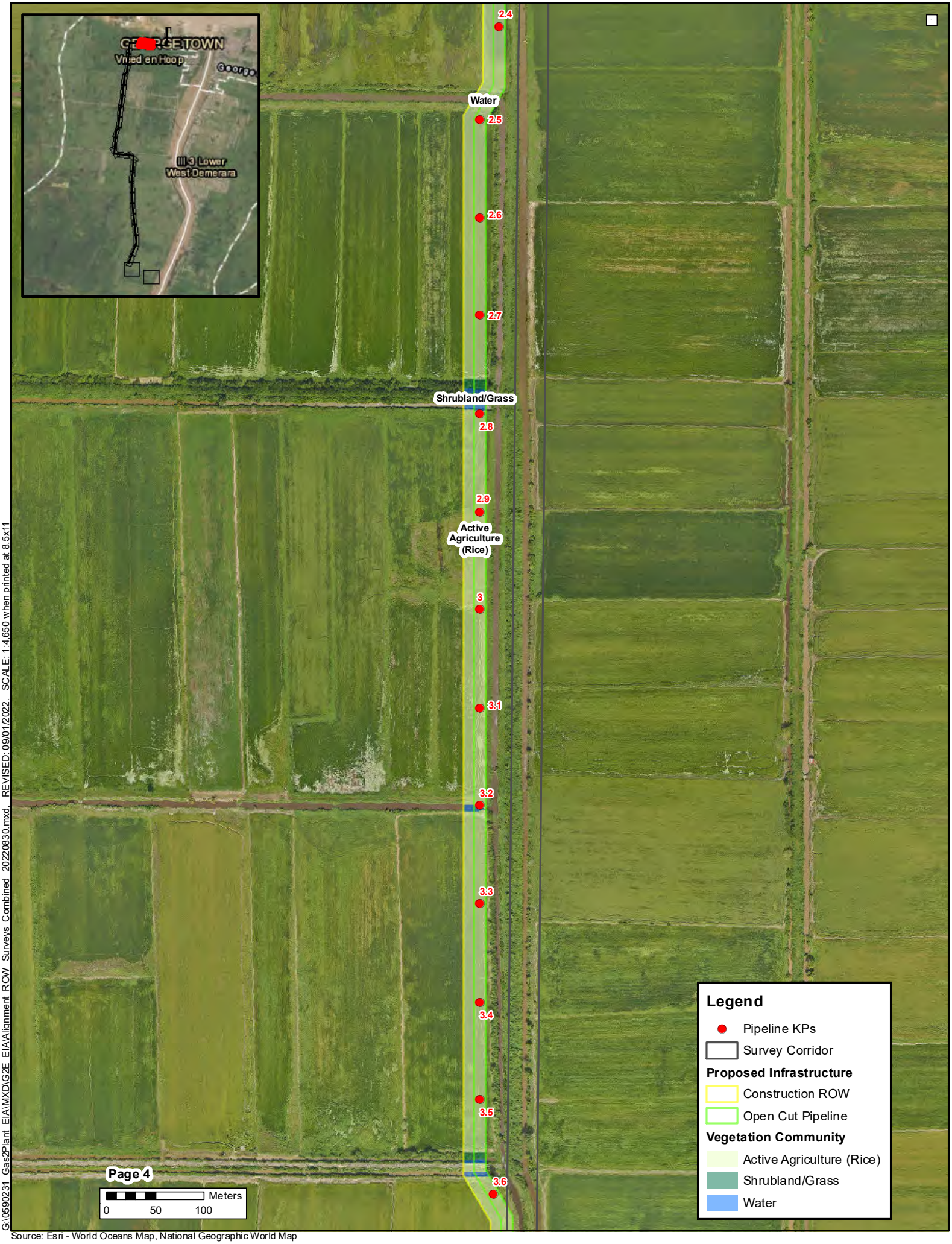

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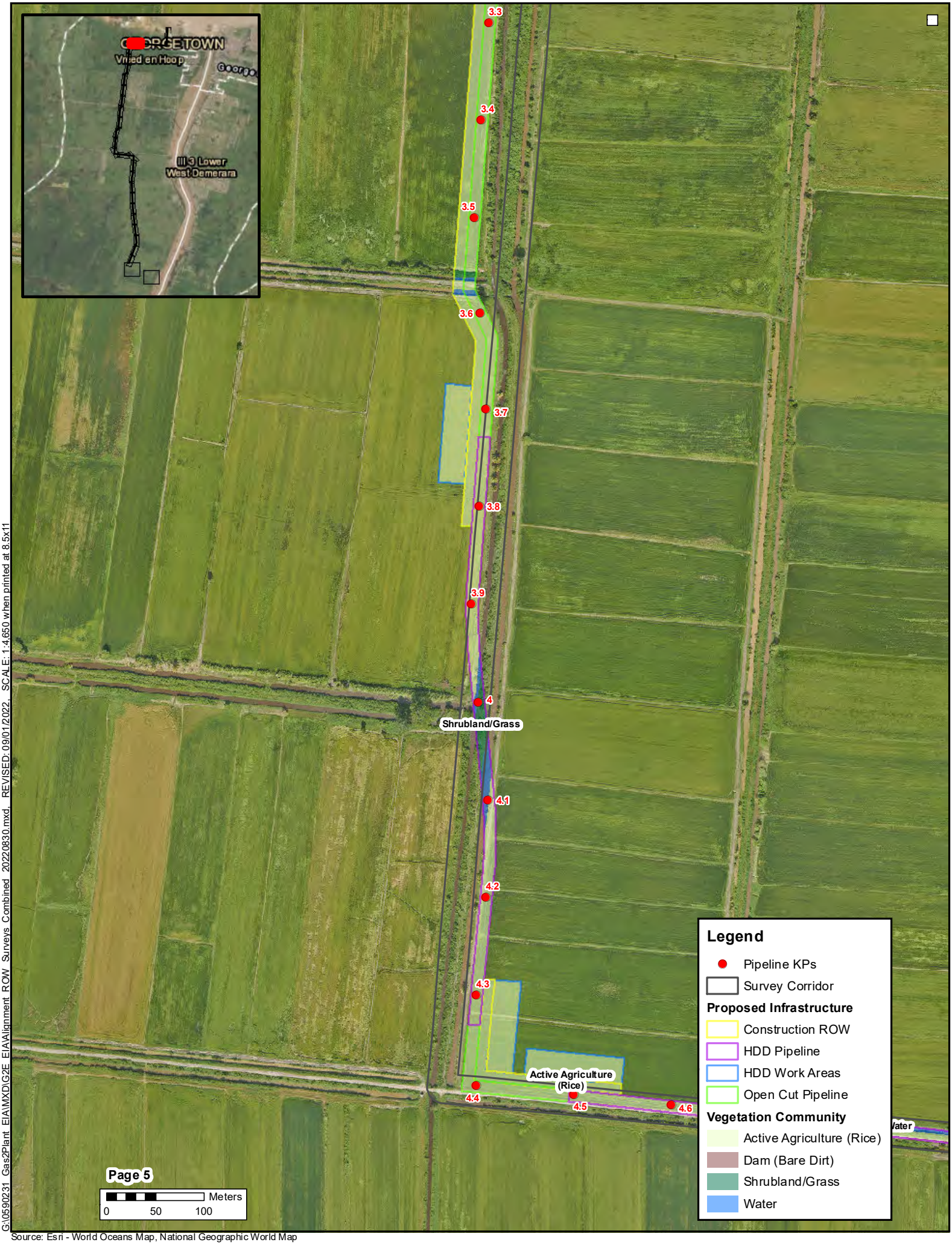
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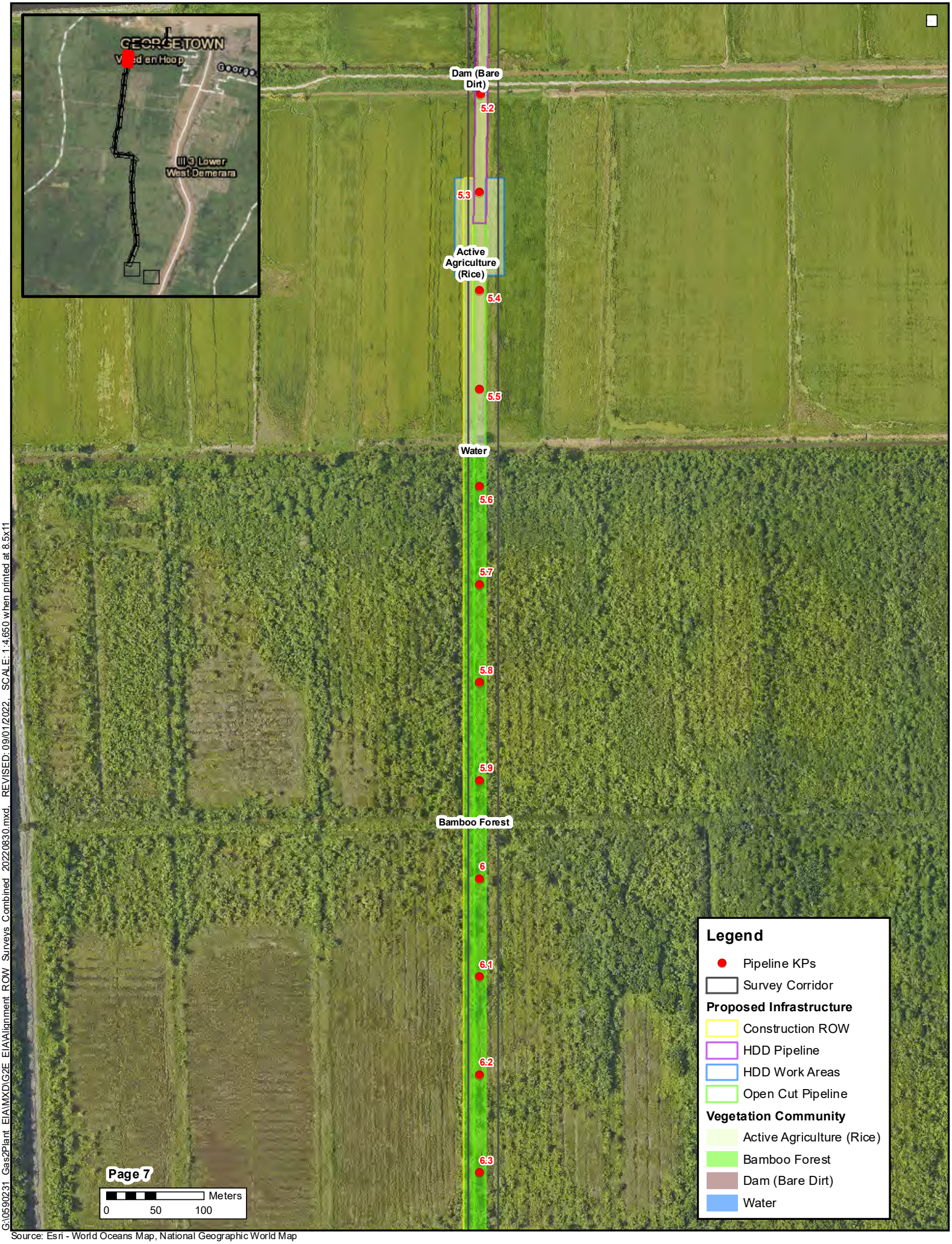
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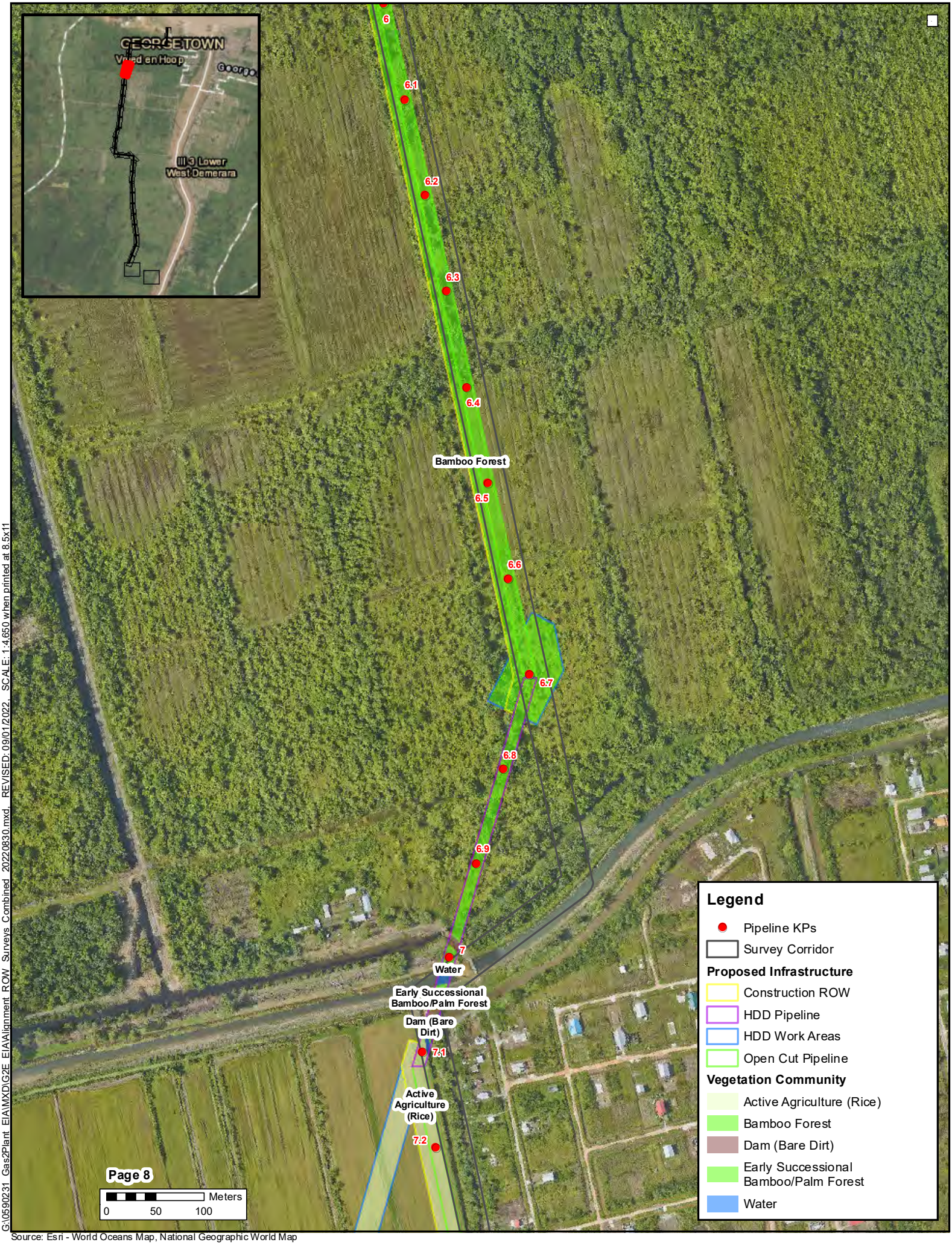
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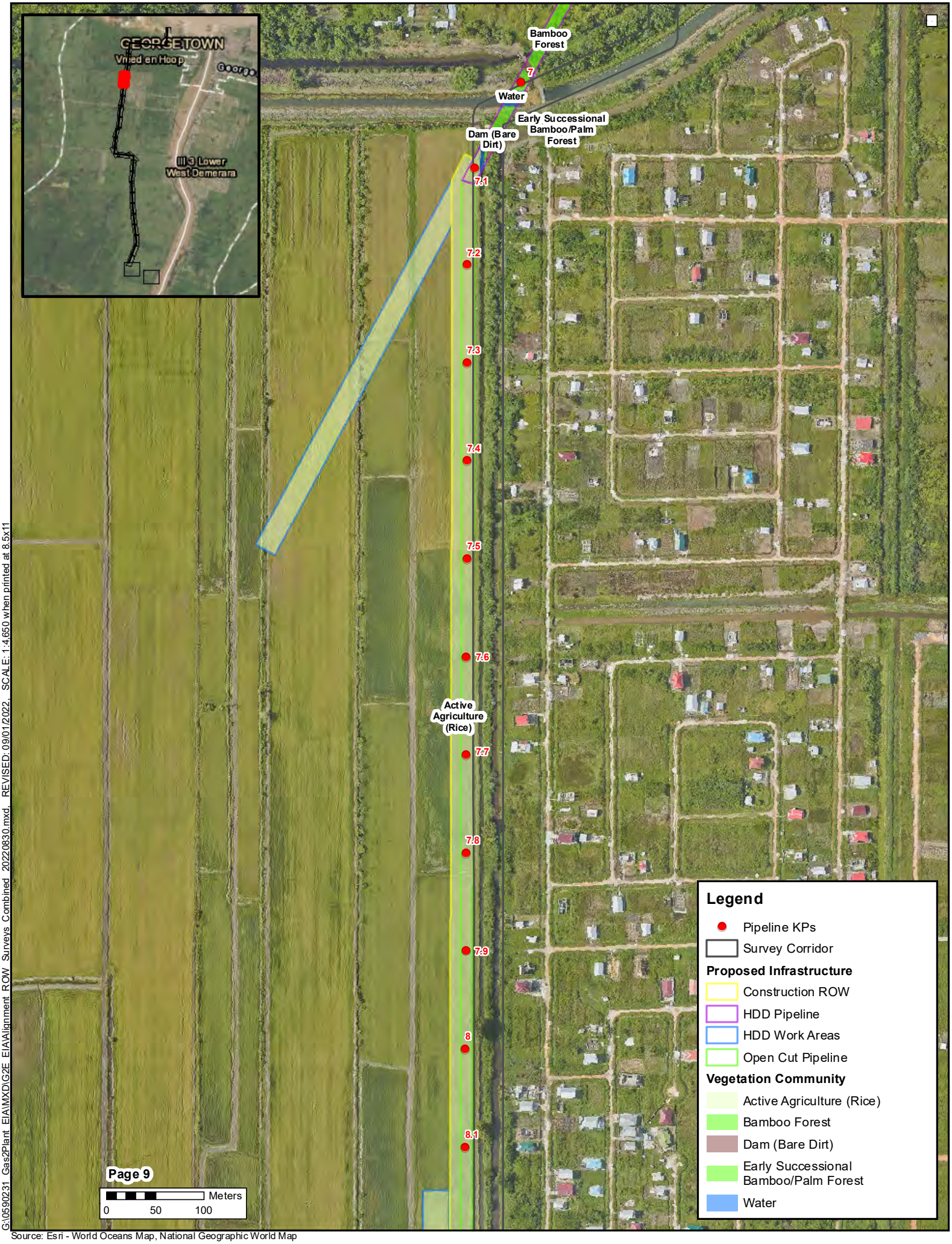

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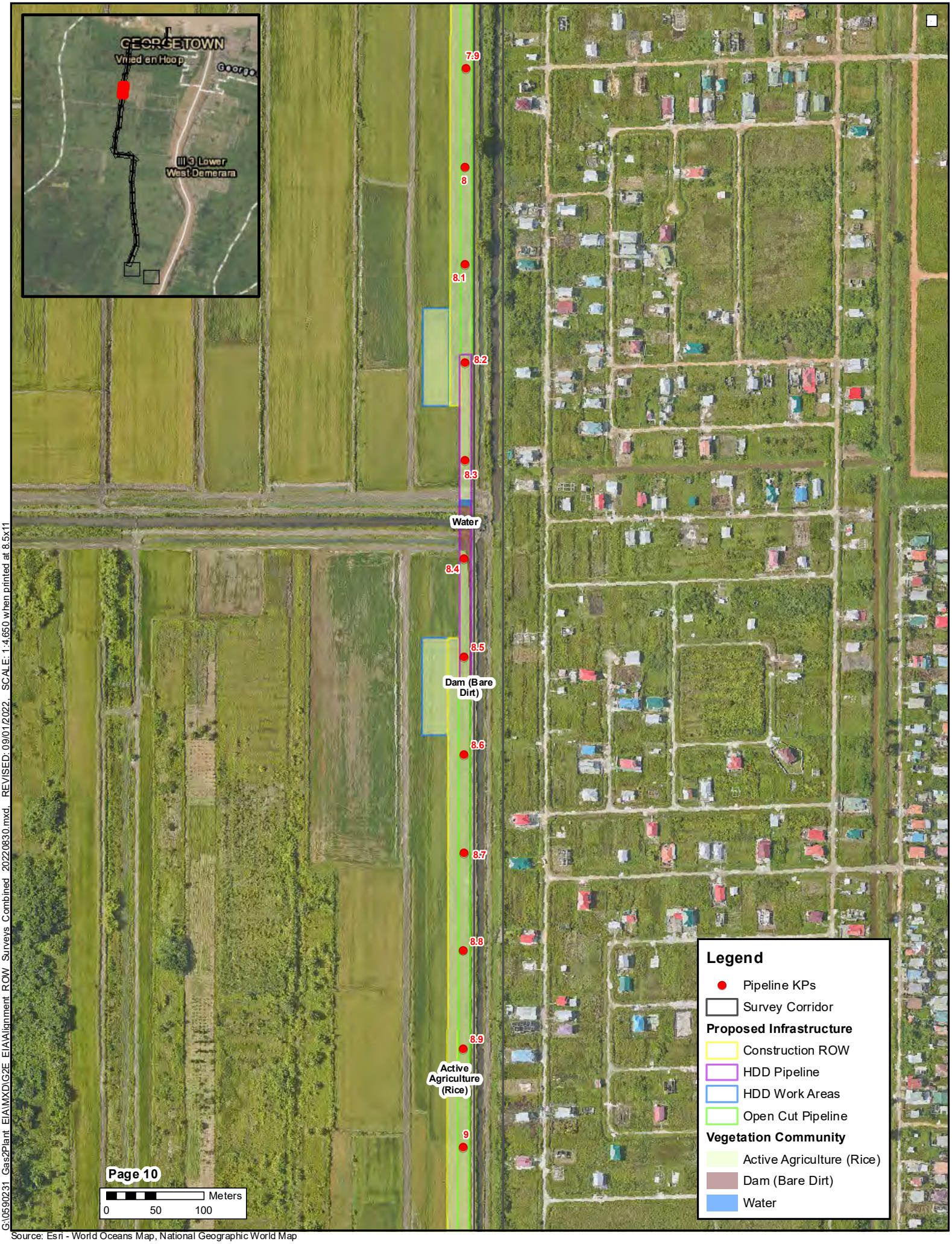

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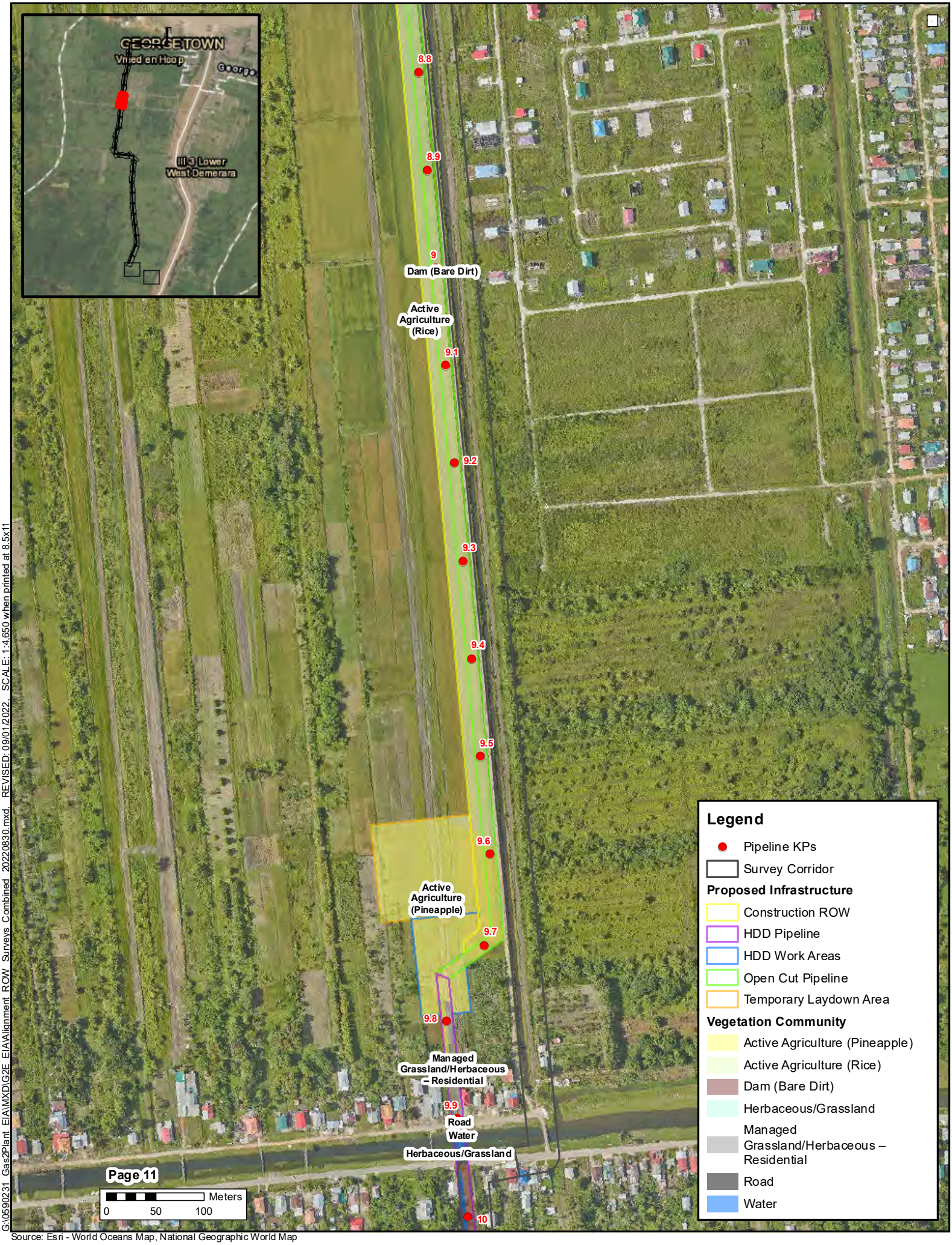

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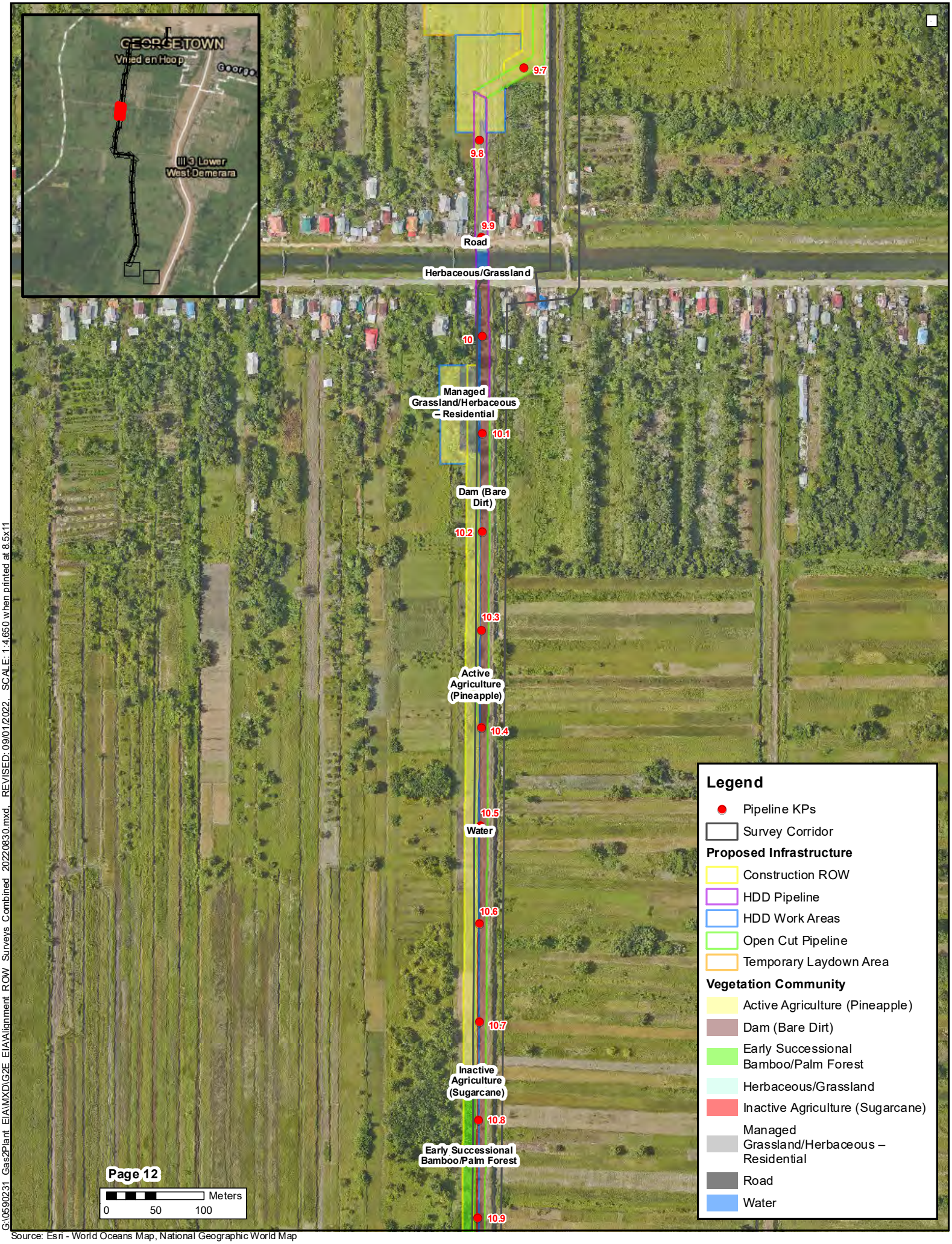
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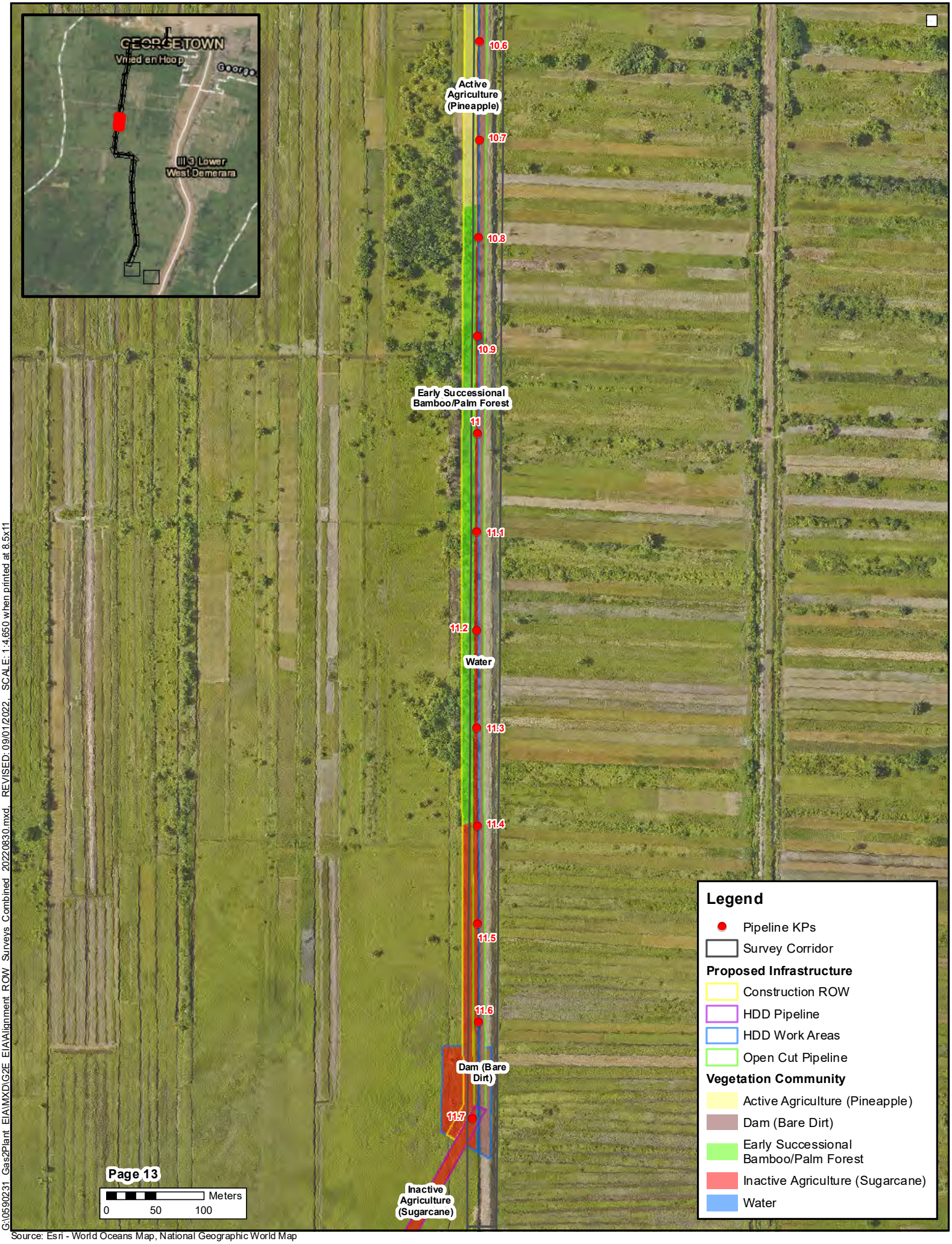
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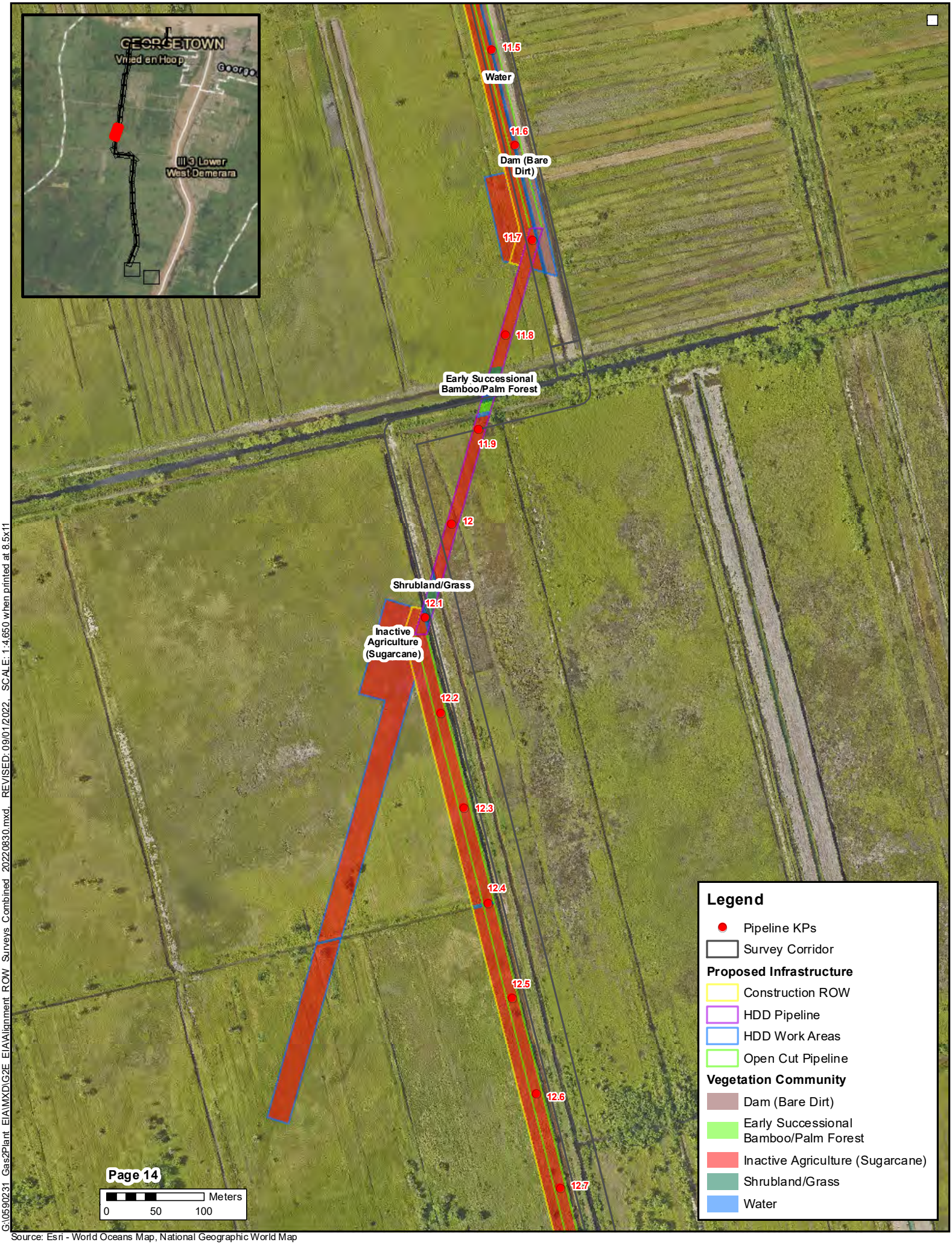
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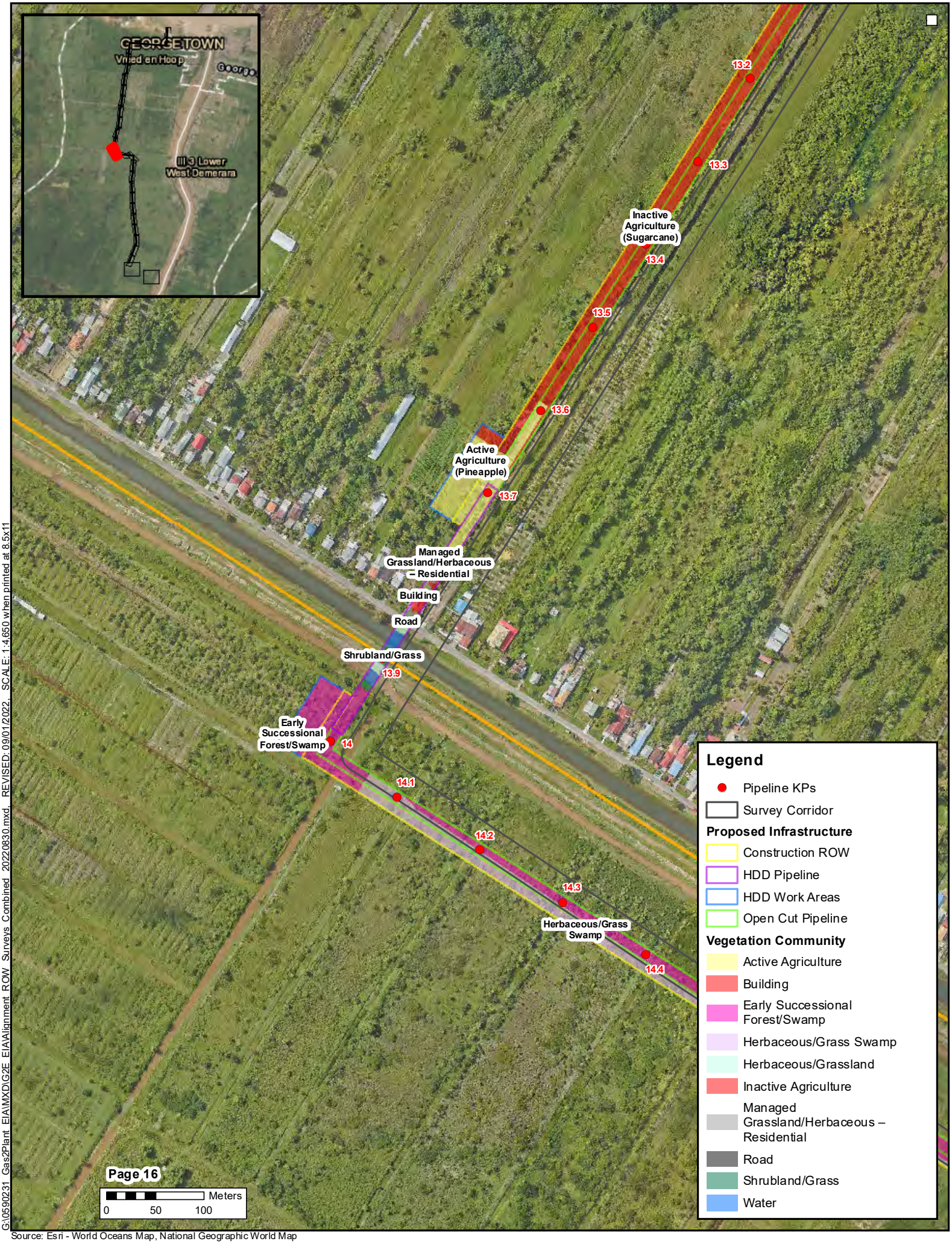

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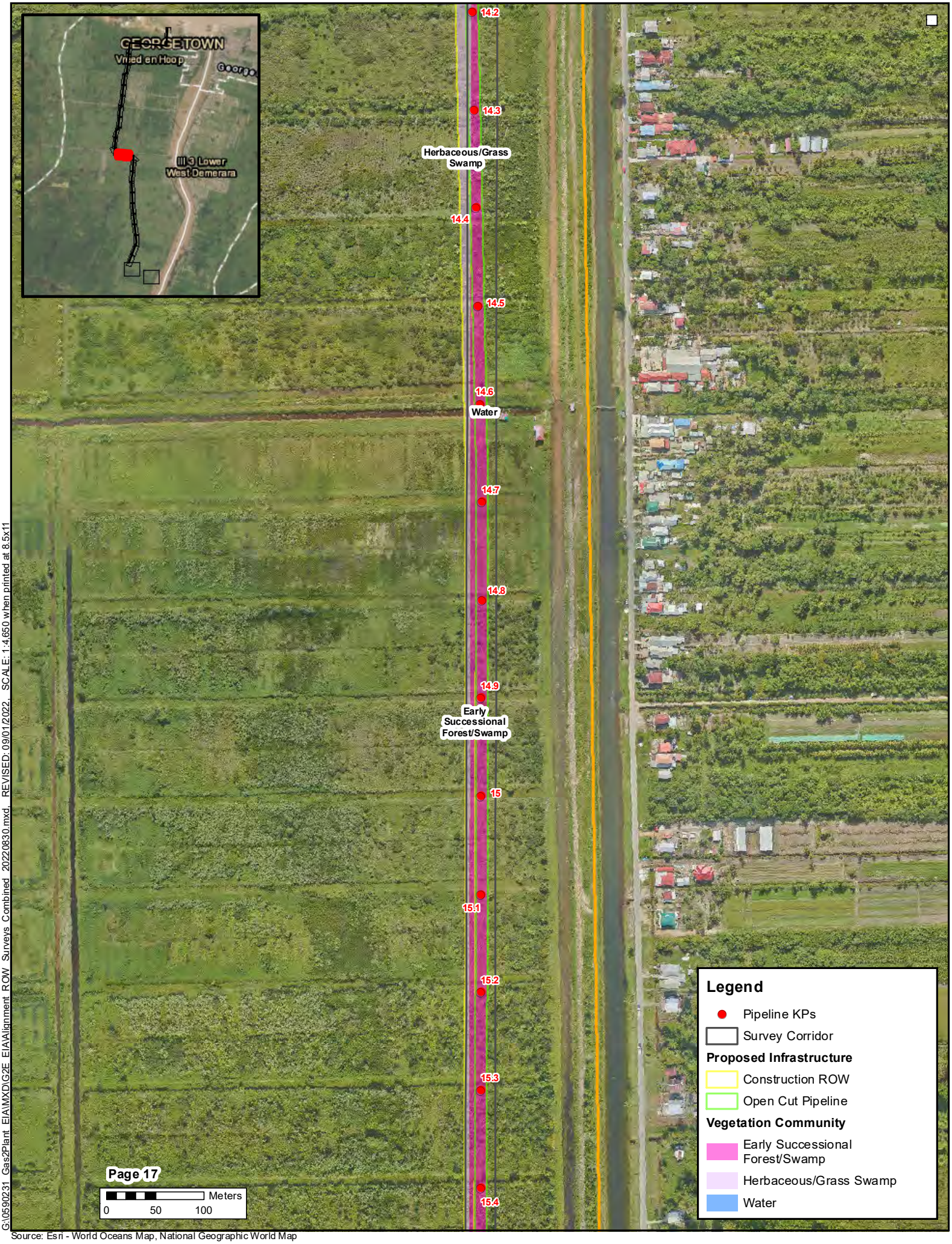

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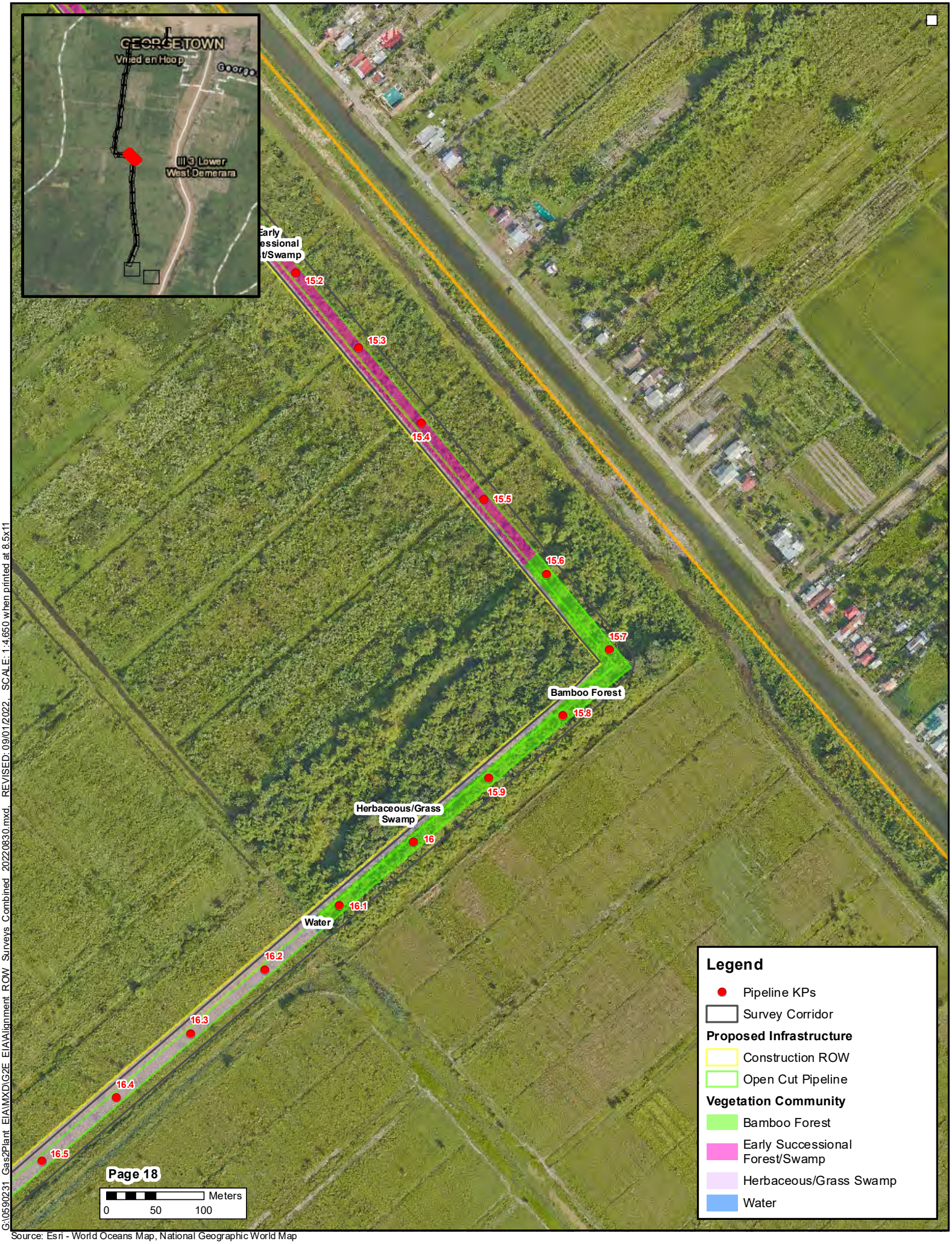

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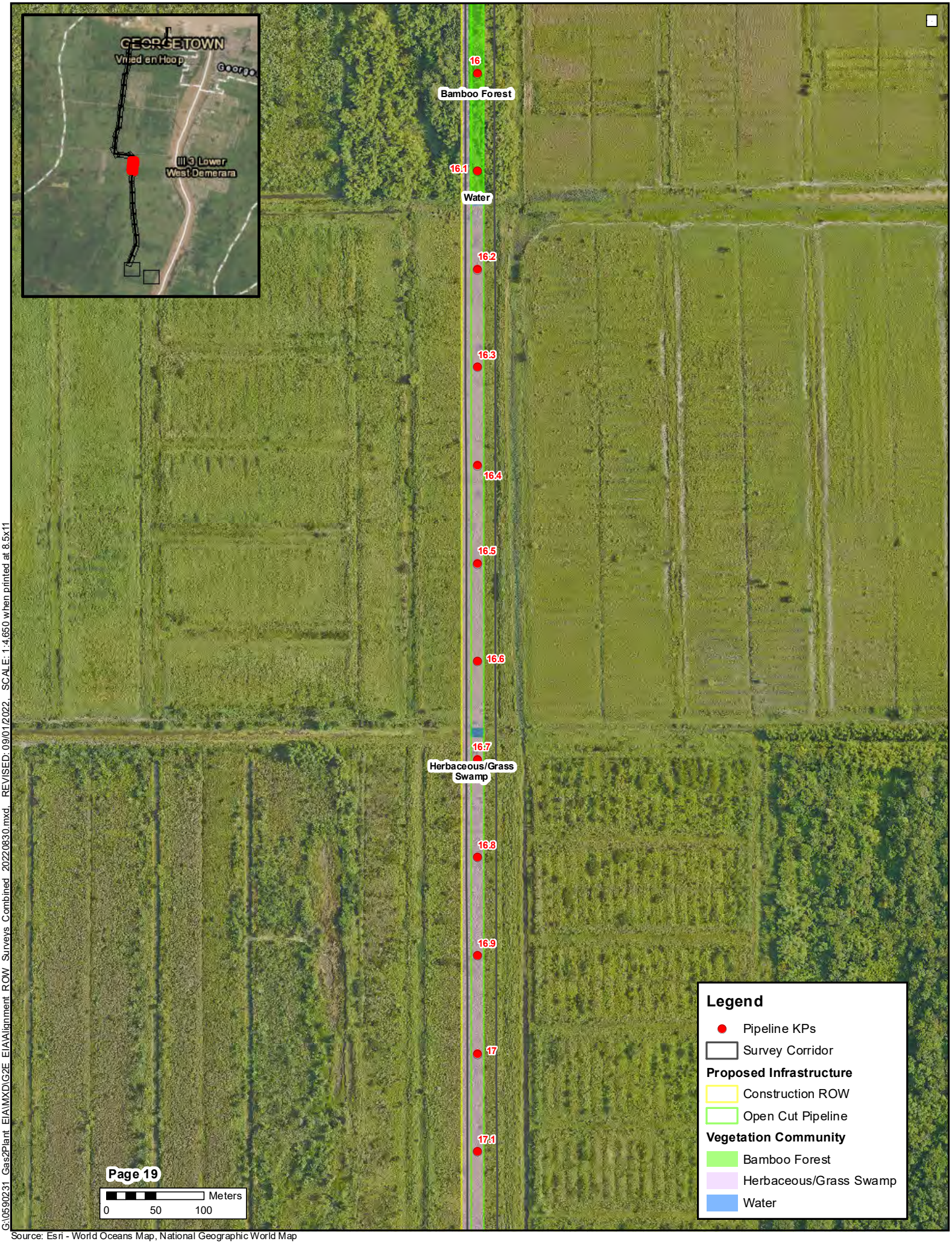

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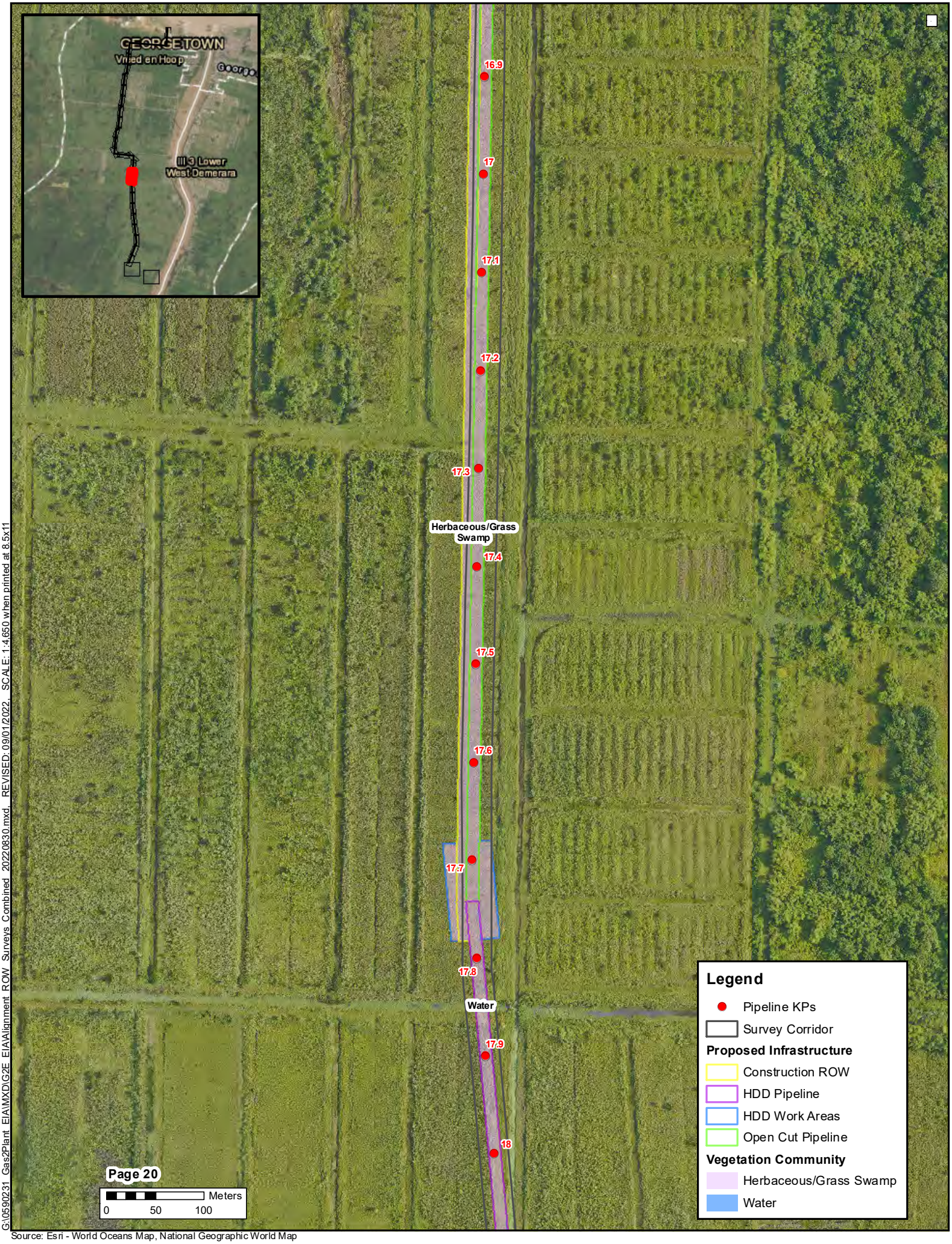

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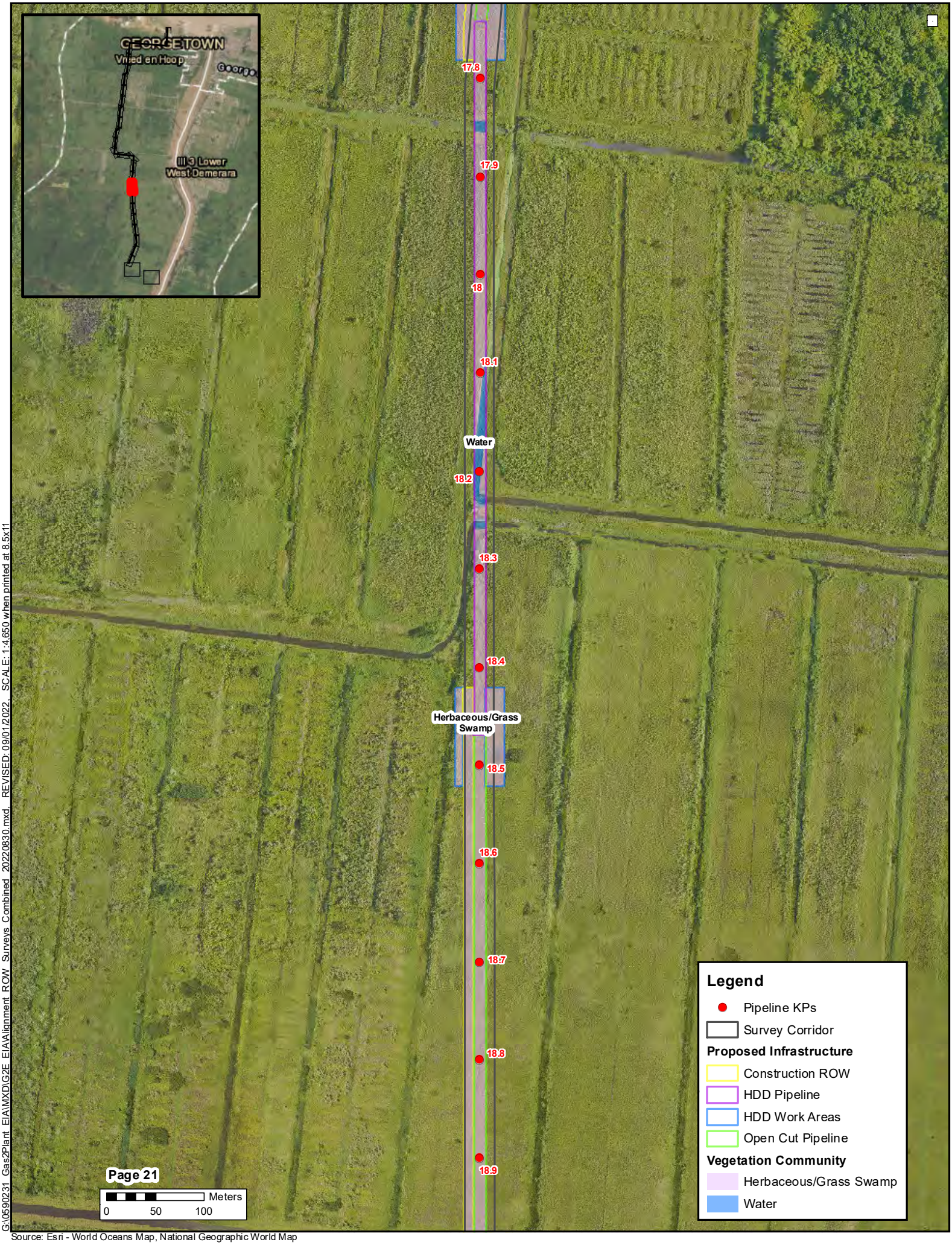

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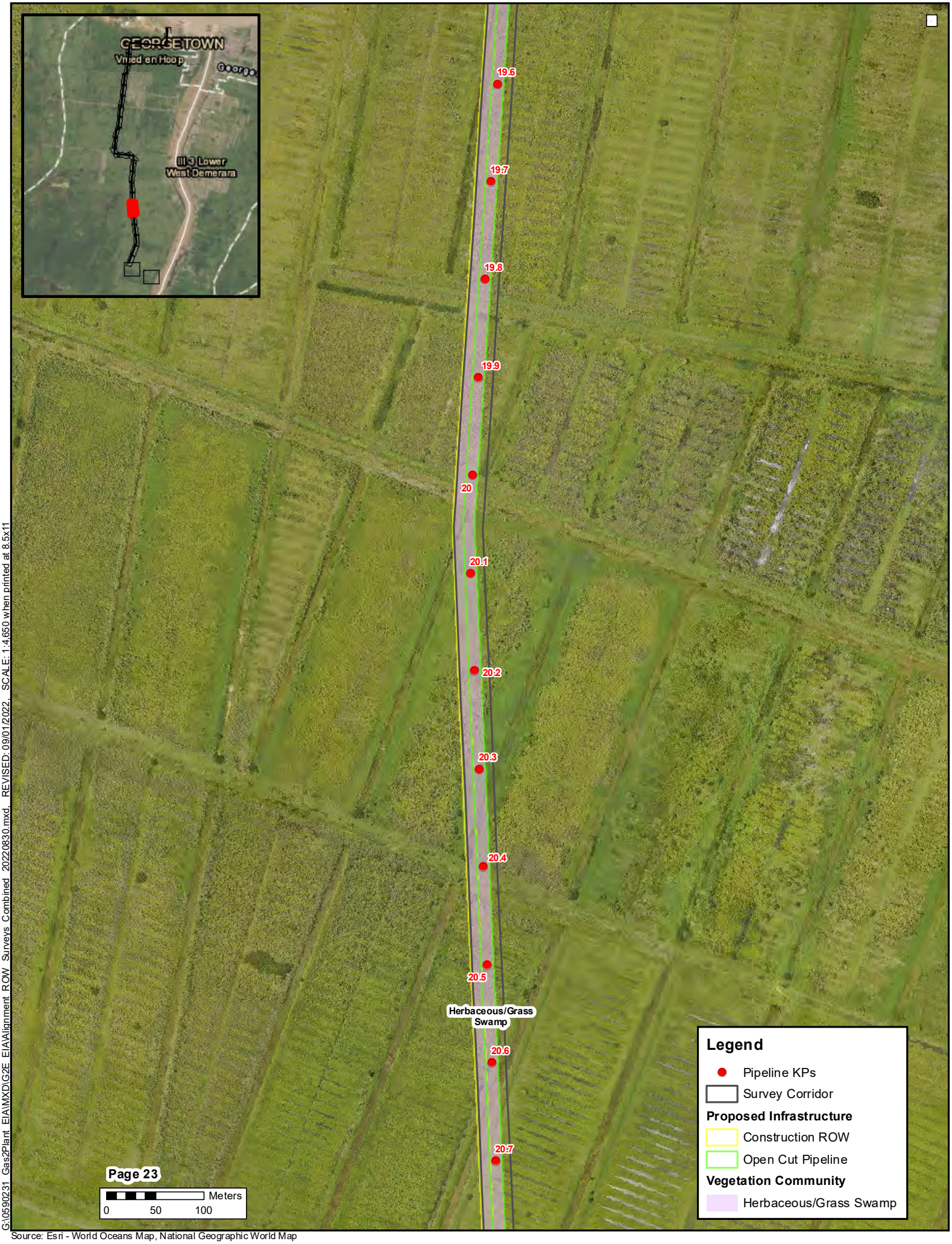

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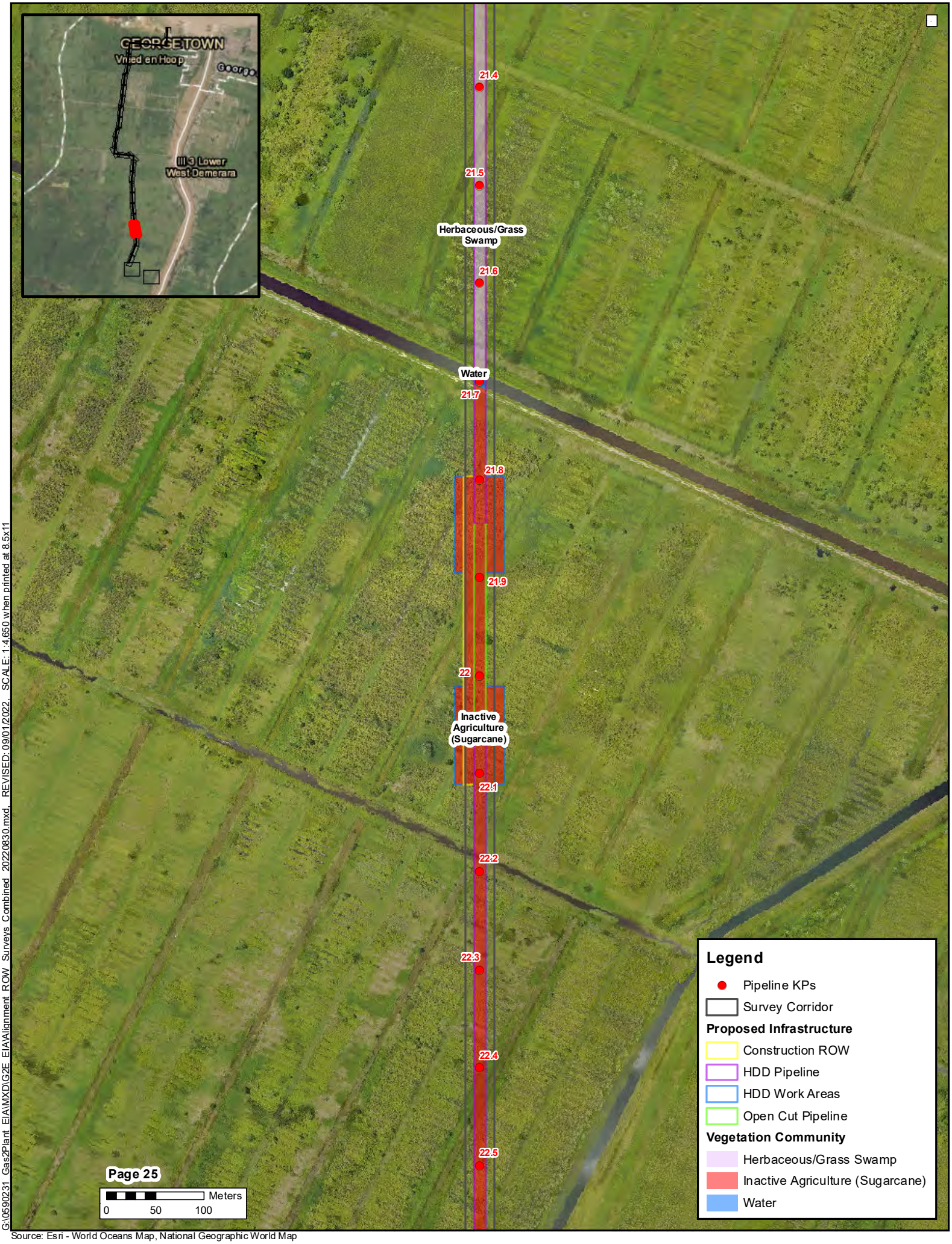
GEORGETOWN
Vreed en Hoop
III 3 Lower West Demerara
21.4
21.5
Herbaceous/Grass Swamp
21.6
Water
21.7
21.8
21.9
22
Inactive Agriculture (Sugarcane)
22.1
22.2
22.3
22.4
22.5
Legend
Pipeline KPs
Survey Corridor
Proposed Infrastructure
Construction ROW
HDD Pipeline
HDD Work Areas
Open Cut Pipeline
Vegetation Community
Herbaceous/Grass Swamp
Inactive Agriculture (Sugarcane)
Water
Page 25
Meters
0
50
100
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Source: Esri - World Oceans Map, National Geographic World Map

GEORGETOWN
Vreed en Hoop
III 3 Lower West Demerara
22.3
22.4
22.5
22.6
22.7
Water
22.8
22.9
Inactive Agriculture (Sugarcane)
23
23.1
23.2
Herbaceous/Grass Swamp
23.4
Legend
Pipeline KPs
Survey Corridor
Proposed Infrastructure
Construction ROW
HDD Pipeline
HDD Work Areas
Open Cut Pipeline
Vegetation Community
Herbaceous/Grass Swamp
Inactive Agriculture (Sugarcane)
Water
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Meters
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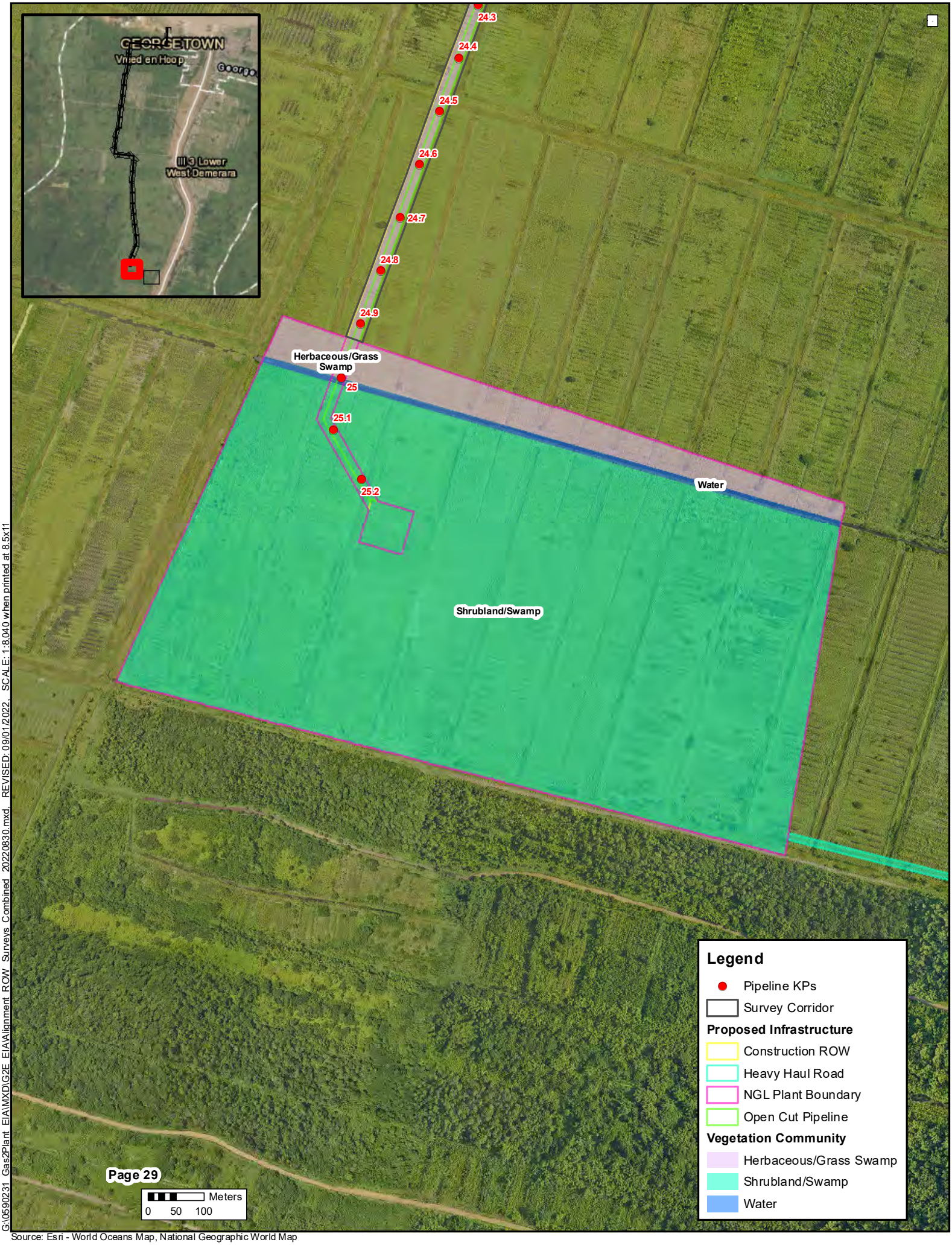

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Source: Esri - World Oceans Map, National Geographic World Map

GEORGETOWN
Vreed en Hoop
III 3 Lower West Demerara
Shrubland/Swamp
Road
Modified Secondary Forest
Riparian Forest (Mangrove Associated Species)
Water
Legend
Proposed Infrastructure
Heavy Haul Road
MOF
Worker Camp
Vegetation Community
Modified Secondary Forest
Riparian Forest (Mangrove Associated Species)
Road
Shrubland/Swamp
Water
Page 30
Meters
0 50 100
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APPENDIX N

Macroinvertebrate Survey (Wet and Dry Season) Diversity Report: Gas to Energy Project

Resubmitted without changes

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UNIVERSITY of GUYANA

CENTER FOR THE STUDY OF BIOLOGICAL DIVERSITY

GAS TO ENERGY PROJECT MACROINVERTEBRATE SURVEY (WET AND DRY SEASON) DIVERSITY REPORT

7 MARCH 2022

Report submitted by:

Gyanpriya Maharaj

PROJECT

ERM is performing this work for the Gas to Energy project under the International Purchase Order (PO) #4501615343 issued to ERM Consultants Canada and local PO #4501615345 issued to ERM Guyana.

PURPOSE AND AIM

The Class Insecta has many species that respond to disturbances within habitats. Therefore, they can be used as environmental bioindicators to provide insights into the levels of change in the environment. As such, aquatic insects are amongst the most frequently used groups in the biological assessment of water quality worldwide, whereas select terrestrial insect groups provide information on anthropogenic changes in terrestrial habitats types.

The study aims to determine baseline inland and nearshore aquatic insect species compositions along with the sites for the gas to shore project for inland waters and the direct area of the MOF on the Demerara River.

OBJECTIVES

1. Conduct biodiversity survey of insect macroinvertebrates in selected inland waterways and the direct area of the MOF on the demerara river along the sites for the gas to shore project.

2. Assess the health of selected inland waterways and direct area of the MOF on the demerara river along the sites using insect macroinvertebrates.

INTRODUCTION

Bioindicators are any living organisms such as plants, planktons, animals, and microbes that naturally occur within an environment that gives us insight into the health of that ecosystem (Parmar et al., 2016, Pattanayak et al., 2020). Furthermore, these organisms serve as biomarkers for the ecosystem's health by their reactions to changes in their surrounding environment (Parmar et al., 2016, Pattanayak et al., 2020). As such, they help us study how

various anthropocentric changes in the environment affect an ecosystem by exhibiting changes in their morphology and population size (Holt & Miller,2010, Zaghloul et al., 2020).

Bioindicators can be utilised in terrestrial and aquatic environments to access physical, chemical, and biological disturbances (Zaghloul et al., 2020). Many Scientists agree that using organisms alone can serve as a sufficient indicator of how ecosystems respond to stressors and changing environmental conditions (da Rocha et al., 2010, Zaghloul et al., 2020). However, since all biological organisms do not exhibit equal responses to changes, scientists select specific taxa to indicate the health of an ecosystem (Burger, 2006; Zaghloul et al., 2020).

Research has shown that invertebrates and specifically insects are beneficial when assessing the effects of anthropogenic activities on the terrestrial and aquatic ecosystems due to inherent characteristics of their physiology and ecology (Burger, 2006; da Rocha et al., 2010; Parikh et al., 2021). Specifically, this taxon is very beneficial when monitoring environmental pollution because of its sensitivity to pollutants and land changes (da Rocha et al., 2010, Parik et al., 2021). In addition, insects are also valuable bioindicators as they are ubiquitous and abundant in most environments and are easy to sample (Imoobe & Ohiozebau, 2010).

Insects that spend part of or their entire life cycle in the water (Mayflies, Dragonflies, etc.) are good indicators of aquatic environments (Priawandiputra et al., 2018, Parikh et al.,2021). These aquatic insects account for approximately 60% of aquatic invertebrates, where they represent critical components of lentic and lotic waterways (Collier, 2016). Thus, they are good bioindicators due to their high diversity, abundance, and sensitivity to natural and man-induced changes in their environments (Karr, 1991; Verneaux et al., 2003). Similarly, terrestrial insects (butterflies, ants, beetles, etc.) are excellent ecological indicators to assess the quality of terrestrial habitats (da Rocha et al., 2010). They can detect and respond to different anthropogenic changes in their environment, such as usage of pesticides, mining, changes in landscapes, among others (Arimoro et al., 2011). Some terrestrial insects such as adult Odonata (Dragonflies and Damselflies) are closely linked to both terrestrial habitat quality and the integrity of freshwater ecosystems; therefore, they serve as excellent indicators of overall landscape changes (Samways & Steytler, 1996).

In addition to changes in the habitat, insect abundance, biodiversity and distribution are regulated by several biotic and abiotic factors and their interactions. Among abiotic factors, temperature and humidity stand out as the most important factors affecting abundance,

distribution of insects, and the ecology of insect communities (Savopoulou-Soultani et al., 2012). In the tropics, although changes related to these abiotic factors are not as stark when compared to insect populations found in temperate climates (Kishimoto-Yamada & Itioka, 2015), there are changes that occur seasonally (Silva et al., 2011), and these population changes are primarily observed in areas with well-defined wet and dry seasons (Silva et al., 2011). As physical and biological conditions favourable for growth, reproduction and development generally prevail during particular seasons (Tauber & Tauber 1976).

This study aimed to ascertain the insect biodiversity in selected inland waterways and the direct area of the MOF on the Demerara River along the sites for the gas to shore project. The main objectives were to collect baseline insect biodiversity data during the wet and dry seasons and to assess the health of these waterways using insect macroinvertebrates.

METHODS

Sample Site

Descriptions are the same as the final Fish report.

Physicochemical Parameter Data Collection

Same as the final Fish report.

Macroinvertebrates Survey

Macroinvertebrates (Class Insecta) were collected to provide a quantitative description of the community composition and indicate water and terrestrial habitat quality at each sampling site. Data was collected during the Dry Season at five sites located on the West Bank of the Demerara and West Coast of the Atlantic from 11-22 November 2020. Sites included Double Door Koker, Coglan Dam, Demerara River Site (MOF), Crane Village and Canal No. 1. During the Wet Season, data were collected at eight sites located on the West Bank of the Demerara and West Coast of the Atlantic from 6-14 Jan 2022 and 8-14 Feb 2022. Sites included Double Door Koker, Coglan Dam, Demerara River Site (MOF), Crane Village and Canal No. 1, Canal No. 1 Site B, Canal No. 1 Site C and Wales Site C.

For data collection, waterways were divided based on habitat type. Each sampling session was conducted at two points within each habitat characterised as upper and lower based on water flow.

Macroinvertebrates (insects) were collected by manual collection (hand picking), examining the substrate, boulders, leaves, and submerged vegetation from waterways at each location.

Insects were also sampled using D-nets and long-handled large hand nets (mesh size <1 mm). Each sweep with long hand nets was taken just under the surface of the water at each site, including subaquatic and aquatic vegetation in the littoral zone so that an area of 3 m^2 were sampled each time. D-nets were pressed against and dragged through the substrate of aquatic habitats. At each sampling point, the sampling time lasted approximately one (1) hour, including time spent sweeping and removing adult insects from the sample so that the different vegetation units, substrates and open water areas reflected similar sampling efforts.

Each sample was placed into a white plastic tray, and macroinvertebrates were separated from macrophytes and sediments using forceps and preserved in 96% ethanol. All field identification was made to the lowest practical taxonomic level. Unidentified invertebrates and contents of each sample were transferred into labelled plastic containers and taken back to the laboratory for further analysis. In the laboratory, samples were viewed under a dissecting microscope and identifications were made to the family level using the appropriate identification keys and texts.

All macroinvertebrate specimens are examined in the laboratory under a stereomicroscope and identified to family level using available keys

Data analysis

Macroinvertebrates

Shannon-Wiener and Simpson Biodiversity indices and family abundance, richness, and evenness were used to describe the population composition. The Biological Monitoring Working party (BMWP), Family Biotic Index (FBI), and Stream Invertebrate Grade Number Average Level (SIGNAL) were used to assess water quality. A paired sample t-Test was used to compare abundance and family diversity between the wet and dry season, a MANOVA was used to determine the relationship between physicochemical properties of the environment (as measured and recorded by the Fish Team), and the abundance of each family and a regression model was used to investigate the relationship of the total family abundance and physicochemical properties of each season. A PCA was used to visualise relationships between the study sites and insect families during each season. All analyses were carried out in RStudio Version (2022.2.0.443), Microsoft Excel(2019), and SPSS Version (28.0.1.1[14]).

Family Abundance, Richness and Evenness

Family abundance is the number of individuals of each family present. The number of families per sample is a measure of richness. Evenness is a measure of the relative abundance of the different families making up the richness of an area. Pielou's evenness is an index that measures diversity along with family richness. A calculated value of Pielou's evenness ranges from 0 (no evenness) to 1 (complete evenness).

Simpson's Index of Diversity (Family Level)

Simpson's Diversity Index is a measure of diversity that considers the number of families present and the abundance of each family. The value of this index ranges between 0 and 1, where 1 represents infinite diversity and 0, no diversity. This index was calculated as follows:

$$\textbf{(Simpson's Index of Diversity) } D = 1 - \left(\frac{\sum n(n-1)}{N(N-1)}\right)$$

Where n = the total number of organisms of a particular family and N = the total number of organisms of all families

Shannon index (Family level)

The Shannon index is an information statistic index; it assumes all families are represented in a sample and that they are randomly sampled. This index was calculated as follows:

$$\textbf{Shannon Index } (H) = -\sum_{i=1}^{s} p_i ln p_i$$

In the Shannon index, p is the proportion (n/N) of individuals of one particular family found (n) divided by the total number of individuals found (N), ln is the natural log, Σ is the sum of the calculations, and s is the number of families.

Biological Monitoring Working Party score (BMWP) and Average Score Per Taxon (ASPT)

The BMWP provides single values, at the family level, representative of the organisms' tolerance to pollution. The greater their tolerance towards pollution, the lower the BMWP score. ASPT represented the average tolerance score of all taxa within the community and was calculated by dividing the BMWP by the number of families represented in the sample (Friedrich et al., 1996); from this value, the water quality of each waterway was assessed (Mackie, 2001). ASPT value-Water Quality Assessment: >6 Clean Water, 5-6 Doubtful quality,

4-5 Probable moderate pollution, <4 Probable severe pollution (Armitage et al.,1983; Friedrich et al.,1996; Mackie, 2001)

Family-level biotic index (FBI)

Family-level pollution tolerance scores for the Hilsenhoff Biotic Index. Adapted from Bode (1988), Hilsenhoff (1988a, 1988b), and Lehmkuhl (1979). In 1988, Hilsenhoff proposed a family-level biotic index (FBI). The purpose of the FBI is to provide a rapid but less critical evaluation of streams. The value of FBI is defined as

$$\mathbf{FBI = \sum x_i t_i / n}$$

in where "xi" is the number of individuals in the "ith" taxon, "ti" is the tolerance value of the "ith" taxon, and "n" is the total number of organisms in the sample. (Hilsenhoff, 1988).

The tolerance score reflects the pollution tolerance of the respective macroinvertebrate taxon. An FBI value between 0 and 3.75 indicates very good water quality (no pollution), 3.75–4.25 indicates good water quality (possible slight organic pollution), 4.26–5.00 indicates moderate water quality (some organic pollution), 5.01–5.75 indicates poor water quality (fairly substantial pollution), 5.76–6.50 indicates fairly poor water quality (substantial pollution likely), 6.51–7.25 indicates very poor water quality (very substantial pollution), and 7.26–10.00 indicates extremely poor water quality (severe organic pollution) (Hilsenhoff, 1988)

Stream Invertebrate Grade Number Average Level (SIGNAL)

SIGNAL is calculated for each collection from a defined habitat by summing the grades of all families present, and the total is divided by the number of families to provide an average grade per family. The status of sampling sites is classified according to SIGNAL values as follows: SIGNAL value = greater than 6, water quality status = clean water; 5-6, doubtful quality, possible mild pollution; 4-5 probable moderate pollution; and less than 4, probable severe pollution. The calculation of average grades is designed to reduce possible bias associated with variations in stream size and sampling technique (Armitage et al., 1983).

RESULTS & DISCUSSION

DRY SEASON

Aquatic Family Abundance					
Family	**Double Door Koker**	**Coglan Dam**	**Demerara River**	**Crane Village**	**Canal No. 1**
Belostomidae	0	27	0	57	0
Caenidae	6	0	0	0	0
Chironomidae	1	5	0	60	1
Coenagrionidae	0	2	0	2	19
Culicidae	0	17	0	2	1
Dytiscidae	0	4	0	0	0
Elmidae	0	0	0	50	0
Hydrophilidae	0	6	0	67	0
Lestidae	1	0	0	39	2
Libellulidae	7	2	0	1	17
Mesoveliidae	0	2	0	0	0
Nepidae	0	0	0	2	0
Notonectidae	0	27	0	9	4
Terrestrial Family Abundance					
Family	**Double Door Koker**	**Coglan Dam**	**Demerara River**	**Crane Village**	**Canal No. 1**
Acrididae	2	0	0	0	1
Apidae	2	1	0	1	0
Bibionidae	0	0	1	0	0
Braconidae	1	1	0	0	0
Chironomidae	1	1	1	0	3
Chrysomelidae	11	6	3	0	1
Cicadellidae	0	0	0	1	0
Coccinellidae	0	0	0	2	0
Coenagrionidae	0	0	0	0	3

Culicidae	0	1	0	0	0
Ectotobidae	0	0	1	0	0
Formicidae	4	8	40	1	2
Geometridae	2	0	0	0	0
Halictidae	1	0	0	0	0
Hesperiidae	1	0	0	0	0
Lampyridae	0	0	0	1	0
Lestidae	2	1	0	0	0
Libellulidae	8	5	5	4	7
Lycaenidae	0	0	0	3	0
Meloidae	0	1	0	0	0
Membracidae	6	0	0	0	0
Muscidae	1	2	4	0	1
Nymphalidae	1	0	3	2	1
Panorpidae	0	1	2	0	0
Pentatomidae	1	1	0	1	0
Phoridae	0	2	0	0	0
Pieridae	1	0	1	4	0
Platystomatidae	0	0	1	0	2
Pyrgomorphidae	1	0	0	0	0
Reduviidae	1	0	0	0	0
Simuliidae	0	0	4	0	0
Sphecidae	3	1	1	4	0
Syrphidae	1	0	2	1	3
Tabanidae	1	0	4	0	0
Termitidae	0	0	21	0	0
Tetrigidae	2	0	1	0	0
Tettigoniidae	2	15	3	1	0
Torymidae	1	0	0	0	0
Vespidae	2	1	11	0	4
Zygaenidae	0	1	0	0	0

Table 1: Total Number of individuals per family at each study site.

Site	% 3 Most Dominant Families Aquatic	Dominant Aquatic Families	% 3 Most Dominant Families Terrestrial	Dominant terrestrial Families
Double Door Koker	100.00%	Libelluidae, Caenidae, Chironomidae and Lestidae	41.79%	Libellulidae, Chrysomelidae, Membracidae
Coglan Dam	75.26%	Belostomidae, Notonectidae, Culicidae	60.00%	Tettigoniidae, Formicidae, Libellulidae
Demerara River	0.00%	None	66.05%	Formicidae, Termitidae, Vespidae
Crane Village	64.78%	Hydrophilidae, Chironomidae, Belostomidae,	45.83%	Sphecidae, Pieridae, Lycaenidae
Canal No. 1	77.27%	Libellulidae, Coenagrionidae, Notonectidae	60.71%	Libellulidae, Vespidae, Syrphidae

Table 2: Dominant Families in aquatic and terrestrial habitats.

Site	Family Richness	Total Abundance	Shannon Diversity Index (H')	Simpson Diversity Index (1-D)	Pielou's J (Evenness)
Double Door Koker	28	74	18.71	0.93	0.88
Coglan Dam	24	141	13.30	0.90	0.81
Demerara River	19	109	8.73	0.82	0.74
Crane Village	22	315	8.30	0.85	0.68
Canal No. 1	15	72	7.17	0.79	0.73

Table 3: Family composition of sites.

The most family rich area was Double Door Koker, followed by Coglan Dam, Crane Village, Demerara River Site and Canal No. 1, with the most individuals collected from Crane Village. In addition, we observed that Double Door Koker was the most diverse and even site, and Canal No. 1 was the least.

Site	Family Richness (Aquatic)	Total Abundance (Aquatic)	SIGNAL Grade		FBI Score		BMWP Score / ASPT	
Double Door Koker	4	15	5.75	Doubtful Quality	8.13	Poor water quality (pollution likely)	5.67	Doubtful Quality
Coglan Dam	9	92	4.56	Probable moderate pollution	6.51	Fairly poor (substantial pollution likely)	5.17	Doubtful Quality
Demerara River	0	-	-	-	-	-	-	-
Crane Village	10	289	5.10	Doubtful Quality	7.15	Fairly poor (substantial pollution likely	5.14	Doubtful Quality
Canal No. 1	6	44	4.83	Probable moderate pollution	8.32	Poor water quality (pollution likely)	5.25	Doubtful Quality

Table 4: Water quality assessment of study sites based on macroinvertebrate indices.

All sites were polluted, and we observed poor water quality with moderate to substantial pollution.

RESULS & DISCUSSION (CONT'D)

Aquatic Macroinvertebrates & Water Quality of the Dry Season

In this study, aquatic macroinvertebrates include all insects (adults and nymphal stages) found in and on the water in the study site rivers or canals. A total of 440 macroinvertebrate individuals of 13 families were collected from four study area sites (Table 1). It must be noted that no aquatic insects were collected at the Demerara Site. The absence of aquatic insects can be attributed to the high level of salinity in the water and the heavy tidal flow. For the remaining four sites surveyed, the Double Door Koker was the most family rich and diverse site with high populations of Libelluidae (Skimmer-Dragonflies) and Caenidae (Small Square Gill Mayflies) in the aquatic environment. Canal No. 1 was the least with pollution tolerant Libellulidae, Coenagrionidae (Narrow-winded Damselflies), and a small number of pollution intolerant Notonectidae (Backswimmers) in the aquatic environment (Tables 2 & 3). These results also coincided with the observation related to water quality, with Double Door Koker having the higher quality water and Canal No. 1 having one of the worse (Table 4). These observations can result from habitat heterogeneity as Double Door Koker had a mixture of sand, mud and small Gravel, whereas the Canal No. 1 Site, although there was the presence of vegetation the substrate was made up of fine mud particles. In addition, at the Canal No. 1 site, there was a fair water current, and it rained on the day of the collection, both contributing factors to low diversity.

Further, Xu et al. (2014) noted that the richness and composition of functional feeding groups change with pollution levels. Where scrapers, shredders, predators, and collector-filterers decrease in number, while collector-gatherers become dominant with increasing total nitrogen, resulting in extremely non-uniform distribution of the functional feeding groups in circumstances of high organic pollution (Xu et al. 2014). Although our study did concur with these evenness findings, it was noted that certain predators such as Coenagrionidae, Lestidae (Spread-winged Dragonflies), and Libellulidae were also found in many of the sites as they are considered pollution tolerant taxa. This was also noted in Crane Village, which had the highest number of individuals with the predatory Belostomatidae (Giant Water Bugs) and Hydrophilidae (Scavenger Beetles) and collector-gather Chironomidae (Red Blood Worms) predominating and in Coglan Dam with a high number of Notonectidae and Belostomatidae. Therefore, in this study, collector-gatherers that feed on detritus organic materials that sunk

to the canal bottom and predators were predominantly found in the impacted sites as was also found by Tamiru (2019).

In addition to the presence of pollution tolerant taxa found in our study, the lack of groups such as a high number of Ephemeroptera, Plecoptera and Trichoptera are consistent with the idea that all the sites were characterised as disturbed as these groups act as bioindicators for good water quality stream system as they are generally considered to be intolerant or sensitive to water pollution. Water pollution occurs when the physical, chemical or biological characteristic of the water is changed, and it adversely affects living organisms and the overall water benefits. It is assumed that in our study, anthropogenic impacts from the disposal of untreated sewage, garbage and discharges and agricultural activities from neighbouring areas are the major causes of pollution in these waterways.

Terrestrial Macroinvertebrates & the Health of Open Environments of the Dry Season

Beraldi-Campesi similarly characterises the terrestrial environment in this study as we did, i.e. non-aquatic environments, viz. banks of study sites and the land-based organisms that live within them (Beraldi-Campesi, 2013). The majority of the sites, excluding the Demerara river, were considered open terrestrial environments characterised by the lack of tall bushes and trees and dominated by grasses (Wojcik, 2021). When areas such as these are healthy, they may contain many flowering plants with many different insect pollinators (Wojcik, 2021). Because the insects have such close relationships with the plants in their ecosystem, their presence or absence can be indicators of health. The most widely used insects as indicators of ecological health are terrestrial insects such as beetles, ants and butterflies. (Dolný et al., 2012)

A total of 271 macroinvertebrate individuals of 40 families were collected from all five study sites (Table 1). At the most diverse site, Double Door Koker and Libellulidae and Chrysomelidae (Leaf Beetles) and Membracidae (Treehoppers) were the main insect groups in the terrestrial environment (Table 2). The Chrysomelidae family were recorded in all of the sites except the one at Crane Village. This indicates that the vegetation (food source) needed to sustain the family was absent in the area due to disturbance that affected the growth and succession of their host plant (Sánchez-Reyes et al., 2019, Wendorff, & Schmitt, 2019). The two most common terrestrial Coleoptera families that were found in the survey were the Coccinellidae and the Chrysomelidae, with the Chrysomelidae having the larger abundance

because of the foliage rich environments. The Chrysomelidae are good indicators because their feeding behaviour depends on a specific set of plants to survive and persist in natural habitats (Ghannem et al., 2018; Sánchez-Reyes et al., 2019). Therefore, anthropogenic disturbances, such as land clearing, that would affect the flora of the habitat would, in turn, affect their abundance (Menta & Remelli, 2020).

Similar to the aquatic environment, the presence of odonates can also be used as an indicator of the health of the terrestrial environment (Dolný et al., 2012, Abdul et al., 2017). Adult odonates (dragonflies and damselflies) are also sensitive to changes in terrestrial systems (Dolný et al., 2012, Nagy et al., 2019). Odonates were found in all of the sites surveyed; either their larvae or their adult forms were collected. The adult Libellulidae family was the most abundant and ubiquitous family of the odonates in all of the sites. However, this family is relatively pollution tolerant, as were the other families found at each site.

In addition to Odonates, wild pollinators are very important for maintaining natural open system systems (Naeem et al., 2020). Butterflies are important wild pollinators because of these close evolutionary relationships with nectar-producing plants (Ghazanfar et al., 2016). Butterflies are effective indicators because they are extensively studied for their environmental tolerances, high reproductive rates, and rapid response to environmental stresses (Kyerematen, Kaiwa, & Acquah-Lamptey, 2018, Naeem et al., 2020). Therefore, declines in butterfly species could be used as a monitoring alarm to signal that something is changing in an ecosystem (Wepprich, Adrion, Ries, Wiedmann, & Haddad, 2019); Naeem et al., 2020). With the exception of Coglan Dam, butterflies of the families Nymphalidae, Pieridae, Lycaenidae and Hesperiidae were found in low numbers. The most common Butterfly family that was found within all five different sites was the Nymphalidae Family. The Nymphalidae family abundance can be an essential family to monitor since their populations have been noted to be affected by urbanisation events that cause disturbance and loss of their native habitats (Sousa et al., 2019; Porath & Aranda, 2020).

Although Lepidoptera were not found at Coglan Dam, we did observe the largest number of Tettigoniidae, which indicated less severe pollution in this habitat, as this group are good bioindicators due to their dependence on Grassland vegetation and microclimate (Menta & Remelli, 2020). Jana, Misra and Bhattacharya (2006) supported these results and pointed out that the orthoptera families of Tettigoniidae, Tetrigidae and Acrididae are susceptible to pollution from industrial sites (Jana et al., 2006).

We recorded the largest abundance of Formicidae and the Family Termitidae for the Demerara site compared to the other sites. Termites exhibit several characteristics, including their short response time to anthropogenic disturbances and their functional importance, that underscore their potential as a bioindicator taxon of habitat quality suitable for monitoring programs in tropical ecosystems (Alves et al., 2011). Whereas Formicidae are indicators of land recovery, are indicators of human disturbance and participate in many ecosystem processes (Jiménez-Carmona, 2020). The presence of both of these groups at this site indicated a fairy healthy terrestrial ecosystem.

RESULTS & DISCUSSION

WET SEASON

Aquatic Family Abundance								
Family	**Double Door Koker**	**Coglan Dam**	**Demerara River**	**Crane Village**	**Canal No. 1**	**Canal No. 1 Site B**	**Canal No. 1 Site C**	**Wales Site C**
Belostomidae	2	12	0	23	0	4	0	0
Baetidae	0	0	0	0	0	6	0	6
Caenidae	0	0	0	0	0	0	0	0
Chironomidae	6	80	0	16	7	19	28	5
Coenagrionidae	0	1	0	6	9	8	3	4
Corixidae	6	2	0	2	0	17	1	5
Culicidae	4	3	1	0	0	2	0	30
Dytiscidae	1	12	3	11	0	0	1	30
Elmidae	1	4	0	5	0	1	0	0
Gyrinidae	2	0	0	0	0	0	0	0
Gerridae	0	0	0	0	0	0	0	37
Hydrophilidae	0	0	0	23	0	4	0	11
Lestidae	0	0	0	0	0	0	0	0
Libellulidae	5	0	0	0	23	16	11	58
Mesoveliidae	0	0	0	0	0	0	0	0

Nepidae	0	0	0	0	0	0	0	0
Notonectidae	2	4	0	13	5	0	0	8
Phoridae	0	0	0	0	0	0	0	0
Prosopistomatidae	1	0	0	0	2	0	0	0
Terrestrial Family Abundance								
Family	**Double Door Koker**	**Coglan Dam**	**Demerara River**	**Crane Village**	**Canal No. 1**	**Canal No. 1 Site B**	**Canal No. 1 Site C**	**Wales Site C**
Acrididae	6	1	10	9	6	1	5	4
Apidae	8	2	0	2	0	1	0	8
Asilidae	0	4	0	0	0	0	0	0
Bibionidae	0	0	0	0	0	0	0	0
Braconidae	0	2	0	0	0	1	0	0
Caenidae	1	0	0	0	0	0	0	0
Cassidinae	0	0	0	0	0	0	0	0
Ceratopogonidae	7	0	0	0	0	0	0	0
Chalcididae	0	0	0	1	0	0	0	0
Chironomidae	1	7	0	0	0	0	0	4
Chrysomelidae	7	1	0	1	4	2	2	4
Cicadellidae	0	6	3	41	1	6	0	4
Coccinellidae	2	4	1	0	5	0	0	0
Coreidae	0	0	0	0	0	0	0	1
Coenagrionidae	0	5	0	1	6	1	4	0
Culicidae	1	2	2	2	0	1	0	0
Dolichopodidae	0	0	1	0	0	0	0	0
Drosophilidae	1	1	0	0	0	1	0	0
Dytiscidae	0	0	0	0	0	0	0	0
Ectotobidae	0	0	0	0	0	0	0	0
Elmidae	0	0	0	0	0	0	0	0
Forficulidae	1	0	0	0	0	0	0	0
Formicidae	4	5	14	2	2	2	15	8
Geometridae	1	0	2	0	0	0	0	0

Halictidae	0	0	0	0	0	0	0	0
Hesperiidae	1	0	0	0	1	3	1	1
Lampyridae	1	0	0	0	0	0	0	0
Lestidae	0	0	0	0	0	0	0	0
Libellulidae	10	6	0	5	10	10	18	32
Lycaenidae	1	0	0	16	0	0	1	0
Mantidae	0	0	0	0	0	0	0	1
Meloidae	0	0	0	0	0	0	0	0
Membracidae	1	0	0	0	13	1	0	1
Miridae	4	0	0	0	0	0	0	0
Muscidae	1	6	1	7	2	0	1	3
Nymphalidae	5	0	0	0	1	4	5	5
Panorpidae	0	0	0	0	0	0	0	0
Pentatomidae	1	0	0	1	4	0	1	1
Phoridae	1	23	9	3	2	0	3	0
Pieridae	1	1	1	4	0	0	2	9
Platystomatidae	0	0	0	0	0	0	0	0
Pyrgomorphidae	0	0	0	0	0	0	0	0
Reduviidae	0	0	0	0	0	0	0	0
Riodidnidae	0	0	1	1	0	0	0	0
Scarabaeidae	0	0	0	1	0	0	0	0
Simuliidae	0	0	0	0	0	0	0	0
Sphecidae	3	0	1	5	0	0	0	0
Syrphidae	0	3	0	0	0	1	0	1
Tabanidae	0	0	0	0	1	0	0	1
Termitidae	0	0	0	0	0	0	0	0
Termitaphididae	0	0	3	0	0	0	0	0
Tetrigidae	0	0	7	0	0	0	0	0
Tettigoniidae	17	16	4	5	4	10	3	37
Torymidae	0	0	0	0	0	0	0	0
Vespidae	6	2	2	0	3	0	0	6
Zygaenidae	0	0	0	0	0	0	0	0

Table 5: Total Number of individuals per family at each study site.

Site	% 3 Most Dominant Families Aquatic	Dominant Aquatic Families	% 3 Most Dominant Families Terrestrial	Dominant terrestrial Families
Double Door Koker	9.75%	Corixidae, Libellulidae, Chironomidae	28.45%	Tettigoniidae, Libellulidae, Apidae
Coglan Dam	46.90%	Chironomidae, Belostomatidae, Dytiscidae	21.39%	Phoridae, Tettigoniidae, Chironomidae
Demerara River	1.50%	Culicidae	50.00%	Acrididae, Formicidae, Phoridae
Crane Village	30.03%	Belostomatidae, Chironomidae , Hydrophilidae	33.90%	Cicadellidae, Lycaenidae, Acrididae
Canal No. 1	26.12%	Chironomidae, Coenagrionidae, Libellulidae	26.10 %	Membracidae, Libellulidae, Coenagrionidae
Canal No. 1 Site B	21.48%	Croxidae, Chironomidae, Libellulidae	21.31%	Libellulidae, Tettigoniidae, Cicadellidae
Canal No. 1 Site C	36.00%	Chironomidae, Coenagrionidae, Libellulidae	36.19%	Libellulidae, Formicidae, Nymphalidae
Wales Site C	24.00%	Gerridae, Libellulidae, Dytiscidae	15.07%	Libellulidae, Pieridae, Tettigoniidae

Table 6: Dominant Families in aquatic and terrestrial habitats.

Site	Family Richness	Total Abundance	Shannon Diversity Index (H')	Simpson Diversity Index (1-D)	Pielou's J (Evenness)
Double Door Koker	34	123	3.09	0.95	0.88
Coglan Dam	25	215	2.34	0.81	0.73
Demerara River	16	66	2.45	0.90	0.86
Crane Village	24	206	2.69	0.91	0.85
Canal No. 1	20	111	2.41	0.87	0.80
Canal No. 1 Site B	21	122	2.52	0.90	0.83
Canal No. 1 Site C	16	105	2.19	0.84	0.76
Wales Site C	27	325	2.53	0.88	0.77

Table 7: Family composition of sites.

The most family-rich area was Double Door Koker, followed by Wales Site C, Coglan Dam, Crane Village, Canal No. 1, Demerara River Site, Canal No. 1 Site B, Canal No. 1 Site C with the most individuals collected from Wales Site C. In addition, we observed that Double Door Koker was the most diverse and even site, and Coglan Dam was the least.

Site	Family Richness (Aquatic)	Total Abundance (Aquatic)	SIGNAL Grade		FBI Score		BMWP Score / ASPT	
Double Door Koker	10	30	4.56	Probable moderate pollution	6.97	Very poor water quality (very substantial pollution)	5	Doubtful quality
Coglan Dam	8	118	4.56	Probable moderate pollution	7.62	Extremely poor water quality (severe organic pollution)	4.67	Probable moderate pollution
Demerara River	2	4	Analysis not carried out due to extremely low population size					
Crane Village	8	99	4.56	Probable moderate pollution	7.17	Very poor water quality (very substantial pollution)	4.67	Probable moderate pollution
Canal No. 1	5	46	5	Doubtful quality	8.39	Extremely poor water quality (severe organic pollution)	5.25	Doubtful quality
Canal No. 1 Site B	9	77	5	Doubtful quality	7.23	Very poor water quality (very substantial pollution)	5	Doubtful quality

Canal No. 1 Site C	5	44	5.2	Doubtful quality	8.18	Extremely poor water quality (severe organic pollution)	5.2	Doubtful quality
Wales Site C	10	194	4.6	Probable moderate pollution	7.21	Very poor water quality (very substantial pollution)	5	Doubtful quality

Table 8: Water quality assessment of study sites based on macroinvertebrate indices.

All sites were polluted, and we observed poor water quality with substantial to severe pollution.

Aquatic Macroinvertebrates & Water Quality of the Wet Season

In this study, as with the dry season, aquatic macroinvertebrates include all insects (adults and nymphal stages) found in and on the water in the study site rivers or canals. A total of 612 macroinvertebrate individuals of 19 families were collected from 8 study area sites (Table 5). It must be noted that only four aquatic insects belonging to the families Culicidae and Dytiscidae were collected at the Demerara Site. This low population can be attributed to the high level of salinity in the water and mainly the heavy tidal flow (Silberbush et al.,2005, Carver et al., 2009). For the remaining sites surveyed, the Wales Site C and Double Door Koker were the most family rich, with Wales Site C being having the highest total abundance of all sites surveyed with high populations of Libelluidae (Skimmer-Dragonflies). While Double Door Koker and Crane Villages were the most diverse sites, Double Door Koker had a low aquatic abundance in comparison to all other sites, with the exception of the Demerara Site. Coglan Dam was the least diverse with high populations of pollution tolerant Chironomidae (red blood worms) and a small population of Dytiscidae (Predaceous Diving Beetles) and Belostomatidae (Giant Water Bugs) in the aquatic environment (Tables 6 & 7). It should also be noted that all Canal No. 1 Sites surveyed also had lower diversity in comparison to other

sites with high populations of Libelluidae (Skimmer-Dragonflies) and Chironomidae (red blood worms).
The results on family diversity also coincided with the observation related to water quality, with the Coglan Dam and Canal No. 1 Sites having extremely poor quality water while the other sites showed moderately poor quality (Table 8). These observations can result from a lack of habitat heterogeneity in the Canal No. 1 Sites. In addition, these sites were mostly heavily polluted owing to Agriculture and pasture land use in the adjoining areas. Thus, low macroinvertebrate diversity in this study strongly correlated to pollution and land use-land cover change as also noted by Breanna and Paula (2011). While Double Door Koker (Wales Site A) had no visible pollution and some canopy cover, Wales Site C had no visible pollution, a high amount of aquatic vegetation, and natural bank regrowth.

It was also observed that the richness and composition of functional feeding groups changed with pollution levels. Where scrapers, shredders, predators, and collector-filterers decrease in number, while collector-gatherers become dominant with increasing total nitrogen, resulting in extremely non-uniform distribution of the functional feeding groups in circumstances of high organic pollution (Xu et al. 2014). Our study did concur with these evenness findings, with Sites such as Coglan Dam and Canal No 1 Sites (A, B and C) having high populations of collector-gather Chironomidae (Red Blood Worms). More so, pollution tolerant predators such as Libelluidae (Skimmer-Dragonflies) were observed at the Canal 1 Sites (A, B and C). While in sites such as Wales Site C there were a larger number of predatory pollution resistant insects such as Libelluidae (Skimmer-Dragonflies), Gerrids (Water Striders), and Dytiscidae (Predaceous Diving Beetles) in comparison to other sites.

In addition to the presence of pollution tolerant/resistant taxa found in our study, there was an evident lack of a high population of the Ephemeroptera and a complete lack of Plecoptera and Trichoptera (EPT) groups. These findings further corroborated that poor water quality and the observations of anthropogenic impacts from the disposal of untreated sewage, garbage and discharges, and agricultural and pastural activities from neighbouring areas.

Terrestrial Macroinvertebrates & the Health of Open Environments of the Wet Season

The terrestrial environment in this study is similarly characterised as the dry season, i.e. non-aquatic environments, viz. banks of study sites and the land-based organisms that live within them (Beraldi-Campesi, 2013). The majority of the sites, excluding the Demerara river, were

considered open terrestrial environments characterised by the lack of tall bushes and trees and dominated by grasses.

A total of 661 macroinvertebrate individuals of 56 families were collected from all eight study sites (Table 1). At the most diverse site, Double Door Koker was found to be dominated by Tettigoniidae (Bush Crickets) and Libellulidae (Skimmer - Dragonflies. Similar findings were noted in Wales Site C which had the highest abundance of terrestrial insects.

From literature, it is noted that Tettigoniidae, which indicated less severe pollution in this habitat, as this group is good bioindicators due to their dependence on Grassland vegetation and microclimate (Menta, & Remelli, 2020). Tettigoniidae were found in all habitats, with the highest abundance noted in the Wales Site C. Similarly, the presence of adult odonates (dragonflies and damselflies) can also be used as an indicator of the health of the terrestrial environment (Dolný et al., 2012, Abdul et al., 2017, Thompson et al., 2017, Nagy et al., 2019). Odonates were found in all of the sites surveyed except the Demerara River. The adult, Libellulidae (Skimmer – Dragonfly) was the most abundant and ubiquitous family of the odonates in all of the sites with the highest number in the Wales Site C.

Although other bioindicator families such as Cicadellidae (Leafhoppers), Formicidae (Ants), and Lepidoptera (Butterflies) were present in all habitats, their total abundance was low with the exception of the high number of individual Cicadellidae present in Crane Village which indicated the presence of grass and shrubs in the area to provide optimal habitats and food sources for members of this family (Gahm, 2017, Dominguez, et al., 2021).

RESULTS & DISCUSSION

COMPARISON OF DRY VS WET

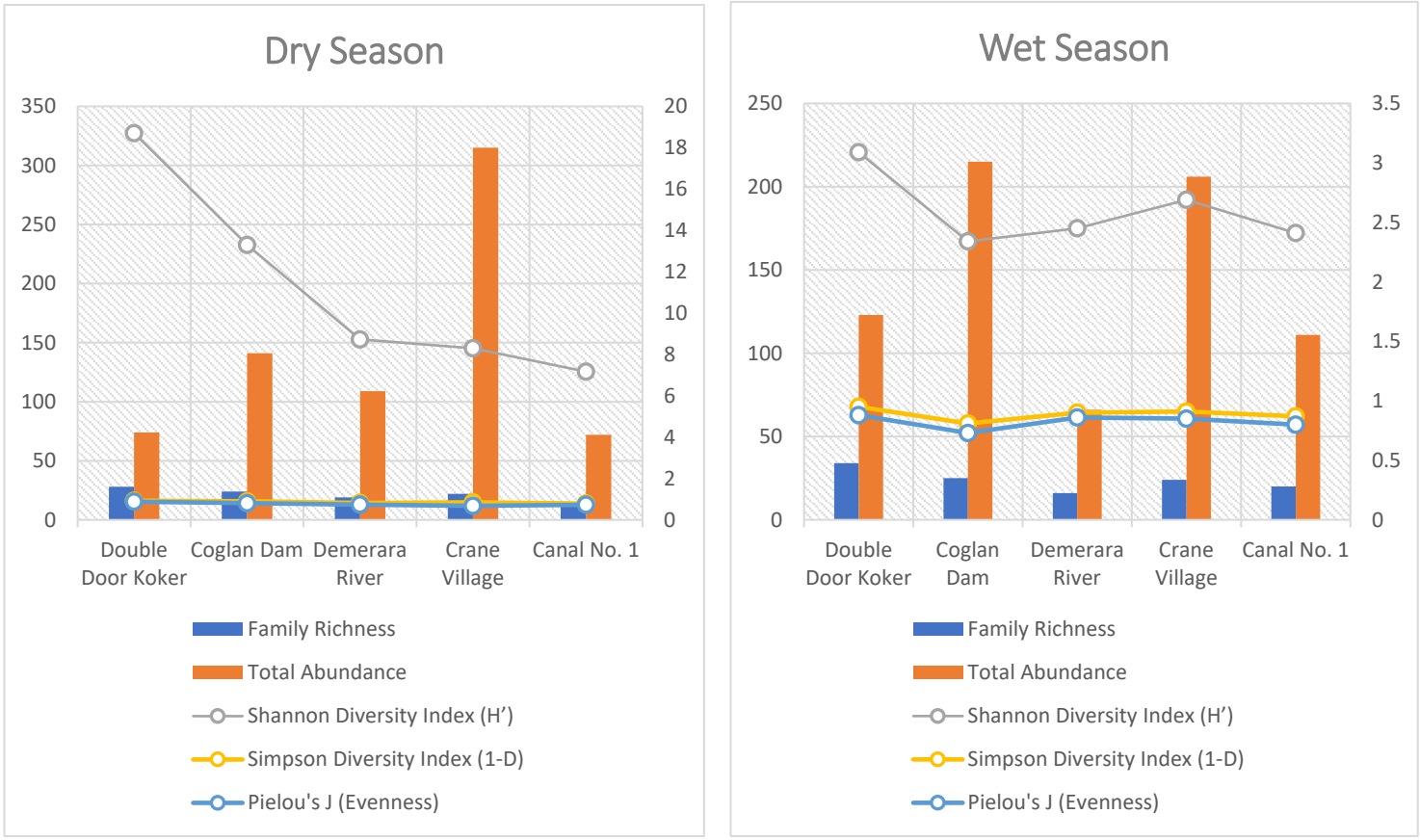
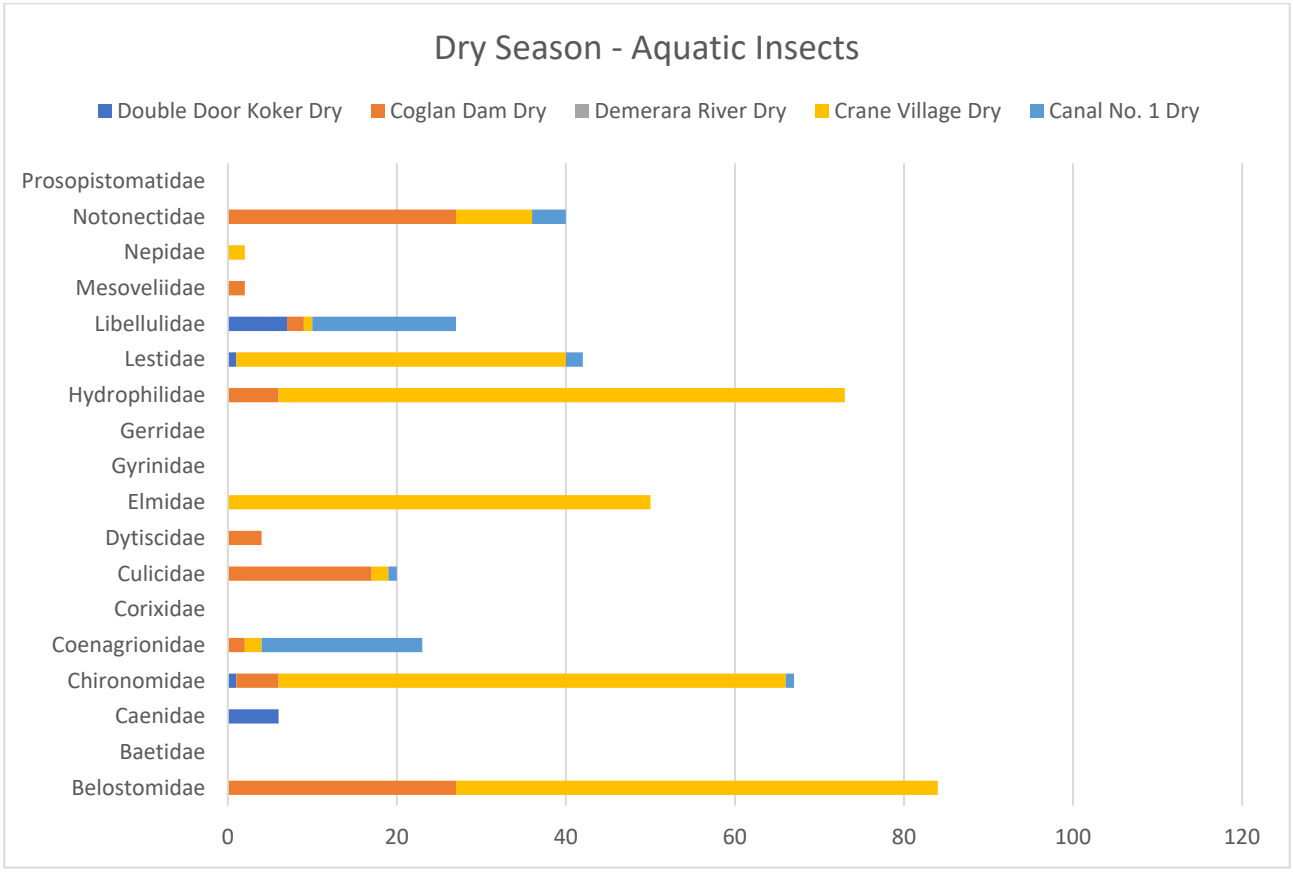


Fig. 1: Comparison of total insect communities in the Dry and Wet Season



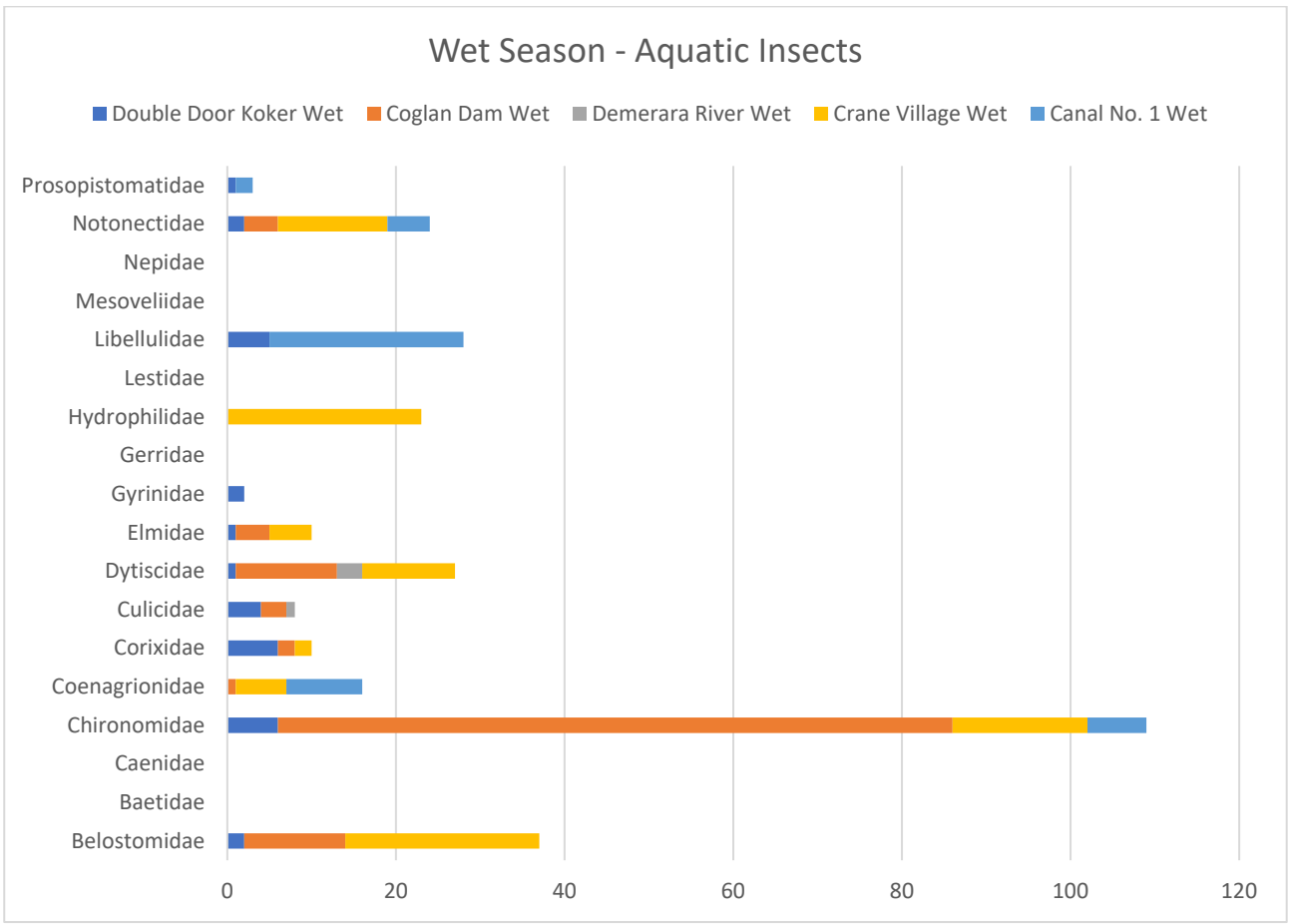
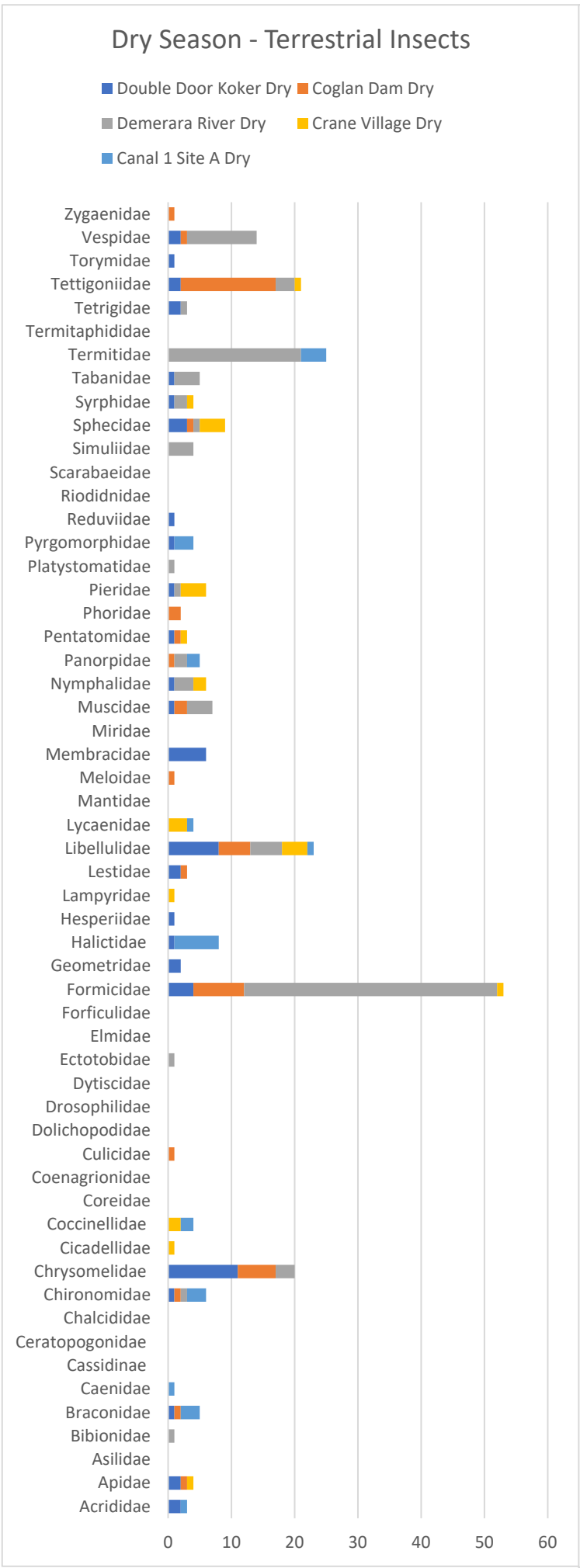


Fig. 2: Comparison of familial aquatic insect communities based on richness in the Dry and Wet Season


Dry Season - Terrestrial Insects
Double Door Koker Dry
Coglan Dam Dry
Demerara River Dry
Crane Village Dry
Canal 1 Site A Dry
Zygaenidae
Vespidae
Torymidae
Tettigoniidae
Tetrigidae
Termitaphididae
Termitidae
Tabanidae
Syrphidae
Sphecidae
Simuliidae
Scarabaeidae
Riodidnidae
Reduviidae
Pyrgomorphidae
Platystomatidae
Pieridae
Phoridae
Pentatomidae
Panorpidae
Nymphalidae
Muscidae
Miridae
Membracidae
Meloidae
Mantidae
Lycaenidae
Libellulidae
Lestidae
Lampyridae
Hesperiidae
Halictidae
Geometridae
Formicidae
Forficulidae
Elmidae
Ectotobidae
Dytiscidae
Drosophilidae
Dolichopodidae
Culicidae
Coenagrionidae
Coreidae
Coccinellidae
Cicadellidae
Chrysomelidae
Chironomidae
Chalcididae
Ceratopogonidae
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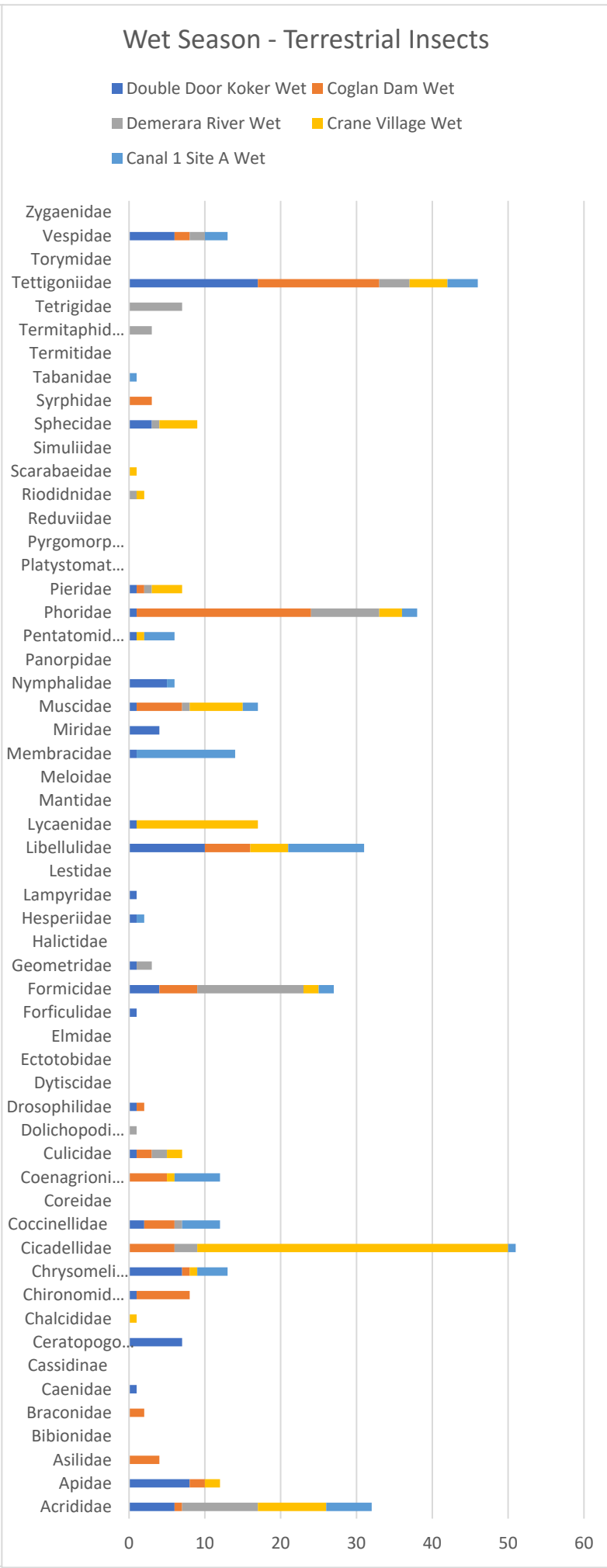
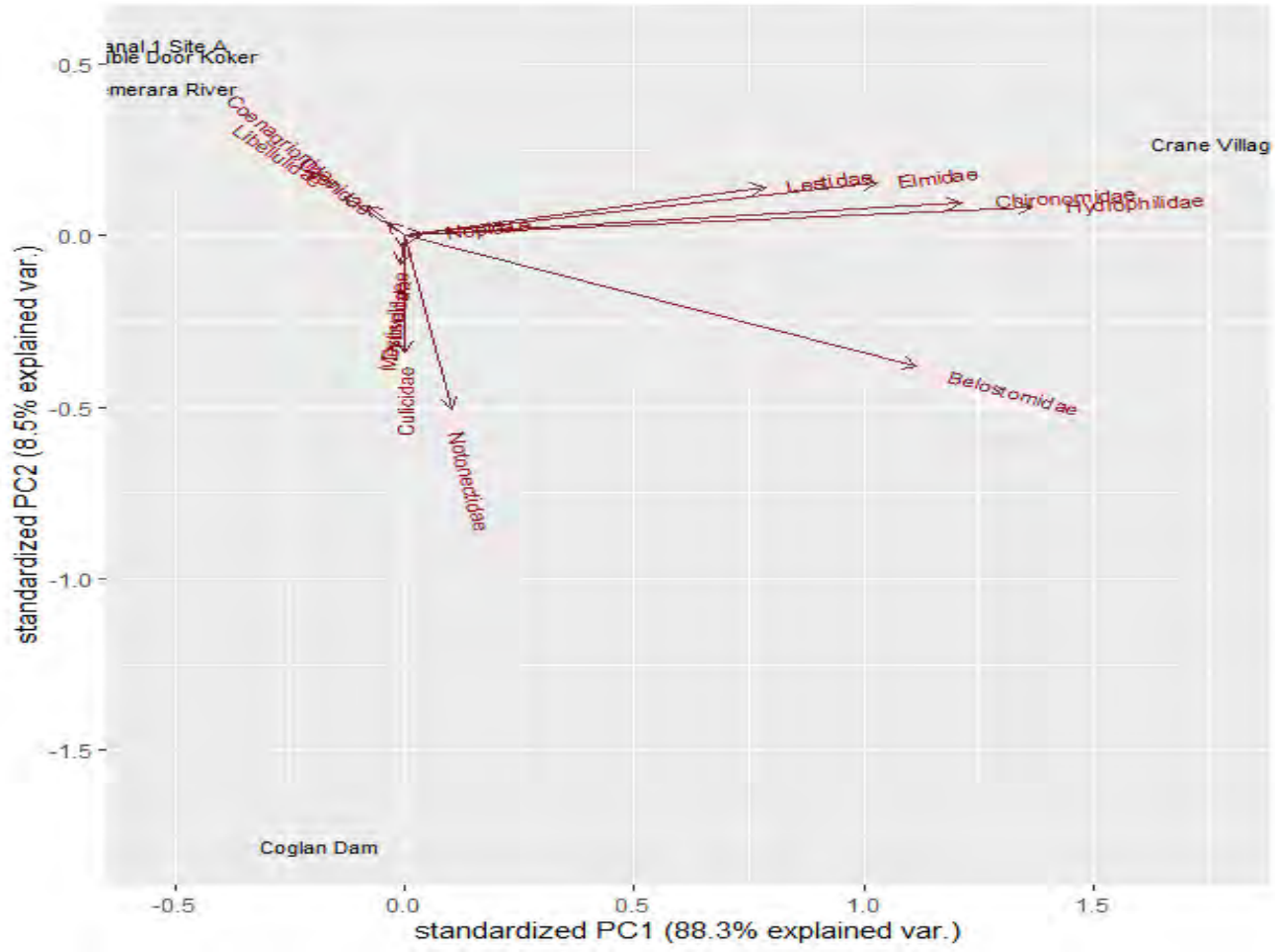

Wet Season - Terrestrial Insects
Double Door Koker Wet
Coglan Dam Wet
Demerara River Wet
Crane Village Wet
Canal 1 Site A Wet
Zygaenidae
Vespidae
Torymidae
Tettigoniidae
Tetrigidae
Termitaphid...
Termitidae
Tabanidae
Syrphidae
Sphecidae
Simuliidae
Scarabaeidae
Riodidnidae
Reduviidae
Pyrgomorp...
Platystomat...
Pieridae
Phoridae
Pentatomid...
Panorpidae
Nymphalidae
Muscidae
Miridae
Membracidae
Meloidae
Mantidae
Lycaenidae
Libellulidae
Lestidae
Lampyridae
Hesperiidae
Halictidae
Geometridae
Formicidae
Forficulidae
Elmidae
Ectotobidae
Dytiscidae
Drosophilidae
Dolichopodi...
Culicidae
Coenagrioni...
Coreidae
Coccinellidae
Cicadellidae
Chrysomeli...
Chironomid...
Chalcididae
Ceratopogo...
Cassidinae
Caenidae
Braconidae
Bibionidae
Asilidae
Apidae
Acrididae
0
10
20
30
40
50
60

Fig. 3: Comparison of familial terrestrial insect communities in the Dry and Wet Season



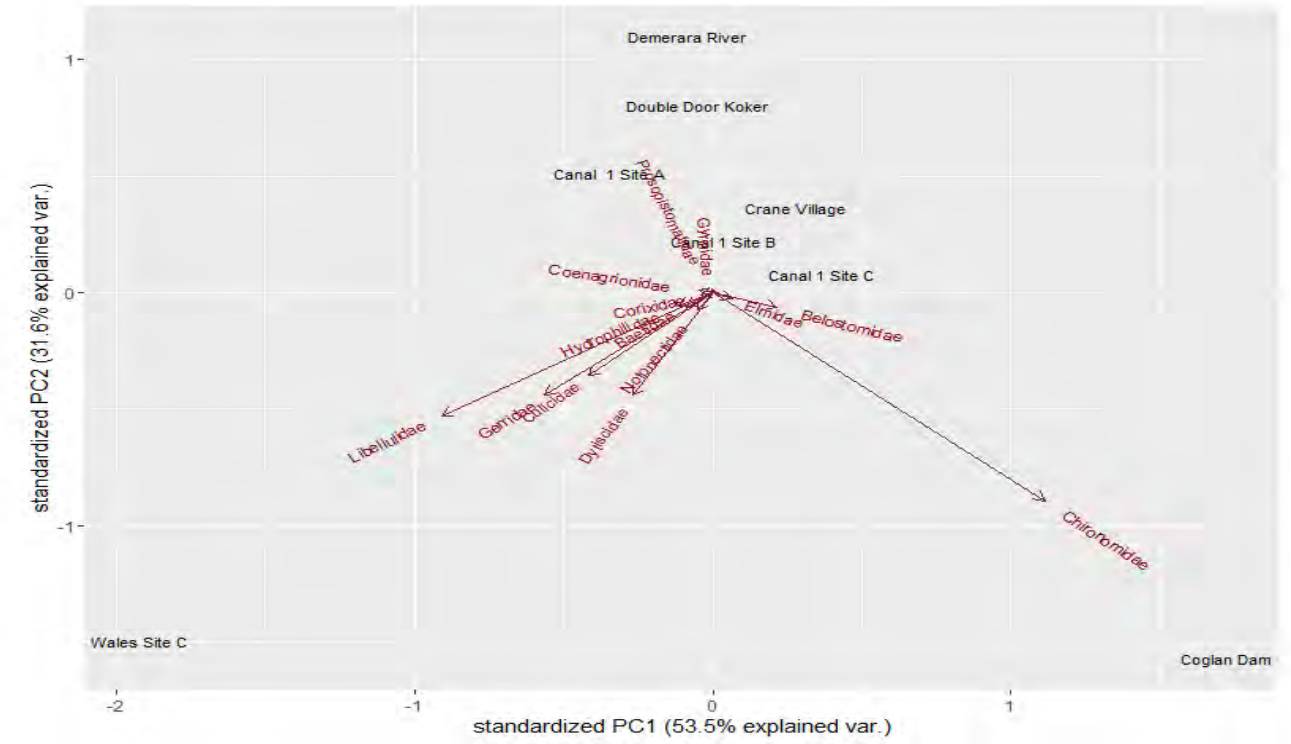


Fig 4.: Association of aquatic insect families with Sites in Dry and Wet Season

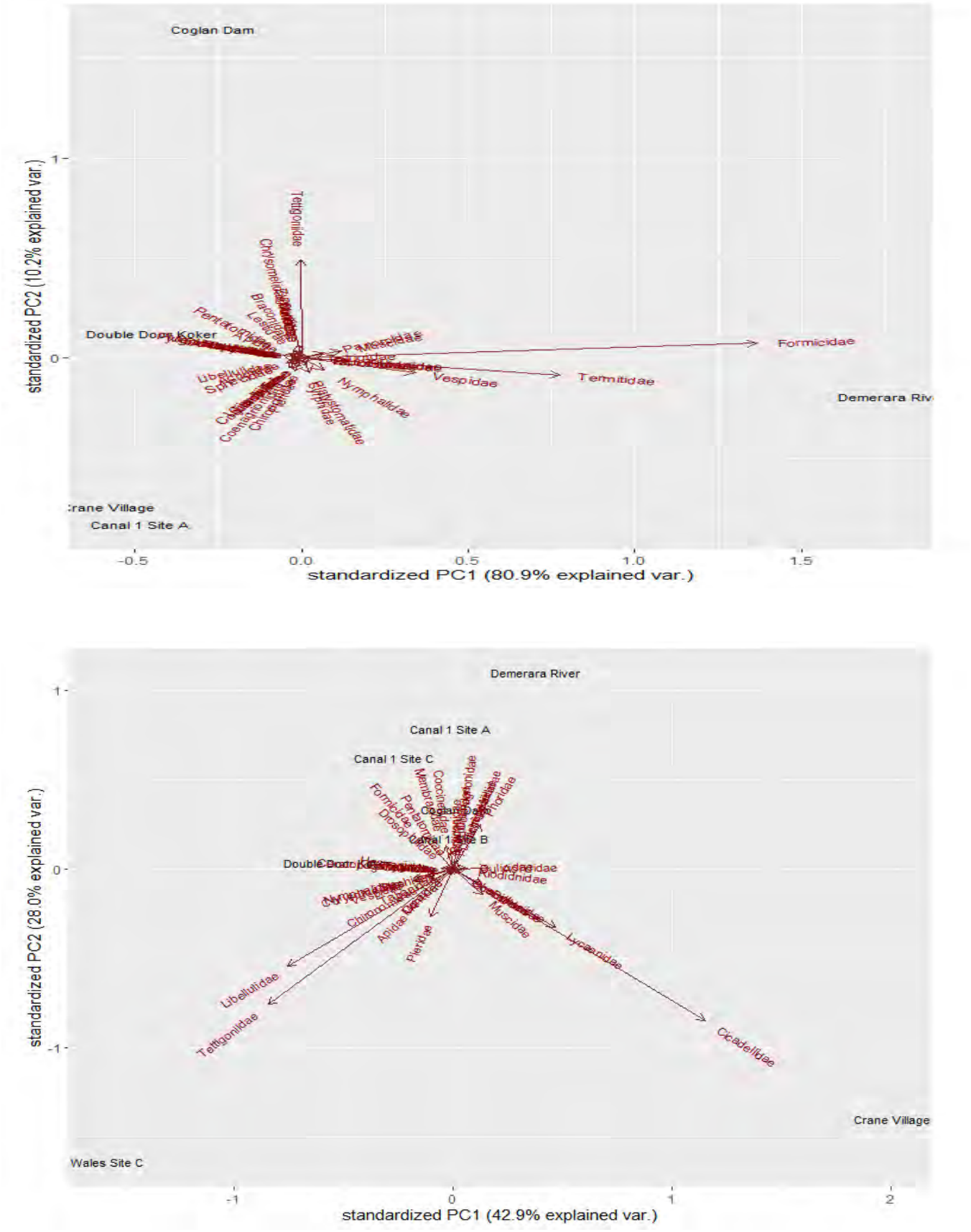


Fig 5.: Association of terrestrial insect families with Sites in Dry and Wet Season

Aquatic Macroinvertebrates & Water Quality of Dry Vs Wet Seasons

For the Dry Season, a total of 440 macroinvertebrate individuals of 13 families were collected from four study area sites (Table 1). For the Wet Season, a total of 612 macroinvertebrate individuals of 19 families were collected from all 8 study area sites and a total of 297 individuals and 12 families were collected from the 5 study area sites sampled during both seasons (Table 5). During both seasons, the number of aquatic insects collected at the Demerara Site was low (Fig. 1) due to salinity levels and the heavy tidal flow. For the remaining four sites surveyed during both seasons, the Double Door Koker had one of the lowest total abundance of individuals collected. However, this site was the most family rich and among the most diverse sites with high populations of Libelluidae (Skimmer-Dragonflies) in the aquatic environment. During the Dry Season Canal No. 1 was the least diverse with pollution tolerant Libellulidae, Coenagrionidae (Narrow-winded Damselflies), and a small number of pollution intolerant Notonectidae (Backswimmers) in the aquatic environment (Tables 2 & 3). While during the Wet Season Coglan Dam was the least diverse with high populations of pollution tolerant Chironomidae (red blood worms) (Fig. 4) and a small population of Dytiscidae and Belostomatidae in the aquatic environment (Tables 6 & 7, Fig. 2). However, during the Wet Season the Canal No. 1 Site also had low diversity with a high population of Libelluidae (Skimmer-Dragonflies) and Chironomidae (Red blood worms) (Fig 4). Seasonality has been found to have some effect on insects that inhabit the aquatic environment, with an increase being seen in the rainy/wet seasons when the environment changes (Santana et al., 2015). Although our study did not show these results for the total abundance our results did show higher Chironomidae populations in the wet seasons than in the dry season because of the availability of organic matter which serves as food (Simião-Ferreira et al.,2009, Santana et al., 2015, Vebrová, et al., 2018). We also assumed that similar to other research, in our study sites the Wet Season provided a catalyst for increases in abundance of these aquatic insects by bringing in food-based nutrient deposits of organic and material from agricultural runoff (Sun et al., 2011, Santana et al., 2015, Buck et al., 2019).
In our study, there was an evident lack of a high population of the Ephemeroptera and a complete lack of Plecoptera and Trichoptera (EPT) groups consistent with the idea that all the sites were characterised as disturbed/polluted. More so, most representatives of these insect orders are wholly aquatic and possess tracheal gills in the larval as such they achieve their highest diversity in flowing waters (Hershey et al., 2010), not characteristic in the study sites. It must be noted that the low populations of the EPT groups were more evident in the wet season as there were extremely low numbers of Caenidae (Small Square-Gill Mayflies) which

although resistant to pollution may disappear slowly during pollution the water body (Mandaville 1999).

The results on family diversity in both Wet and Dry seasons coincided with water quality, with Double Door Koker having the higher quality water and Canal No. 1 and Coglan Dam poor-quality water (Tables 4 & 8). Overall, higher pollution levels were noted in the Wet Season than in the Dry Season (based on Biotic indices). This can result from runoff due to increased rainfall from surrounding residential, agriculture, and pasture land. It must be noted that a MANOVA carried out on the Aquatic Families abundance per site and physicochemical properties showed no meaningful analyses due to the low number of the families and the multivariate regression on the total abundance and physicochemical properties showed no statistical significance among the aquatic insect families for both Wet and Dry Seasons. These results are not surprising as although many aspects of water chemistry can restrict the occurrence or abundance of aquatic insects, including pH, salinity, and concentrations of specific ions or elements it is the extremes of these parameters that result in a change to aquatic insect communities, while levels around the mean have a less direct impact. More so, although some aquatic insects prefer a narrow range of temperature others can tolerate a broader range of temperatures and only wide temperature fluctuation will possibly alter the species composition of aquatic insects (Hershey et al., 2010). It should be noted that seasonal and spatial variations and other factors contributing such as stream size, flow, and level of disturbance can affect dissolved oxygen concentration can greatly restrict the types and diversity of insects found in aquatic environments. In addition, turbidity as sedimentation can affect ecosystem functions (Kefford et al., 2012). As turbidity increases, a reduction in plant growth occurs because less light is available for photosynthetic production. The effects of reduced primary production on herbivorous insects at higher trophic levels are compounded when sediment settles on remaining macrophytes. Thus, not only is primary production reduced by sedimentation and turbidity, but macrophyte quality also is reduced as a food source (Henley et al., 2000). Therefore although not statistically significant results were noted in this study, DO and turbidity parameters should be monitored as low DO and turbid water induces stress in many aquatic organisms.

From the PCA analysis (Fig 4 & 5), we can see that specific families are strongly associated with various sites such as Formicidae and Termitidae with the Demerara River site, Lestidae, Elmidae, Chironomidae, and Hydrophilidae with Crane Village, Notonectidae, and Culicidae

with Coglan Dam during the Dry Season. While during the Wet Season Chironomidae with Coglan Dam. Hortal et al. (2010) argue that habitat-related variables, biotic factors, bionomic process, and occupancy dynamic seem to operate at the landscape, local, and point scales related to the distribution of insects. In both seasons, the richness and composition of functional feeding groups changed with pollution levels where mainly predators decreased in number, while collector-gatherers became dominant.

Terrestrial Macroinvertebrates & the Health of Open Environments of Dry vs Wet Seasons

During the Dry Season, A total of 271 macroinvertebrate individuals of 40 families were collected from all five study sites (Table 1). At the most diverse site, Double Door Koker and Libellulidae Skimmer – Dragonfly) and Chrysomelidae (Leaf Beetles), and Membracidae (Treehoppers) were the main insect groups in the terrestrial environment (Table 2, Fig 5). The least diverse during this season was Canal No. 1 with low numbers of bioindicator families. During the Wet Season, a total of 661 macroinvertebrate individuals of 56 families were collected from all 8 study sites (Table 5) while 424 individuals from 38 families were found in the five sites surveyed during both seasons (Table 5). In the Wet Season the most diverse site, Double Door Koker was found to be dominated by Tettigoniidae (Bush Crickets), and Libellulidae (Skimmer – Dragonfly) (Figs 3 & 5). The least diverse site was Coglan Dam (Fig. 3) and it was dominated by Phoridae (Humpbacked Flies) and low numbers of all other families. This taxon exploits a wide range of habitats and is attracted to decaying organic matter (Disney, 2012, Gerhardt & Hribar, 2019).

Although there were differences in the dominant families in the more diverse sites all families (Fig. 5) noted indicated less disturbed habitats as these taxa are dependent on localised relatively healthy vegetation and microclimates and sensitive to change in their environment. Specifically, groups such as Hemiptera and Coleopterans have been linked with seasonality because of their dependence on plants (Silva et al., 2011). Ultimately the seasonal abundance of most terrestrial insects cannot be explained equally by changes in climate. Other factors, including covariate factors such as availability of food resources and interactions with the biotic environments, form the varying trends in abundance with insect families being affected differentially (Silva et al., 2011).

Our findings did not correlate with literature that generally shows insects tend to have a higher abundance when the temperature is higher in the dry season because their rates of

development and reproduction are highest (Wolda,1980, Silva et al., 2011). However, due to the weather patterns noted during these study seasons, we do believe that our results did show there is an optimal period between the end of the dry season and the start of the wet season in the transitional period where the plants are blooming new foliage which provides both a food resource and shelter for insects causing population increase (Wolda,1980, Lingbeek et al., 2017). The compounding factors of the temperature increase and the increased availability of waters provide the opportunity for increased abundance in some insect groups (Silva et al., 2011, Shin et al.,2021).

Overall, we found little difference in the Dry and Wet Season data with total family richness, total abundance, Simpson Diversity Index, and Pielou's J evenness test showing no statistical significance between seasons. The only community metric that was statistically significant was the Shannon Diversity Index. This result may be attributed to the fact that the Simpson index is a dominance index and it accounts proportion of species in a sample. Whereas, the Shannon-Weiner index is based on randomness present at a site and considers both species richness and equitability in the distribution in a sample. Therefore, this statistical difference is due to the differing abundance levels of specific families associated with sites during particular seasons (Figs 4 & 5).

CONCLUSIONS & RECOMMENDATIONS

The presence or absence of a species differs since each species will have differing ecological tolerances to pollutants (Jones, 2011; Parmar et al., 2016; Putro et al., 2017). Therefore, it is important to select the correct biotic organism depending on their habitat needs that can give the right response to pollutants (Burger, 2006; Pinilla-Cortés, 2019; Zaghloul et al., 2020) as Taxaspecific indicators give better resolution on the effects of pollution on macroinvertebrates than community-level statistical indices do (Johnson et al., 1992). The sensitivities of different macroinvertebrate taxa to pollution depend on their life history and feeding ecology (Giudici et al., 1988). Consequently, different taxa have considerably different pollution tolerances (Arimoro & Ikomi, 2008).

This study found specific taxa that occurred in various water qualities. Although most of the Families collected were moderately or highly tolerant to pollution and many that were pollution sensitive were collected in low numbers, it was noted during the dry season that a

few taxa, such as Caenidae from the Order Ephemeroptera, presented only in higher quality water (although still polluted). On the other hand, during both seasons, Chironomidae from the Order Diptera occurred in almost all water quality grades but varied in numbers with higher numbers found in lower quality water as they are extensively adaptable to the environment could survive in all types of substrates and all water quality grades (as noted in research by Kazanci & Girgin, 1998; Arimoro & Ikomi 2008; Oscoz et al., 2011). During the Dry Season the Terrestrial habitats, the health of the habitats was assessed based on the presence of Chrysomelidae, Tettigoniidae, Nymphalidae, Formicidae, and Termitidae, indicating healthier environments. In the Wet Season, the health of the Terrestrial habitats was assessed based on the presence of Libelluidae and Tettigoniidae, indicating healthier environments. More so, our results show that certain sites were more associated with specific families of insects due to optimal habitats.

Therefore, we recommend a general survey in both aquatic and terrestrial environments with a focus on the abundance of the following taxonomic Orders Ephemeroptera (Canidae), Odonata, Coleoptera, Hemiptera, Hymenoptera, Diptera (Chironomidae), Lepidoptera, Termitidae, Formicidae and Orthoptera (Tettigoniidae, Tetrigidae and Acrididae). In addition, we recommend terrestrial insects survey (soil and plant) be carried out in a 10 m zone around the waterways to fully assess the health of the surrounding habitats and with all physicochemical properties are monitored in the aquatic habitats with emphasis on turbidity and DO.

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APPENDIX O

Socioeconomic Surveys—Questionnaires

Resubmitted without changes

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APPENDIX O

Door-to-door household surveys (Survey A)

Script:
Good Morning/Good Afternoon,

My name is _____ and I am employed by E&A/ERM as a surveyor the Gas to Energy Environmental and Social Impact Assessment being conducted on behalf of EEPGL. This research requires that we establish a reliable base of information by collecting data on communities near to the Wales Estate and potential locations for the proposed Gas to Energy Project, including potential pipeline route to the coast. As such, we are conducting these surveys across this general area. For this reason, we request your cooperation in allowing us to collect data on your [household or business or community].

All information collected in this survey will be kept confidential. The data obtained throughout all of the surveys will be aggregated and analyzed for trends, and not evaluate on a personal or individual level.

This survey should take 30 minutes.

Key to Form

- Brown = Quantitative / box checking
- Blue = Independent entry required

General Information

1. Surveyor Name [List]
2. Date [Calendar Drop Down for November and December 2021]
3. Community Name [List]
4. Address / Lot [List]
5. Household Member Interviewed (Last, First, Middle) [List]
6. Household Member Phone Number [List]
7. List any other household members present [List]

Household Information

8. Interviewee Relationship to Head of Household (HOH) [Drop Down]
   - HOH
   - Spouse
   - Child
   - Parent
   - In-law
   - Grandchild
   - Step-Child
   - Nieces //nephews
   - Other relative
   - Renter
   - Unknown
   - No Answer

9. Marital Status [Drop Down]
   - Never married
   - Currently married

- Separated / divorced
- Widowed
- Other
- Unknown
- No answer

10. Gender [Drop Down]
- Male
- Female
- Nonbinary
- No Answer

11. Age [Enter age]

12. Education [Drop Down]
- None/Kindergarten
- Primary
- Secondary (some grades)
- Secondary (completed)
- Post-Secondary
- University/Tertiary
- Other
- No Answer

13. Ethnicity [Drop Down]
- East Indian Descent
- African Descent / Black
- Mixed Ethnicity
- Amerindian
- Chinese
- Portuguese
- White
- Other
- Unknown
- No answer

14. Number of people currently living in this household [list]

15. Number of household members below the age of 18 (children) [list]

16. Number of household members over the age of 65 [list]

17. Do you receive any social or government assistance (e.g. COVID relief, elderly pension, welfare support)? [Drop Down: Yes, No, Unsure, No Answer]

18. Are any members of the following: [Drop Down]
- Handicapped (mobility)
- Handicapped (learning capacity)
- Blind
- Deaf
- Age (elderly)
- Woman headed household
- Internally Displaced Person
- Teenage or adolescent household
- Unknown
- No answer

Employment and Income Information

19. Occupation (Primary) [Drop Down]
- Farming, agriculture or agribusiness
- Fishing
- Housewife / Househusband
- Civil servant or public sector employee
- Retail services
- Hospitality (restaurants, accommodations, etc.)
- Business owner (what type) [list]
- Retired
- Student
- Other
- No Answer

20. Which sector are you employed? (Primary) [Drop Down]
- Agriculture, Fishing, and Forestry
- Mining and Quarrying (excluding oil and gas)
- Oil and Gas
- Wholesale and Retail Trade
- Transportation and Storage
- Construction
- Manufacturing
- Public Administration
- Information and Communication
- Financial and Insurance Activities
- Education
- Other Services
- Health and Social Services
- Electricity and Water
- Real Estate

21. What type of employment do you have?
- Full-time
- Part-time
- Contract/gig
- Seasonal
- Self-employed
- Other
- No Answer

22. Occupation (Secondary – if any) [Drop Down]
- None
- Farmer
- Fisher
- Housewife / Househusband
- Merchant/shopkeeper
- Public Sector Employee
- Work Part-time / temporary
- Business Owner (what type)
- Retired
- Student
- Other
- No Answer

23. What is your total monthly income (employment, benefits, other sources)? [Drop Down]
- Less than 60,000

- 60.000 to 100,000
- More than 100,000
- 200,000 to 300,000
- 400,000 to 500,000
- More than 500,000

24. Do you receive regular (e.g. monthly) remittances from a family member or relative (e.g. Western Union, Moneygram)? [Drop Down: Yes, No, Unsure, No Answer]

a. If yes, how much? [List Guy$ amount]
b. If yes, has this changed due to COVID-19? [Drop Down]
   - Greater value of remittances
   - Lower value of remittances
   - Unknown
   - No Answer

25. Have you or a household member lost your employment in the past 18 months due to COVID-19? [Drop Down: Yes, No, Unsure, No Answer]

26. Do you or anyone in your household have a savings account? [Drop Down: Yes, No, Unsure, No Answer]

27. Do you or anyone in your household have a bank loan or private loan? [Drop Down: Yes, No, Unsure, No Answer]

28. Have you lost access to any core services in relation to COVID-19?

- None
- Supply Chain
- Utilities
- Groceries
- Transportation
- Health Services
- Other
- Unknown
- No Answer

29. Have there been any improvements in your access to internet/wifi services as a result of COVID-19? [Drop Down: Yes, No, Unsure, No Answer]

Residency and Land Use

30. Is this your primary residence? [Drop Down: Yes, No, Unsure, No Answer]

a. If no, where do you live permanently? [List Name]
b. If no, what do you use this property for? [Drop Down]
   - Weekend / Holiday Home
   - To visit friends / family
   - Agriculture / Fishing
   - Other
   - Unknown
   - No Answer
c. If no, how many weeks per year? [List # of weeks]
d. If yes, how long have you resided in the Wales Estate area? [Drop Down]
   - Past 6 months
   - 1 to 2 years ago
   - 5 to 10 year ago
   - 10+ years or more
   - Unsure

31. What type of tenure do you have on this land? [Drop Down]
- Own
- Lease
- Informal agreement
- Use land – no agreement
- Unknown
- No Answer

32. If you do not own the land, who does? [List name/entity]

33. Have you engaged with or been consulted by the Government about your land in the past 6 months? [Drop Down: Yes, No, Unsure, No Answer]

A. If yes, how satisfied are you with the consultation and negotiation process with the government?
- Very satisfied
- Satisfied
- Neutral
- Not satisfied
- Not known
- No answer

B. If yes, what were you engaged or consulted on?

C. If no, are you expecting to be? [Drop Down: Yes, No, Unsure, No Answer]

34. Do you know of any cultural heritage or cultural services in the area (natural spaces of religious importance, or places that hold value for recreation or tourism? [Drop Down: Yes, No, Unsure, No Answer]

A. If yes, where? [List]

35. Do you know of any guest houses or rented accommodations in the area? [Drop Down: Yes, No, Unsure, No Answer]

B. If yes, where? [List]

Utilities, Transport and Furnishings

36. What is your domestic water source? [Drop Down]
- Tied to main line
- Well
- River/Canals
- Other
- Unknown
- No Answer

37. What type of toilets do you have? [Drop Down]
- latrine
- flush toilet
- others
- Unknown
- No Answer

38. What is your source of electricity? [Drop Down]
- Tied to main line
- Generator
- No electricity
- Unknown
- No Answer

39. What is your primary mode of transportation? [Drop Down]
- Vehicle (owned by family)
- Vehicle (owned by other)
- Motorcycle / Moped
- Bus
- Taxi / Shared Ride Service
- Bicycle
- Boat
- By foot
- No Response
- Unknown

40. How many of these do you possess at this residency? [Drop Down for each: 0, 1, 2, 3+]
- Radio
- Bicycle
- Car
- Motorcycle
- Boat
- Television
- Generator
- Computer
- Refrigerator
- Washing machine
- Air conditioner
- Kerosene lantern

Fishing

41. Do you or anyone in your household fish? [Drop Down: Yes, No, Unsure, No Answer]

42. Do you/they fish for which primary reason?
- Commercial Business / Income
- Subsistence / Family Use
- Recreation
- Other

43. Where do you fish most often (sites, locations)? [List]

44. How often do you fish? [Drop Down]
- Daily
- Several times per week
- Several times per month
- Occasionally

45. What do you do with your catch? [Drop Down – Multiple Answers Allowed
- Sell at local market
- Sell in Vreed-en-Hoop
- Sell in Georgetown
- Family Consumption
- Share with Friends
- No Response
- Unknown

46. How do you fish? [Drop Down – Multiple Answers Allowed]
- Trawls
- Fishing Traps and lines

- Gilnets, drift seines, fyke nets/Chinese seins/Cadell Line
- Aquaculture methods
- Other Specify [List]
- No answer

47. What type of fish do you typically catch? [Drop Down – Multiple Answers Allowed]
- grey snapper
- cuffum
- cuirass
- gillbacker
- small trout
- red snapper
- highwaterman catfish
- bangamary
- butterfish
- pacu
- whitebelly shrimp
- prawns
- Seabob
- Other

48. How many fishing boats are in the nearby landing site? [List]

49. How do you use the canals, if at all? [List]

Agricultural Production and Livestock

50. What crops do you grow? [Drop Down]
- None
- Rice
- Fruits
- Casava / Root Vegs
- Greens, Other Vegetables
- Hay
- Other [List]
- No Answer / Unknown

A. For each that you grow – how much do you harvest (consider past 3 years on average)? [List # and unit per crop]
B. For each that you grow – how much of the total do you sell? [List average percentage]
C. For each that you grow – how much of the total do you eat / consume? [List average percentage]
D. For each that you grow – how much of the total do you use for animals? [List average percentage]

51. Do you receive assistance to harvest your crops? [Drop Down: Yes, No, Unsure, No Answer]
A. If yes, from whom?
- Relative
- Neighbor
- Hired labor
- Other

52. How many of each livestock do you own? [List # of each]
- No livestock
- Cow
- Horse / Donkey

- Pigs
- Sheep /Goats
- Poultry
- Other

53. Do they graze on your land here? [Drop Down]
- Yes
- No
- Other Land Nearby
- Other Land Not in Vicinity
- Unknown
- No Answer

54. Do they always go to the same pasture, or are there several pastures where they go? [Drop Down]
- Same pasture
- Several pastures
- Unknown
- No Response

55. How do you help your neighbors out from time to time? [Drop Down]
- Help with fishing
- Help with transportation
- Help with plowing
- Help with harvesting
- Lend tools / equipment (tractors, etc.)
- Help in house construction
- Other, please specify [List]
- Not helping neighbors

56. Does anyone in your household engage in the following for home consumption or for sale? [Drop Down – Multiple Answers Allowed]
- Fruit/vegetable preserving /Honey
- Wild plants / Nuts / Mushrooms
- Traditional Crafts (pelts, baskets, use of mangroves)
- Traditional medicine (harvesting and production) – manicole, moricut harvesting, logging etc.

Communication

57. What is your primary mode of communication? [Drop Down]
- Landline
- Cell phone
- WIFI / Internet
- In Person
- No Response
- Unknown

58. How do you receive your information about community events or news? [Drop Down – Multiple Answers Allowed]
- Printed materials
- Radio
- T.V.
- Digital media (such as Facebook, LinkedIn or YouTube)
- Face to face meeting
- Email
- Cell phone call

- SMS
- Messaging app (e.g., WhatsApp)
- None
- No answer
- Do not know

59. How would you rate your level of understanding about the proposed Project? [Drop Down]
- very good understanding
- Good understanding
- Limited understanding
- No information
- Unknown
- No Answer

60. How would you like to receive information about the proposed Project? [Drop Down – Multiple Answers Allowed]
- Printed materials (such as newsletter)
- Broadcast media (such as radio station)
- Broadcast media (such as TV)
- Digital media (such as Facebook, LinkedIn or YouTube)
- Face to face meeting
- Email
- Cell phone call
- SMS
- None
- No answer
- Do not know

61. Would you or any members of your household look for employment or other opportunities with the Project? [Drop Down: Yes, No, Unsure, No Answer]

62. In your opinion, what type of community investment initiative might best serve this area best? [List]

Thank you for cooperation!

General Commercial Survey (Survey B)

Script:
Good Morning/Good Afternoon,

My name is _____ and I am employed by E&A/ERM as a surveyor the Gas to Energy Environmental and Social Impact Assessment being conducted on behalf of EEPGL. This research requires that we establish a reliable base of information by collecting data on communities near to the Wales Estate and and potential locations for the proposed future Gas to Energy site, including potential pipeline route to the coast. As such, we are conducting these surveys across this general area. For this reason, we request your cooperation in allowing us to collect data on your [household or business or community].

All information collected in this survey will be kept confidential. The data obtained throughout all of the surveys will be aggregated and analyzed for trends, and not evaluate on a personal or individual level.

This survey should take no more than 10 minutes.

Key to Form

- Brown = Quantitative / box checking
- Blue = Independent entry required

General Information

1. Surveyor Name [List]
2. Date [Calendar Drop Down for November and December 2021]
3. Business Name [List]
4. Address / Lot [List]
5. Person Interviewed (Last, First, Middle) [List]
6. Contact Phone Number [List]
7. List any other business persons present [List]

Commercial Information

8. Business Type [Drop Down – Use the COL tables at end of document]
9. Is this a women-owned business?
10. What is your firm size?
    - 1 – 5 employees
    - 5 – 20 employees
    - 21 – 100 employees
    - Over 100 employees
    - Unknown
    - No Answer
11. What percentage of your staff is female? [List %]
12. Please indicate the operational / geographic service area of your business [List]
13. How do your clients or customers hear / connect with you and your services? [Drop Down – Multiple Answers Allowed]
    - Walk by / Drive by
    - Referral
    - Reputation
    - Only service provider in area

- Specialized expertise
- Online
- [Other]
- No Answer

14. For those with a physical storefront, how do clients arrive at your location? [Drop Down – Multiple Answers Allowed]
    - Car
    - Motorcycle/moped
    - Bicycle
    - By foot
    - Boat
15. What is your average monthly water cost? [List]
16. What is your average monthly electricity cost? [List]
17. Would you be willing to share your estimated annual sales volume? (Below is Total Sales Volume) [Drop Down]
    - Refused to Answer
    - Less than 1 M
    - 1 M to 5 M
    - 6 M to 10 M
    - 11 M to 15 M
    - 16 M to 20 M
    - 21 M to 30 M
    - 31 M to 40 M
    - 41 M to 50 M
    - 51 M to 60 M
    - 61 M to 70 M
    - 71 M to 80 M
    - 81 M to 100 M
    - Over 100 M
18. What is your primary operational challenge (e.g. reliability of workers, supply chain, parking)? [List]
19. How do you receive your information about community events or news? [Drop Down – Multiple Answers Allowed]
    - Printed materials
    - Radio
    - T.V.
    - Digital media (such as Facebook, LinkedIn or YouTube)
    - Face to face meeting
    - Email
    - Cell phone call
    - SMS
    - Messaging app (e.g., WhatsApp)
    - None
    - No answer
    - Do not know

20. How would you rate your level of understanding about the proposed Project? [Drop Down]
    - Very good understanding
    - Good understanding
    - Limited understanding
    - No information
    - Unknown
    - No Answer

21. How would you like to receive information about the proposed Project? [Drop Down – Multiple Answers Allowed]

- Printed materials (such as newsletter)
- Broadcast media (such as radio station, TV)
- Broadcast media (such as TV)
- Digital media (such as Facebook, LinkedIn or YouTube)
- Face to face meeting
- Email
- Cell phone call
- SMS
- None
- No answer
- Do not know

22. Would you be looking to become involved in the proposed Project? [Drop Down: Yes, No, Unsure, No Answer]

A. If yes, what type? [List]

23. Do you know of any guest houses or rented accommodations in the area? [Drop Down: Yes, No, Unsure, No Answer]

B. If yes, where? [List]

Focus Group Screening Checklist for Ecosystem Services

Ecosystem Service	Description, Examples
Provisioning Services	
Food: wild-caught fish and shellfish & aquaculture	Fish caught for subsistence or commercial sale; Fish, shellfish, and/or plants that are bred and reared in ponds, enclosures, and other forms of freshwater or saltwater confinement for harvesting
Food: wild plants, nuts, mushrooms, fruit, honey	Fruit, nuts, wild plants, etc. collected in natural areas for consumption or sale
Food: wild meat	Animals hunted primarily for food (recreational hunting is covered separately under cultural services); extent of wildlife trapping and trade (Region 1)
Food: cultivated crops	Annual and permanent crops grown for subsistence use and commercial sale
Biomass for livestock production	Sedentary and nomadic livestock farming supported by native forage plants
Biomass fuel	Wood, dung and plant matter collected for charcoal or fuel
Timber and wood products	Wood collected for local use or for sale as timber, wood pulp, paper – wood is used in house construction (importance varies by community)
Non-wood fibers and resins	For example, cane, palm, straw, cotton, hemp, twine and rope, natural rubber
Freshwater - household use	Freshwater for bathing, drinking, laundry, household use
Freshwater - irrigation & industry	Freshwater for irrigation or industrial use
Natural medicines, pharmaceuticals	Natural medicines, biocides, food additives, pharmaceuticals and other biological material for commercial or domestic use
Ornamental resources	For example, pelts, carved or decorative animal products, live animal trade
Genetic resources	Genes and genetic information used for animal breeding, plant improvement, and biotechnology
Transportation	In remote areas no alternative methods of transport; commercial transportation facilities such as wharfs, ferry stellings, etc.
Social / Economic	Income generators or services supporting income generation (e.g., boat building, repairs, transportation services)
Traditional Resource Use (Region 1)	Traditional medicine, manicole and morocut harvesting, logging, non-wood fibers and resins for sustenance and crafts, biomass for fuel, gathering wild plants and honey, turtle/wildlife trappings, and harvesting of shells
Regulating Services	
Regulation of air quality	The influence ecosystems have on air quality by extracting chemicals from the atmosphere (i.e., serving as a “sink”) or emitting chemicals to the atmosphere (i.e., serving as a “source”)
Climate regulation: global	Vegetated areas sequester CO_2, with implications for global climate change
Climate regulation: local	Regulation of temperature, shade air, and quality by vegetated areas

Ecosystem Service	Description, Examples
Regulation of water timing and flows (including flood regulation)	Influence ecosystems have on the timing and magnitude of water runoff, flooding, and aquifer recharge
Water purification and waste treatment	Role played by vegetation in the filtration and decomposition of organic wastes and pollutants and the assimilation and detoxification of compounds
Shoreline protection	Role of natural habitats (e.g., wetlands, beaches, reefs) in protecting crops, buildings, recreation areas from waves, wind and flooding from coastal storms
Fire regulation	Regulation of fire frequency and intensity (e.g., dense forest can provide firebreaks)
Pest regulation	Predators from forests, grassland areas, etc. may control pests attacking crops or livestock
Disease regulation	Influence ecosystems have on the incidence and abundance of human pathogens
Erosion regulation	Role of vegetation in regulating erosion on slopes and riparian areas
Pollination	Birds, insects and some small mammals pollinate certain flora species, including some agricultural crops
Cultural Services	
Spiritual or religious value	Natural spaces or species with spiritual or religious importance
Traditional practices	Cultural value placed on traditional practices such as hunting, fishing, crafts and use of natural resources
Tourism and recreation	Use of natural spaces and resources for tourism or local recreation (e.g., swimming, boating, fishing); tourism potential and infrastructure needs (Region 1)
Aesthetic value	Cultural value placed on the aesthetic value provided by landscapes, natural landmarks
Educational and inspirational values	Information derived from ecosystems used for intellectual development, culture, art, design, and innovation
Non-use value of biodiversity (e.g. existence, bequest value)	Species and areas valued globally as of high conservation value
Cultural Services	Cultural aspects and places of importance and protection for Amerindian communities
Supporting Services [a]	
Habitat provision	Natural spaces that maintain species populations and protect the capacity of ecological communities to recover from disturbances
Primary production	Formation of biological material by plants through photosynthesis and nutrient assimilation
Nutrient cycling	Flow of nutrients (e.g., nitrogen, sulfur, phosphorus, carbon) through ecosystems
Water cycling	Flow of water through ecosystems in its solid, liquid, or gaseous forms.
Soil formation	Natural soil-forming processes throughout vegetated areas

24. * Supporting Services are intermediate ecological outcomes that are not directly used but rather support other ecosystem services. An exception is made for Habitat Provision, which is sometimes valued as an “end-use” service by stakeholders in addition to its supporting role

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APPENDIX P

Socioeconomic Surveys—Summary Data Tables

Resubmitted without changes

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Table 1: Socioeconomic Survey Data – Household Surveys, Part 1 of 6

Study Area	Date of Survey	Interviewee Relationship to Head of Household	Marital Status	Gender	Age	Highest Education	Nationality/Ethnic Group	Do you receive any social / government assistance?	Household Members Vulnerability (self-identified, details are withheld)	Occupation (primary)	Employment Sector (primary)	What type of employment do you have?	Occupation (Secondary)	Do you receive regular (e.g., monthly) remittances from a family members / relative?	Has this changed due to COVID-19?
Primary	11/11/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	No	Yes	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	12/6/2021	HOH	Currently married	Female	25-39	Secondary	African Descent Black	No	No	Civil servant	Other	Full time			
Primary	12/2/2021	HOH	Currently married	Female	<25	Secondary	African Descent Black	No	No	Other	Other Services	Full time		No	
Primary	12/6/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time			
Primary	12/2/2021	HOH	Widowed	Male	>65	Primary	African Descent Black	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	11/30/2021	In law	Currently married	Male	25-39	Primary	African Descent Black	No	No	Other	Construction	Part time		No	
Primary	12/7/2021	HOH	Never married	Female	40-65	Primary	African Descent Black	No	No	Other	Other	Full time			
Primary	11/11/2021	Spouse	Currently married	Female	<25	Secondary completed	African Descent Black	No	No	Housewife Househusband	Other		None	No	
Primary	12/2/2021	Spouse	Common law	Female	40-65	Secondary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	12/2/2021	HOH	Widowed	Female	40-65	Primary	East Indian Descent	No	No	Retired					
Primary	12/2/2021	Spouse	Currently married	Female	25-39	Primary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	12/7/2021	Spouse	Currently married	Female	40-65	Primary	East Indian Descent		No	Civil servant	Other	Full time			
Primary	11/30/2021	HOH	Separated divorced	Male	40-65	University Tertiary	East Indian Descent	Yes	No	Retired	Other			No	
Primary	11/30/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent		No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	12/6/2021	Spouse	Currently married	Female	25-39	Secondary completed	East Indian Descent	Yes	No	Housewife Househusband					
Primary	11/30/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	Yes	Yes	Other				No	
Primary	12/2/2021	HOH	Separated divorced	Female	40-65	No Answer	East Indian Descent	Yes	No	Retired				No	
Primary	12/6/2021	HOH	Single	Female	40-65	Primary	African Descent Black	No	Yes	Merchant shopkeeper	Wholesale and Retail Trade	Full time			
Primary	12/7/2021	HOH	Never married	Female	40-65	University Tertiary	East Indian Descent	Yes	No	Retired	Education				
Primary	11/30/2021	HOH	Separated divorced	Female	40-65	Secondary	East Indian Descent	Yes	Yes	Other	Other Services	Part time		Yes	More frequent remittances
Primary	11/12/2021	HOH	Single	Male	<25	Secondary	Mixed Ethnicity	No	No	Farmer	Agriculture Fishing and Forestry	Part time	None	Yes	More frequent remittances
Primary	11/30/2021	HOH	Currently married	Female	40-65	Primary	East Indian Descent	No	No	Retired					
Primary	12/7/2021	HOH	Never married	Male	40-65	Secondary	East Indian Descent	No	No	Civil servant	Other	Part time	Other		
Primary	12/7/2021	Spouse	Currently married	Female	40-65	Secondary completed	Mixed Ethnicity	No	No	Public Sector Employee	Electricity and Water	Full time			
Primary	12/2/2021	HOH	Common law	Male	25-39	Secondary	East Indian Descent	No	No	Other	Construction	Full time		Yes	Less frequent remittances
Primary	11/12/2021	HOH	Single	Male	25-39	Secondary	Mixed Ethnicity	No	No	Farmer	Agriculture Fishing and Forestry	Self employed	Other	Yes	Unknown
Primary	11/30/2021	HOH	Common law	Male	40-65	Primary	East Indian Descent	Yes	Yes	Housewife Househusband	Other			Yes	Less frequent remittances
Primary	12/6/2021	Spouse	Currently married	Female	40-65	Secondary	African Descent Black	No	No	Public Sector Employee	Health and Social Services	Full time			
Primary	12/7/2021	HOH	Currently married	Male	25-39	Secondary	Mixed Ethnicity	No	No	Other	Construction	Full time			
Primary	12/6/2021	Spouse	Currently married	Female	40-65	Secondary	African Descent Black	No	No	Farmer	Agriculture Fishing and Forestry	Full time			
Primary	11/30/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	No	No	Other	Other	Full time		No	
Primary	11/12/2021	HOH	Currently married	Male	40-65	Primary	Amerindian	No	No	Other	Construction	Self employed	Farmer	No	
Primary	11/30/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	Yes	Yes	Other	Construction	Full time		No	
Primary	11/12/2021	HOH	Currently married	Male	40-65	Primary	African Descent Black	No	No	Other	Construction	Full time	None	No	
Primary	12/2/2021	HOH	Common law union	Male	40-65	Secondary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	11/11/2021	Spouse	Currently married	Female	25-39	Secondary completed	African Descent Black	No	No	Other	Wholesale and Retail Trade	Full time	None	No	
Primary	11/30/2021	In law	Widowed	Female	40-65	Secondary	East Indian Descent	No	No	Housewife Househusband				No	
Primary	12/7/2021	HOH	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Other	Construction	Full time			
Primary	12/2/2021	Child	Currently married	Male	40-65	Secondary	East Indian Descent	Yes	Yes	Farmer	Agriculture Fishing and Forestry	Full time		Yes	Unknown
Primary	12/6/2021	Child	Single	Male	<25	Secondary	Mixed Ethnicity	No	No	Other	Mining and Quarrying (excluding oil and gas)	Part time	Other		
Primary	11/30/2021	HOH	Currently married	Male	40-65	Secondary completed	African Descent Black	No	Yes	None				No	
Primary	12/6/2021	HOH	Widowed	Male	>65	University Tertiary	East Indian Descent	No	Yes	Retired					
Primary	11/11/2021	Spouse	Currently married	Female	25-39	Post-secondary	Mixed Ethnicity	No	No	Other	Education	Full time	None	Yes	Less frequent remittances
Primary	11/11/2021	HOH	Never married	Female	25-39	Primary	African Descent Black	No	Yes	Merchant shopkeeper	Wholesale and Retail Trade	Full time		No	
Primary	11/12/2021	HOH	Separated divorced	Female	40-65	Secondary	Mixed Ethnicity	Yes	Yes	Merchant shopkeeper	Other	Self employed	Farmer	Yes	Less frequent remittances
Primary	12/2/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	12/7/2021	Spouse	Common-law union	Female	25-39	Secondary	Mixed Ethnicity	No	No	Civil servant	Mining and Quarrying (excluding oil and gas)	Full time			
Primary	11/30/2021	HOH	Never married	Female	25-39	Secondary	Mixed Ethnicity	No	No	Other	Other	Part time		No	
Primary	11/30/2021	HOH	Widowed	Female	>65	Primary	East Indian Descent	Yes	Yes	Other	Manufacturing	Full time		No	
Primary	12/2/2021	Spouse	Currently married	Female	40-65	Secondary	Mixed Ethnicity	No	No	Farmer	Agriculture Fishing and Forestry	Part time		No	
Primary	11/30/2021	HOH	Currently married	Female	40-65	Secondary completed	African Descent Black	No	No	Retired				No	
Primary	11/11/2021	HOH	Currently married	Female	40-65	Primary	Mixed Ethnicity	Yes	No	Housewife Househusband	Other	Other	None	No	
Primary	12/2/2021	HOH	Currently married	Male	>65	University Tertiary	Portuguese	No	Yes	Retired	Construction			No	
Primary	12/2/2021	HOH	Currently married	Female	40-65	Primary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	

Note: In order to respect the privacy of survey participants, this summary table does Not include personal identification details or Other information that could be used to identify individual participants. Some questions/responses have therefore been excluded, and a randomized order has been applied.

Study Area	Date of Survey	Interviewee Relationship to Head of Household	Marital Status	Gender	Age	Highest Education	Nationality/Ethnic Group	Do you receive any social / government assistance?	Household Members Vulnerability (self-identified, details are withheld)	Occupation (primary)	Employment Sector (primary)	What type of employment do you have?	Occupation (Secondary)	Do you receive regular (e.g., monthly) remittances from a family members / relative?	Has this changed due to COVID-19?
Primary	11/11/2021	HOH	Currently married	Male	>65	Primary	African Descent Black	Yes	No	Merchant shopkeeper	Wholesale and Retail Trade	Self employed	Farmer	No	
Primary	11/30/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	11/30/2021	HOH	Currently married	Male	>65	Primary	East Indian Descent	Yes	No	Retired				No	
Primary	11/30/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	11/30/2021	HOH	Married under religious rights	Male	40-65	Primary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Part time	Other	No	
Primary	11/30/2021	Parent	Currently married	Female	25-39	Secondary completed	Mixed Ethnicity	Yes	No	Other	Transportation and Storage	Full time	Farmer	No	
Primary	12/2/2021	HOH	Never married	Female	40-65	Primary	East Indian Descent	No	Yes	Retired				No	
Primary	12/2/2021	HOH	Currently married	Male	40-65	Primary	Mixed Ethnicity	No	No	Other	Construction	Full time		No	
Primary	12/3/2021	HOH	Widowed	Female	>65	Secondary completed	East Indian Descent	Yes	No	Retired					
Primary	12/7/2021	Spouse	Currently married	Male	25-39	University Tertiary	African Descent Black	No	No	Other	Other	Full time	Other		
Primary	11/11/2021	Spouse	Currently married	Female	25-39	Primary	East Indian Descent	Yes	No	Housewife Husehusband				No	
Primary	12/2/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	No	No	Other	Other Services	Full time	Farmer	No	
Primary	11/30/2021	Other relative	Currently married	Female	>65		East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time			
Primary	11/11/2021	HOH	Currently married	Male	25-39	University Tertiary	African Descent Black	No	No		Public Administration	Full time	Civil servant	No	
Primary	12/7/2021	HOH	Never married	Male	25-39	Secondary	East Indian Descent	No	No	Other	Construction	Full time			
Primary	11/30/2021	HOH	Currently married	Male	25-39	University Tertiary	Mixed Ethnicity	Yes	No	Civil servant	Information and Communication	Full time		No	
Primary	11/11/2021	Spouse	Currently married	Female	40-65	Secondary completed	African Descent Black	No	Yes	Other	Other Services	Part time	Farmer	No	
Primary	11/30/2021	HOH	Widowed	Female	>65	Primary	East Indian Descent	Yes	Yes	Housewife Husehusband				No	
Primary	12/6/2021	Spouse	Common law	Female	25-39	Secondary completed	East Indian Descent	No	No	Other	Transportation and Storage	Full time			
Primary	11/11/2021	Parent	Single	Male	<25	University Tertiary	African Descent Black	Yes	No	Work Part time temporary	Financial and Insurance Activities	Full time		No	
Primary	12/7/2021	HOH	Separated divorced	Female	25-39	Secondary	African Descent Black	No	No	Civil servant	Other				
Primary	12/3/2021	HOH	Widowed	Female	40-65	Primary	East Indian Descent	No	Yes	Work Part time temporary	Other	Part time			
Primary	11/11/2021	HOH	Widowed	Female	>65	Primary	African Descent Black	Yes	No	Housewife Husehusband				Yes	Less frequent remittances
Primary	11/30/2021	Spouse	Currently married	Female	25-39	Secondary completed	East Indian Descent	No	No	Other	Transportation and Storage	Full time		No	
Primary	11/30/2021	HOH	Currently married	Male	40-65	Post-secondary	East Indian Descent	No	No	Other	Financial and Insurance Activities	Part time		No	
Primary	11/30/2021	Spouse	Currently married	Female	40-65	Secondary completed	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	12/7/2021	HOH	Never married	Male	25-39	Secondary completed	African Descent Black	Yes	No	Merchant shopkeeper	Wholesale and Retail Trade	Full time			
Primary	12/2/2021	HOH	Currently married	Male	25-39	Secondary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Part time	Other	No	
Primary	12/3/2021	Child	Separated divorced	Male	40-65	Secondary	African Descent Black		Yes	Civil servant	Construction				
Primary	11/12/2021	Spouse	Currently married	Female	25-39	Post-secondary	East Indian Descent	No	No	Civil servant	Education	Full time	Civil servant	No	
Primary	12/2/2021	Spouse	Currently married	Female	25-39	Secondary	Amerindian	No	No	Housewife Husehusband				No	
Primary	12/6/2021	HOH	Currently married	Male	40-65	Primary	Amerindian	No	No	Civil servant	Construction	Full time			
Primary	11/30/2021	Spouse	Currently married	Female	>65	University Tertiary	East Indian Descent	Yes	No	Retired				No	
Primary	11/30/2021	HOH	Currently married	Male	40-65	Primary	African Descent Black	No	No	Civil servant	Public Administration	Full time		No	
Primary	11/30/2021	Spouse	Currently married	Female	40-65	Primary	Mixed Ethnicity	Yes	Yes	Farmer	Agriculture Fishing and Forestry	Part time	Housewife Husehusband	No	
Primary	11/30/2021	Spouse	Currently married	Female	25-39	University Tertiary	Mixed Ethnicity	Yes	No	Public Sector Employee	Other	Full time		Yes	Unknown
Primary	11/11/2021	Parent	Widowed	Male	>65	Primary	East Indian Descent	Yes	Yes	Farmer	Agriculture Fishing and Forestry	Full time	None	No	
Primary	11/30/2021	HOH	Widowed	Female	>65	Secondary completed	African Descent Black	Yes	Yes	Other	Manufacturing	Full time		Yes	Unknown
Primary	11/12/2021	HOH	Engaged	Female	25-39	Primary	Mixed Ethnicity	No	No	Farmer	Agriculture Fishing and Forestry	Self employed	Other	Unsure	
Primary	11/30/2021	Child	Never married	Female	<25	Secondary completed	African Descent Black	No	Yes	Other				Yes	More frequent remittances
Primary	12/2/2021	Spouse	Currently married	Female	<25	Secondary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Part time		No	
Primary	12/6/2021	HOH	Never married	Male	25-39	Secondary	African Descent Black	No	No	Civil servant	Transportation and Storage	Full time			
Primary	11/30/2021	HOH	Currently married	Female	25-39	Secondary	Mixed Ethnicity	Yes	No	Other	Other	Part time	Other	No	
Primary	11/11/2021	HOH	Currently married	Male	40-65	Primary	Mixed Ethnicity	Yes	Yes	Public Sector Employee	Health and Social Services	Full time	Farmer	No	
Primary	12/2/2021	HOH	Currently married	Male	40-65	Primary	African Descent Black	Yes	Yes	Other	Other Services	Full time	None	No	
Primary	12/2/2021	HOH	Currently married	Male	40-65	University Tertiary	African Descent Black	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	11/30/2021	Spouse	Currently married	Female	40-65	Primary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	11/30/2021	Child	Currently married	Female	40-65	Secondary	East Indian Descent	Yes	No	Other	Construction	Part time		No	
Primary	12/2/2021	Spouse	Currently married	Female	40-65	Primary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	12/2/2021	Spouse	Currently married	Female	40-65	None / Kindergarten	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	11/11/2021	Spouse	Currently married	Female	25-39	Secondary completed	African Descent Black	No	Yes	Other	Health and Social Services	Full time	Farmer	No	
Primary	12/6/2021	HOH	Never married	Male	25-39	Secondary	East Indian Descent	No	No	Civil servant	Construction	Full time			
Primary	11/30/2021	HOH	Currently married	Female	40-65	Primary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	11/30/2021	HOH	Currently married	Female	>65	Primary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	11/30/2021	HOH	Currently married	Male	40-65	Secondary completed	East Indian Descent	Yes	No	Other	Construction	Full time		No	
Primary	11/30/2021	HOH	Currently married	Male	40-65	Secondary completed	African Descent Black	No	No	Public Sector Employee	Health and Social Services	Full time		No	
Primary	12/7/2021	HOH	Currently married	Female	40-65	Secondary	Mixed Ethnicity	No	No	Housewife Husehusband					

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Study Area	Date of Survey	Interviewee Relationship to Head of Household	Marital Status	Gender	Age	Highest Education	Nationality/Ethnic Group	Do you receive any social / government assistance?	Household Members Vulnerability (self-identified, details are withheld)	Occupation (primary)	Employment Sector (primary)	What type of employment do you have?	Occupation (Secondary)	Do you receive regular (e.g., monthly) remittances from a family members / relative?	Has this changed due to COVID-19?
Primary	11/12/2021	Spouse	Currently married	Female	40-65	Primary	African Descent Black	Yes	No	Housewife Househusband			Other	Yes	Lower value of remittances
Primary	11/11/2021	HOH	Widowed	Female	25-39	University Tertiary	Mixed Ethnicity	No	No	Farmer	Agriculture Fishing and Forestry	Full time	Other	No	
Primary	11/30/2021	HOH	Widowed	Female	40-65	Secondary	Mixed Ethnicity	No	No	Housewife Househusband				No	
Primary	11/11/2021	HOH	Never married	Male	<25	Secondary	African Descent Black	No	Yes	Other	Transportation and Storage	Full time	None	Yes	Lower value of remittances
Primary	11/11/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Housewife Househusband		Full time	None	No	
Primary	12/7/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	No	No	Fisher	Agriculture Fishing and Forestry	Part time	Civil servant		
Primary	11/12/2021	Spouse	Currently married	Female	25-39	Secondary completed	Mixed Ethnicity	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	12/3/2021	Spouse	Currently married	Female	25-39	Secondary completed	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time			
Primary	11/30/2021	Nieces nephews	Never married	Female	25-39		African Descent Black	Yes	No	Work Part time temporary	Agriculture Fishing and Forestry	Part time		No	
Primary	12/6/2021	HOH	Currently married	Male	40-65	Post-secondary	African Descent Black	No	No	Other	Construction	Full time			
Primary	12/6/2021	HOH	Separated divorced	Male	40-65	Primary	Amerindian	No	No	Other	Transportation and Storage	Part time	Other		
Primary	11/30/2021	HOH	Currently married	Male	>65	Secondary	East Indian Descent	Yes	No	Retired					
Primary	11/12/2021	Other relative	Currently married	Female	40-65	Secondary	African Descent Black	Yes	No						
Primary	12/7/2021	HOH	Widowed	Female	>65	Secondary	African Descent Black	Yes	No	Retired					
Primary	11/11/2021	HOH	Never married	Male		Secondary completed	Mixed Ethnicity	No	No	Farmer	Agriculture Fishing and Forestry	Seasonal	Farmer	No	
Primary	12/7/2021	HOH	Never married	Male	25-39	Post-secondary	Mixed Ethnicity	No	No	Other	Construction	Full time			
Primary	11/30/2021	HOH	Currently married	Male	40-65	Secondary completed	East Indian Descent	Yes	No	Merchant shopkeeper	Wholesale and Retail Trade	Full time		No	
Primary	12/2/2021	HOH	Currently married	Male	40-65	Primary	African Descent Black	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	11/30/2021	Spouse	Common law	Female	25-39	Primary	Amerindian	Yes	No	Other	Transportation and Storage	Full time	None	No	
Primary	11/30/2021	HOH	Widowed	Female	>65	Secondary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	12/3/2021	HOH	Common law marriage	Male	25-39	Secondary completed	East Indian Descent	No	No	Other	Transportation and Storage	Full time			
Primary	11/30/2021	HOH	Currently married	Male	>65	University Tertiary	East Indian Descent	Yes	No	Retired	Financial and Insurance Activities	Self employed	Farmer	No	
Primary	12/3/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Housewife Househusband					
Primary	12/6/2021	Child	Never married	Female	<25	Secondary completed	East Indian Descent	Yes	No	None					
Primary	11/30/2021	Child	Currently married	Male	40-65	Secondary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Primary	12/6/2021	HOH	Never married	Female	40-65	Secondary completed	Mixed Ethnicity	No	No	Civil servant	Other	Full time			
Primary	12/2/2021	HOH	Currently married	Male	25-39	Secondary	East Indian Descent	No	Yes	Farmer	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/15/2021	HOH	Separated divorced	Male	40-65	Secondary	African Descent Black	No	Yes	None				No	
Secondary	11/15/2021	HOH	Currently married	Female	25-39	Secondary completed		No	No	Housewife Househusband	Other Services	Full time		No	
Secondary	11/23/2021	HOH	Currently married	Female	40-65	Post-secondary	African Descent Black	No	No	Civil servant	Education	Part time	Civil servant	No	
Secondary	11/17/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	Yes	Yes	None				No	
Secondary	11/19/2021	Spouse	Currently married	Female	25-39	Primary	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/22/2021	HOH	Never married	Female	>65	Secondary completed	African Descent Black	Yes	Yes	Civil servant	Other	Full time		No	
Secondary	11/25/2021	HOH	Currently married	Female	40-65	Post-secondary	African Descent Black	No	No	None				No	
Secondary	11/17/2021	HOH	Widowed	Female	>65	Secondary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/17/2021	HOH	Currently married	Male	25-39	Secondary completed	East Indian Descent	No	Yes	Other				No	
Secondary	11/9/2021								No			Other			
Secondary	11/19/2021	HOH	Currently married	Male	40-65	Secondary completed	African Descent Black	Yes	Yes	Civil servant	Other	Full time		No	
Secondary	11/23/2021	HOH	Separated divorced	Female	40-65	Post-secondary	Mixed Ethnicity	Yes	No	Retired				Yes	Less frequent remittances
Secondary	11/15/2021	HOH	Currently married	Male	40-65	University Tertiary	African Descent Black	No	No	Retired	Other		Other	No	
Secondary	11/15/2021	Spouse	Currently married	Female	<25	Secondary	African Descent Black	No	No	Other	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/15/2021	HOH	Currently married	Female	40-65	Primary	Mixed Ethnicity	No	No	Housewife Househusband				No	
Secondary	11/19/2021	Child	Never married	Female	<25	University Tertiary	East Indian Descent	No	No	Student				Yes	Unknown
Secondary	11/25/2021	HOH	Never married	Female	25-39	Secondary completed	African Descent Black	No	No	Housewife Househusband				Yes	Less frequent remittances
Secondary	11/16/2021	HOH	Currently married	Male	25-39	Secondary	East Indian Descent	No	No	Work Part time temporary	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/19/2021	HOH	Currently married	Male	>65	Primary	African Descent Black	Yes	Yes	Retired				No	
Secondary	11/25/2021	HOH	Never married	Male	40-65	Primary	African Descent Black	No	No	Other	Agriculture Fishing and Forestry			No	
Secondary	11/25/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/25/2021	HOH	Widowed	Female	>65	Primary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/26/2021	HOH	Currently married	Male	<25	Secondary	East Indian Descent	No	No	Fisher	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/18/2021	HOH	Currently married	Male	>65	Secondary	East Indian Descent	Yes	Yes	Retired				Yes	Less frequent remittances
Secondary	11/19/2021	HOH	Widowed	Female	>65	Primary	African Descent Black	Yes	Yes	None	Other			Yes	Less frequent remittances
Secondary	11/19/2021	HOH	Currently married	Male	>65	Primary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/26/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	No	No	Civil servant	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/22/2021	Spouse	Currently married	Female	>65	Secondary	East Indian Descent	Yes	No	Housewife Househusband				No	
Secondary	11/22/2021	HOH	Currently married	Male	40-65	Primary	African Descent Black	No	No	Retired				No	
Secondary	11/15/2021	Spouse	Currently married	Female	25-39	Secondary	African Descent Black	No	Yes	Housewife Househusband				No	

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Study Area	Date of Survey	Interviewee Relationship to Head of Household	Marital Status	Gender	Age	Highest Education	Nationality/Ethnic Group	Do you receive any social / government assistance?	Household Members Vulnerability (self-identified, details are withheld)	Occupation (primary)	Employment Sector (primary)	What type of employment do you have?	Occupation (Secondary)	Do you receive regular (e.g., monthly) remittances from a family members / relative?	Has this changed due to COVID-19?
Secondary	11/18/2021	HOH	Currently married	Male	>65	Secondary	East Indian Descent	Yes	Yes	Retired	Other			No	
Secondary	11/22/2021	HOH	Currently married	Male	25-39	Secondary completed	East Indian Descent	No	No	Other	Transportation and Storage	Full time		Yes	Unknown
Secondary	11/23/2021	In law	Currently married	Female	25-39	Secondary completed	African Descent Black	No	No	Housewife Househusband		Full time		No	
Secondary	11/19/2021	Parent	Never married	Female	25-39	Secondary completed	Mixed Ethnicity	No	No	Other	Other Services	Full time		No	
Secondary	11/23/2021	HOH	Widowed	Male	>65	Primary	African Descent Black	Yes	Yes	Retired				No	
Secondary	11/25/2021	HOH	Widowed	Female	40-65	Primary	East Indian Descent	No	Yes	Housewife Househusband				No	
Secondary	11/18/2021	HOH	Widowed	Female	>65	Primary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/19/2021	HOH	Currently married	Female	40-65	Primary	African Descent Black	No	No	Housewife Househusband				No	
Secondary	11/26/2021	HOH	Never married	Male	40-65	University Tertiary	East Indian Descent	Yes	Yes	Other	Financial and Insurance Activities	Full time		Unsure	
Secondary	11/26/2021	Spouse	Currently married	Female	>65	Secondary	East Indian Descent	Yes	No	Retired				Yes	Less frequent remittances
Secondary	11/26/2021	Child	Currently married	Male	25-39	Secondary	Mixed Ethnicity	No	No	Other	Oil and Gas	Full time		No	
Secondary	11/18/2021	HOH	Common law	Female	40-65	Primary	African Descent Black	No	No	Public Sector Employee	Other	Full time		No	
Secondary	11/18/2021	Child	Never married	Male	<25	Secondary	East Indian Descent	Yes	Yes	Other		Full time		No	
Secondary	11/26/2021	HOH	Separated divorced	Female	40-65	Secondary completed	East Indian Descent	No	Yes	None				No Answer	
Secondary	11/15/2021	Spouse	Never married	Female	40-65	Secondary	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/16/2021	HOH	Widowed	Male	>65	Primary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/16/2021	HOH	Never married	Female	40-65	Secondary completed	African Descent Black	No	No	Housewife Househusband				No	
Secondary	11/19/2021	HOH	Currently married	Male	40-65	Secondary completed	Mixed Ethnicity	No	No	Civil servant	Electricity and Water	Full time		No	
Secondary	11/19/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Housewife Househusband		Full time		Yes	Unknown
Secondary	11/22/2021	Other relative	Currently married	Female	25-39	Secondary	African Descent Black	Yes	No	Merchant shopkeeper	Wholesale and Retail Trade	Full time		No	
Secondary	11/15/2021	HOH	Currently married	Male	25-39	Secondary completed	East Indian Descent	Unsure	No	Merchant shopkeeper	Other	Full time	None	No	
Secondary	11/23/2021	HOH	Currently married	Male	25-39	University Tertiary	Mixed Ethnicity	No	No	Public Sector Employee	Oil and Gas	Full time		No	
Secondary	11/26/2021	HOH	Currently married	Male	>65	Post-secondary	East Indian Descent	Yes	No	Retired				No	
Secondary	11/16/2021	HOH	Widowed	Male	>65	Primary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Seasonal	None	No	
Secondary	11/16/2021	Spouse	Currently married	Male	40-65	Primary	East Indian Descent	No	No	Housewife Househusband				Yes	Unknown
Secondary	11/16/2021	Spouse	Currently married	Female	25-39	University Tertiary	East Indian Descent	No	No	Civil servant	Education	Full time	None	No	
Secondary	11/26/2021	HOH	Currently married	Male	25-39	Secondary completed	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Part time	Fisher	No	
Secondary	11/26/2021	HOH	Currently married	Male	40-65	Secondary completed	East Indian Descent	No	No	Other	Other Services	Full time		No	
Secondary	11/16/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Housewife Househusband		Full time	None	No	
Secondary	11/18/2021	HOH	Currently married	Male	>65	Secondary	African Descent Black	Yes	No	Retired				Yes	Less frequent remittances
Secondary	11/22/2021	HOH	Widowed	Male	>65	Secondary completed	East Indian Descent	Yes	Yes	Retired	Other			Yes	Unknown
Secondary	11/15/2021	Spouse	Currently married	Female	>65	University Tertiary	East Indian Descent	Yes	Yes	Housewife Househusband		Full time	None	No	
Secondary	11/17/2021	Child	Never married	Male	<25	Secondary	East Indian Descent	No	No	Other	Mining and Quarrying (excluding oil and gas)	Full time		No	
Secondary	11/18/2021	HOH	Relationship	Female	25-39	None / Kindergarten	East Indian Descent	No	No	Other	Construction	Full time		No	
Secondary	11/25/2021	HOH	Currently married	Female	40-65	Secondary	East Indian Descent	No	Yes	Housewife Househusband				No	
Secondary	11/19/2021	Spouse	Common Law	Male	25-39	Secondary	East Indian Descent	No	No	Other	Other Services	Full time		No	
Secondary	11/18/2021	HOH	Separated divorced	Female	40-65	Secondary completed	African Descent Black	Yes	Yes	Retired				Yes	Unknown
Secondary	11/23/2021	HOH	Separated divorced	Male	40-65	Primary	East Indian Descent	No	No	Other	Other Services	Part time		No	
Secondary	11/15/2021	HOH	Currently married	Female	40-65	Secondary	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/18/2021	Other relative	Never married	Male	40-65	Secondary completed	East Indian Descent	No	Yes	None		Part time	Other	Yes	Unknown
Secondary	11/16/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	No	No	Other	Transportation and Storage	Full time		No	
Secondary	11/23/2021	HOH	Never married	Female	40-65	Primary	Mixed Ethnicity	No	No	Other				Yes	More frequent remittances
Secondary	11/15/2021	Child	Currently married	Male	25-39	Secondary	East Indian Descent	No	No	Other	Construction	Full time		Yes	Less frequent remittances
Secondary	11/19/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	No	No	Other	Agriculture Fishing and Forestry		Other	No	
Secondary	11/23/2021	HOH	Currently married	Male	40-65	Secondary completed	African Descent Black	No	No	None	Transportation and Storage	Part time		Yes	Lower value of remittances
Secondary	11/26/2021	Spouse	Currently married	Female	25-39	Secondary completed	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/15/2021	HOH	Widowed	Male	40-65	Primary	Mixed Ethnicity	No	No	Other	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/19/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	Yes	No	Public Sector Employee	Other	Part time		No	
Secondary	11/23/2021	Spouse	Currently married	Female	40-65	Secondary completed	Mixed Ethnicity	Yes	No	Civil servant	Education	Seasonal		No Answer	
Secondary	11/18/2021	HOH	Never married	Female	40-65		East Indian Descent	No	No	Fisher	Agriculture Fishing and Forestry	Part time		No	
Secondary	11/19/2021	HOH	Currently married	Male	>65	Post-secondary	African Descent Black	Yes	No	Retired				Yes	Unknown
Secondary	11/15/2021	HOH	Currently married	Female	40-65	Secondary completed	East Indian Descent	No	No	Housewife Househusband		Full time	None	No	
Secondary	11/18/2021	HOH	Common law union	Male	40-65	Secondary	East Indian Descent	Yes	No	Housewife Househusband		Part time	Other	No	
Secondary	11/18/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	Yes	No	Fisher	Agriculture Fishing and Forestry	Part time	Other	Yes	Unknown
Secondary	11/19/2021	HOH	Widowed	Female	>65	Secondary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/18/2021	Grandchild	Never married	Female	<25	Secondary completed	East Indian Descent	Yes	No	Student				No	
Secondary	11/22/2021	Spouse	Currently married	Female	>65	Primary	East Indian Descent	No	Yes	Retired			Merchant shopkeeper	No	

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Study Area	Date of Survey	Interviewee Relationship to Head of Household	Marital Status	Gender	Age	Highest Education	Nationality/Ethnic Group	Do you receive any social / government assistance?	Household Members Vulnerability (self-identified, details are withheld)	Occupation (primary)	Employment Sector (primary)	What type of employment do you have?	Occupation (Secondary)	Do you receive regular (e.g., monthly) remittances from a family members / relative?	Has this changed due to COVID-19?
Secondary	11/25/2021	Child	Never married	Male	25-39	Secondary completed	East Indian Descent	No	Yes	Public Sector Employee	Other	Full time		No	
Secondary	11/15/2021	HOH	Currently married	Female	25-39	University Tertiary	East Indian Descent	Yes	No	Other	Information and Communication	Full time	None	No	
Secondary	11/16/2021	Spouse	Currently married	Female	40-65	University Tertiary	African Descent Black	No	No	Housewife Househusband				No	
Secondary	11/26/2021	Child	Currently married	Male	25-39	University Tertiary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/15/2021	HOH	Single parent	Female	40-65	Secondary completed	African Descent Black	No	No	Merchant shopkeeper	Wholesale and Retail Trade	Full time	None	No	
Secondary	11/17/2021	Other relative	Currently married	Female	40-65	Secondary	Mixed Ethnicity	No	No	Housewife Househusband				Yes	Less frequent remittances
Secondary	11/19/2021	HOH	Currently married	Female	>65	None / Kindergarten	East Indian Descent	No	Yes	None				No	
Secondary	11/15/2021	Spouse	Currently married	Female	25-39	Secondary completed	Mixed Ethnicity	Yes	No	Housewife Househusband				No	
Secondary	11/19/2021	Other relative	Never married	Female	<25	Secondary completed	African Descent Black	Yes	No	None				No	
Secondary	11/23/2021	Nieces nephews	Never married	Male	<25	Secondary completed	African Descent Black	No	No	Other				No	
Secondary	11/25/2021	Spouse	Currently married	Female	40-65	Primary	East Indian Descent	Yes	No	None				No	
Secondary	12/1/2021	HOH	Currently married	Male	40-65	Secondary completed	East Indian Descent	Yes	Yes	Other	Construction	Full time		No	
Secondary	11/17/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Housewife Househusband		Full time		Yes	Unknown
Secondary	11/19/2021	HOH	Currently married	Male	25-39	Post-secondary	African Descent Black	No	No	Work Part time temporary	Transportation and Storage	Part time	Other	No	
Secondary	11/22/2021	HOH	Never married	Male	40-65		East Indian Descent	No	No	Work Part time temporary	Construction	Part time		No	
Secondary	11/16/2021	HOH	Currently married	Male	25-39	Secondary completed	Mixed Ethnicity	Yes	Yes	Work Part time temporary	Other Services	Part time		No	
Secondary	11/17/2021	HOH	Widowed	Female	>65	Secondary completed	East Indian Descent	No	Yes	None				No	
Secondary	11/23/2021	HOH	Currently married	Male	40-65	Secondary completed	East Indian Descent	No	No	Other	Transportation and Storage	Full time		Yes	Lower value of remittances
Secondary	11/15/2021	HOH	Separated divorced	Male	40-65	Secondary	East Indian Descent	No	Yes	None				Yes	Unknown
Secondary	11/16/2021	Spouse	Currently married	Female	40-65	No Answer	East Indian Descent	No	No	Fisher	Agriculture Fishing and Forestry	Full time	Merchant shopkeeper	Yes	Less frequent remittances
Secondary	11/18/2021	HOH	Currently married	Male	>65	Primary	East Indian Descent	No	No	Retired				No	
Secondary	11/26/2021	HOH	Currently married	Male	>65	University Tertiary	East Indian Descent	Yes	No	Retired				No	
Secondary	11/26/2021	HOH	Widowed	Male	>65	Secondary	East Indian Descent	Yes	No	Retired				No	
Secondary	11/22/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	Yes	Yes	None	Construction	Full time		No	
Secondary	11/25/2021	Child	Currently married	Female	25-39	Secondary completed	East Indian Descent	No	No	None				No	
Secondary	11/25/2021	HOH	Currently married	Male	25-39	Secondary	East Indian Descent	Yes	Yes	Other	Construction	Full time		No	
Secondary	11/17/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	Unsure	No	Housewife Househusband		Full time		Yes	Unknown
Secondary	11/18/2021	Child	Never married	Male	25-39	Secondary completed	East Indian Descent	No	No	None	Construction	Full time		No	
Secondary	11/19/2021	HOH	Currently married	Male	>65	Secondary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/25/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	No	No	Other				No	
Secondary	11/17/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	No	No	Other	Other	Full time		No	
Secondary	11/19/2021	HOH	Widowed	Female	>65	Secondary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/25/2021	Child	Never married	Female	<25	Secondary completed	East Indian Descent	Yes	No	Merchant shopkeeper	Wholesale and Retail Trade	Full time		Yes	Lower value of remittances
Secondary	11/3/2021	Spouse	Currently married	Female	25-39	University Tertiary	East Indian Descent	No	No	Other					
Secondary	11/19/2021	HOH	Common law union	Male	40-65	Secondary	East Indian Descent	Yes	No	Other	Other	Full time		No	
Secondary	11/26/2021	HOH	Separated divorced	Male	40-65	Secondary	East Indian Descent	No	No	Other				No	
Secondary	11/17/2021	Spouse	Currently married	Female	40-65	Secondary	African Descent Black	Yes	Yes	Housewife Househusband				No	
Secondary	11/18/2021	Spouse	Currently married	Female	40-65	Secondary completed	East Indian Descent	Yes	No	Housewife Househusband			None	Yes	Less frequent remittances
Secondary	11/17/2021	HOH	Currently married	Male	40-65	Secondary completed	African Descent Black	No	No	Retired				No	
Secondary	11/26/2021	HOH	Currently married	Female	40-65	Secondary	East Indian Descent	Yes	Yes	Housewife Househusband				No	
Secondary	11/15/2021	HOH	Currently married	Male	40-65	Secondary completed	East Indian Descent	No	Yes	None	Other	None/Doesn't work	None	No	
Secondary	11/19/2021	HOH	Widowed	Male	40-65	None / Kindergarten	East Indian Descent	No	No	Public Sector Employee	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/18/2021	HOH	Common law union	Female	25-39	Secondary	Mixed Ethnicity	No	No	None			Other	Yes	Less frequent remittances
Secondary	11/19/2021	HOH	Currently married	Male	>65	Secondary	African Descent Black	Yes	Yes	Civil servant	Transportation and Storage	Full time		No	
Secondary	11/25/2021	HOH	Never married	Male	40-65	Secondary	African Descent Black	No	No	Other	Mining and Quarrying (excluding oil and gas)	Full time	Other	No	
Secondary	11/17/2021	HOH	Widowed	Female	>65	Primary	East Indian Descent	Yes	Yes	None				Yes	Less frequent remittances
Secondary	11/15/2021	HOH	Currently married	Male	25-39	Secondary completed	East Indian Descent	No	No	Other	Transportation and Storage	Full time		Yes	Unknown
Secondary	11/19/2021	Parent	Never married	Male	40-65	Secondary	East Indian Descent	No	Yes	Work Part time temporary	Agriculture Fishing and Forestry	Part time	Work Part time temporary	Yes	
Secondary	11/19/2021	HOH	Never married	Female	25-39	University Tertiary	East Indian Descent	Yes	Yes	Other	Education	Full time			
Secondary	11/23/2021	Child	Never married	Female	<25	University Tertiary	Mixed Ethnicity	No	No	Student				No	
Secondary	11/17/2021	HOH	Widowed	Female	40-65	Primary	East Indian Descent	Yes	No	Other	Other Services	Part time		No	
Secondary	11/17/2021	HOH	Currently married	Male	25-39	Secondary completed	East Indian Descent	No	No	Other		Self employed		No	
Secondary	11/19/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	No	No	Other	Construction	Self employed	Other	No	
Secondary	11/23/2021	Spouse	Currently married	Female	25-39	Secondary	African Descent Black	No	No	None				Yes	Unknown
Secondary	11/16/2021	Spouse	Currently married	Female	<25	Primary	East Indian Descent	No	No	Housewife Househusband					
Secondary	11/19/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/15/2021	HOH	Never married	Female	25-39	Secondary	Amerindian	No	Yes	Housewife Househusband		Full time	Other	No	

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Study Area	Date of Survey	Interviewee Relationship to Head of Household	Marital Status	Gender	Age	Highest Education	Nationality/Ethnic Group	Do you receive any social / government assistance?	Household Members Vulnerability (self-identified, details are withheld)	Occupation (primary)	Employment Sector (primary)	What type of employment do you have?	Occupation (Secondary)	Do you receive regular (e.g., monthly) remittances from a family members / relative?	Has this changed due to COVID-19?
Secondary	11/15/2021	HOH	Never married	Male	40-65	Secondary	African Descent Black	No	No	Merchant shopkeeper	Wholesale and Retail Trade	Full time		No	
Secondary	11/17/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	Yes	Yes	Other	Other Services	Full time		No	
Secondary	11/18/2021	HOH	Currently married	Male	>65	Secondary completed	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/18/2021	Spouse	Currently married	Female	25-39	Primary	East Indian Descent	No	No	Other		Part time		Yes	Unknown
Secondary	11/22/2021	HOH	Widowed	Female	40-65	Primary	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/25/2021	Spouse	Currently married	Female	40-65	Secondary	Mixed Ethnicity	No	No	Housewife Househusband		Full time		Yes	Unknown
Secondary	11/25/2021	HOH	Widowed	Female	>65	Secondary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/26/2021	HOH	Currently married	Female	40-65	Primary	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/17/2021	Child	Currently married	Male	25-39	Secondary	East Indian Descent	No	No	Other	Transportation and Storage	Full time		No	
Secondary	11/19/2021	HOH	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/22/2021	HOH	Currently married	Female	40-65	Primary	Amerindian	No	No	Housewife Househusband				No	
Secondary	11/19/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	Yes	No	Housewife Househusband		Full time		No	
Secondary	11/15/2021	Spouse	Currently married	Female	25-39	Secondary completed	East Indian Descent	Yes	No	Housewife Househusband		Full time		Yes	Less frequent remittances
Secondary	11/19/2021	HOH	Currently married	Male	40-65	Secondary	African Descent Black	No	No	Other	Other Services	Full time		No	
Secondary	11/16/2021	Spouse	Common law relationship	Female	<25	Secondary	East Indian Descent	No	No	Housewife Househusband		Part time	Other	No	
Secondary	11/19/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	No	No	Retired				No	
Secondary	11/23/2021	HOH	Currently married	Female	25-39	University Tertiary	Mixed Ethnicity	No	No	Housewife Househusband		Full time		Yes	Unknown
Secondary	11/23/2021	Spouse	Currently married	Female	40-65	University Tertiary	African Descent Black	No	No	Public Sector Employee	Education	Full time		No	
Secondary	11/19/2021	Parent	Single	Male	25-39	University Tertiary	East Indian Descent	No	No	Other	Construction	Part time		No	
Secondary	11/26/2021	HOH	Currently married	Male	40-65	Secondary completed	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Seasonal		No	
Secondary	11/17/2021	HOH	Currently married	Female	40-65	Secondary	East Indian Descent	Yes	Yes	Merchant shopkeeper	Wholesale and Retail Trade	Full time		No	
Secondary	11/18/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	No	Yes	Retired				No	
Secondary	11/18/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Seasonal		No	
Secondary	11/26/2021	HOH	Currently married	Female	40-65	Secondary completed	African Descent Black	No	No	None				No	
Secondary	11/18/2021	Child	Never married	Female	<25	University Tertiary	East Indian Descent	Yes	No		Construction			No	
Secondary	11/25/2021	HOH	Never married	Female	40-65	Secondary	Mixed Ethnicity	No	Yes	Housewife Househusband				No	
Secondary	11/15/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Housewife Househusband		Full time	None	Yes	Less frequent remittances
Secondary	11/18/2021	Spouse	Currently married	Female	25-39	University Tertiary	East Indian Descent	Yes	No	None	Education			No	
Secondary	11/25/2021	HOH	Separated divorced	Female	40-65	Secondary completed	Mixed Ethnicity	No	Yes	Housewife Househusband				No	
Secondary	11/18/2021	HOH	Never married	Female	25-39	Secondary	African Descent Black	No	No	Civil servant	Other	Full time		Yes	Less frequent remittances
Secondary	11/22/2021	HOH	Currently married	Male	>65	Primary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/22/2021	HOH	Separated divorced	Female	40-65	Secondary completed	African Descent Black	No	No	Merchant shopkeeper	Wholesale and Retail Trade	Part time	Other	No	
Secondary	11/18/2021	HOH	Currently married	Female	40-65	University Tertiary	East Indian Descent	No	No	Civil servant	Education	Full time		Yes	Less frequent remittances
Secondary	11/18/2021	Parent	Never married	Male	<25	Secondary	African Descent Black	No	No	None	Construction			No	
Secondary	11/26/2021	Spouse	Currently married	Female	40-65	Secondary completed	East Indian Descent	Yes	Yes	Housewife Househusband				No	
Secondary	11/17/2021	HOH	Widowed	Female	>65	Primary	East Indian Descent	Yes	No	Retired				Yes	Unknown
Secondary	11/19/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	Yes	No	Housewife Househusband				No	
Secondary	11/22/2021	Child	Never married	Male	25-39	Secondary completed	African Descent Black	No	Yes	Merchant shopkeeper	Wholesale and Retail Trade	Full time		Yes	Unknown
Secondary	11/15/2021	HOH	Currently married	Female	40-65	Primary	East Indian Descent	No	No	Retired				Yes	Less frequent remittances
Secondary	11/16/2021	HOH	Never married	Male	>65	Primary	African Descent Black	No	No	Other	Other Services	Full time		No	
Secondary	11/25/2021	Spouse	Currently married	Female	25-39	Secondary completed	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/15/2021	HOH	Single	Male	40-65	Primary	Mixed Ethnicity	No	No	Other	Construction	Contract gig	Work Part time temporary	No	
Secondary	11/19/2021	Spouse	Currently married	Female	40-65	Primary	East Indian Descent	Yes	Yes	Housewife Househusband				Yes	Less frequent remittances
Secondary	11/18/2021	HOH	Common law union	Male	25-39	Primary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Part time	Farmer	No	
Secondary	11/15/2021	HOH	Never married	Female	25-39	Secondary	Mixed Ethnicity	Yes	Yes	Work Part time temporary	Other Services	Full time	None	No	
Secondary	11/17/2021	Child	Never married	Female	40-65	Secondary	East Indian Descent	Yes	Yes	Housewife Househusband				Yes	Less frequent remittances
Secondary	11/18/2021	HOH	Separated divorced	Female	>65	Primary	East Indian Descent	Yes	No	Retired				Yes	Unknown
Secondary	11/23/2021	HOH	Widowed	Male	>65	University Tertiary	African Descent Black	Yes	Yes	Retired				No	
Secondary	11/25/2021	HOH	Common law union	Female	40-65	Primary	East Indian Descent	No	No	Housewife Househusband				Yes	Unknown
Secondary	11/16/2021	Child	Currently married	Male	25-39	Secondary completed	East Indian Descent	Yes	No	Other	Agriculture Fishing and Forestry	Full time	Fisher	No	
Secondary	11/17/2021	HOH	Widowed	Female	40-65	Secondary completed	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/22/2021	HOH	Currently married	Male	>65	University Tertiary	East Indian Descent	No	No	Retired				No	
Secondary	11/17/2021	HOH	Widowed	Female	>65	No Answer	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/22/2021	HOH	Single	Male	40-65	Secondary	East Indian Descent	No	No	Other	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/25/2021	HOH	Never married	Female	40-65	Secondary	Mixed Ethnicity	No	No	Other	Other	Full time		No	
Secondary	11/25/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	Yes	Yes	Housewife Househusband				No	
Secondary	11/17/2021	Nieces nephews	Never married	Female	25-39	Secondary	East Indian Descent	No	Yes	None				No	

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Study Area	Date of Survey	Interviewee Relationship to Head of Household	Marital Status	Gender	Age	Highest Education	Nationality/Ethnic Group	Do you receive any social / government assistance?	Household Members Vulnerability (self-identified, details are withheld)	Occupation (primary)	Employment Sector (primary)	What type of employment do you have?	Occupation (Secondary)	Do you receive regular (e.g., monthly) remittances from a family members / relative?	Has this changed due to COVID-19?
Secondary	11/19/2021	HOH	Widowed	Female	>65	Primary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/18/2021	HOH	Never married	Female	40-65	Primary	East Indian Descent	Yes	Yes	Other		Part time		Yes	Greater value of remittances
Secondary	11/23/2021	Child	Never married	Female	25-39	University Tertiary	African Descent Black	No	No	Civil servant	Education	Full time		Yes	Unknown
Secondary	11/25/2021	HOH	Widowed	Male	>65	None / Kindergarten	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/19/2021	Spouse	Currently married	Female	40-65	Secondary	Mixed Ethnicity	Yes	Yes	Housewife Househusband				No	
Secondary	11/25/2021	Renter	Currently married	Female	40-65	Secondary	East Indian Descent	No	Yes	None				Yes	Unknown
Secondary	11/25/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	No	Yes	Fisher	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/26/2021	Spouse	Currently married	Female	>65	Primary	East Indian Descent	Yes	Yes	Housewife Househusband				No	
Secondary	11/19/2021	Grandchild	Single	Male	40-65	Primary	East Indian Descent	No	Yes	Public Sector Employee	Agriculture Fishing and Forestry	Part time		No	
Secondary	11/26/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	No	No	Merchant shopkeeper	Other	Full time		Yes	Less frequent remittances
Secondary	11/26/2021	Spouse	Never married	Female	40-65	Secondary completed	Mixed Ethnicity	No	No	Housewife Househusband				Yes	Less frequent remittances
Secondary	11/16/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	No	No	Other	Agriculture Fishing and Forestry	Seasonal	None	Yes	Less frequent remittances
Secondary	11/18/2021	HOH	Never married	Male	40-65	University Tertiary	East Indian Descent	No	No	Other	Construction	Part time	None	No	
Secondary	11/22/2021	Spouse	Currently married	Female	>65	University Tertiary	African Descent Black	No	Yes	Housewife Househusband				No	
Secondary	11/16/2021	HOH	Separated divorced	Male	40-65	Secondary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Seasonal	None	No	
Secondary	11/18/2021	HOH	Currently married	Male	40-65	Other	East Indian Descent	No	No	Retired				No	
Secondary	11/25/2021	Nieces nephews	Never married	Male	<25	Secondary	East Indian Descent	No	No	Other	Transportation and Storage	Full time		No	
Secondary	11/26/2021	HOH	Widowed	Female	40-65	Secondary	East Indian Descent	No	Yes	Housewife Househusband				No	
Secondary	11/17/2021	Child	Never married	Female	<25	Secondary completed	East Indian Descent	Yes	Yes	Student				No	
Secondary	11/25/2021	Spouse	Never married	Female	25-39	Secondary	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/18/2021	Parent	Separated divorced	Male	40-65	Secondary	East Indian Descent	Yes	Yes	Other	Other	Full time		No	
Secondary	11/23/2021	Spouse	Currently married	Female	40-65	Primary	African Descent Black	No	No	Housewife Househusband				No	
Secondary	11/23/2021	Child	Single	Female	40-65	Secondary completed	African Descent Black	Yes	Yes	Other	Other Services	Full time		No	
Secondary	11/26/2021	Child	Currently married	Male	40-65	Secondary completed	East Indian Descent	Yes	Yes	None				No	
Secondary	11/17/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	Yes	Yes	Other		Part time		Yes	Less frequent remittances
Secondary	11/17/2021	HOH	Never married	Female	>65	Secondary	African Descent Black	Yes	No	Merchant shopkeeper	Wholesale and Retail Trade	Part time		No	
Secondary	11/18/2021	HOH	Currently married	Male	>65	Primary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/19/2021	HOH	Widowed	Female	40-65	Secondary	East Indian Descent	Yes	No	Other	Other Services	Full time		No	
Secondary	11/22/2021	HOH	Single	Female	<25	Secondary completed	African Descent Black	Yes	Yes	Other	Wholesale and Retail Trade	Full time		No	
Secondary	11/25/2021	Spouse	Currently married	Female	40-65	Secondary completed	African Descent Black	No	Yes	Housewife Househusband				No	
Secondary	11/15/2021	HOH	Never married	Male	40-65	Secondary	East Indian Descent	No	No	Other	Construction	Self employed		No	
Secondary	11/17/2021	HOH	Widowed	Male	>65	Secondary	East Indian Descent	No	No	Retired	Agriculture Fishing and Forestry			No	
Secondary	11/17/2021	HOH	Separated divorced	Female	40-65	Primary	East Indian Descent	Yes	Yes	None				No	
Secondary	11/18/2021	HOH	Currently married	Male	40-65	Secondary completed	East Indian Descent	Yes	Yes	Work Part time temporary	Electricity and Water	Self employed		No	
Secondary	11/25/2021	HOH	Common law union	Female	40-65	Secondary	Mixed Ethnicity	Yes	No	Other	Other	Part time		No	
Secondary	11/26/2021	Parent	Never married	Female	40-65	Secondary completed	Mixed Ethnicity	Yes	Yes	None				No	
Secondary	11/15/2021	HOH	Currently married	Male	>65	Secondary completed	African Descent Black	No	No	Other	Construction	Full time	None	No	
Secondary	11/25/2021	HOH	Never married	Male	<25	Secondary completed	East Indian Descent	No	No	Other	Transportation and Storage	Full time		No	
Secondary	11/26/2021	Spouse	Currently married	Female	40-65	Secondary completed	African Descent Black	No	No	Public Sector Employee	Financial and Insurance Activities	Full time		No	
Secondary	11/17/2021	Spouse	Widowed	Female	>65	Primary	East Indian Descent	Yes	Yes	Retired				Yes	More frequent remittances
Secondary	11/18/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	Yes	No	None	Agriculture Fishing and Forestry			No	
Secondary	11/18/2021	HOH	Separated divorced	Female	>65	Primary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/25/2021	HOH	Currently married	Male	40-65	Post-secondary	East Indian Descent	Yes	No	Other	Agriculture Fishing and Forestry	Seasonal		No	
Secondary	11/18/2021	HOH	Separated divorced	Female	40-65	Secondary	East Indian Descent	No	No	Other	Health and Social Services	Full time		No	
Secondary	11/15/2021	HOH	Currently married	Female	25-39	Secondary completed	Mixed Ethnicity	No	No	Other	Other	Full time	Merchant shopkeeper	No	
Secondary	11/25/2021	HOH	Currently married	Male	>65	University Tertiary	East Indian Descent	No	No	Retired				No	
Secondary	11/26/2021	Brother	Never married	Male	40-65	Secondary completed	East Indian Descent	Yes	Yes	Other	Other Services	Full time		No	
Secondary	11/17/2021	Child	Never married	Male	25-39	Secondary completed	Mixed Ethnicity	No	No	Civil servant	Other	Full time		No	
Secondary	11/19/2021	Child	Currently married	Female	25-39	Secondary completed	East Indian Descent	No	No	Housewife Househusband				No	
Secondary	11/18/2021	Spouse	Currently married	Female	25-39	Secondary	Mixed Ethnicity	No	No	Housewife Househusband				No	
Secondary	11/26/2021	HOH	Never married	Male	25-39	Secondary completed	African Descent Black	No	No	Other	Other	Part time		No	
Secondary	11/15/2021	Spouse	Currently married	Female	25-39	Secondary completed	East Indian Descent	No	No	Other	Transportation and Storage	Full time		No	
Secondary	11/19/2021	HOH	Currently married	Female	25-39	University Tertiary	African Descent Black	No	No	Civil servant	Education	Full time		Yes	Greater value of remittances
Secondary	11/19/2021	Spouse	Currently married	Female	25-39	Secondary completed	African Descent Black	No	No	Housewife Househusband				Yes	Unknown
Secondary	11/22/2021	HOH	Never married	Female	40-65	Post-secondary	East Indian Descent	No	Yes	Other	Information and Communication	Part time	Civil servant	No	
Secondary	11/26/2021	Child	Never married	Male	<25	University Tertiary	East Indian Descent	Unsure	No	Student				No	
Secondary	11/17/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	Yes	Yes	Housewife Househusband				Yes	Less frequent remittances

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Study Area	Date of Survey	Interviewee Relationship to Head of Household	Marital Status	Gender	Age	Highest Education	Nationality/Ethnic Group	Do you receive any social / government assistance?	Household Members Vulnerability (self-identified, details are withheld)	Occupation (primary)	Employment Sector (primary)	What type of employment do you have?	Occupation (Secondary)	Do you receive regular (e.g., monthly) remittances from a family members / relative?	Has this changed due to COVID-19?
Secondary	11/19/2021	Spouse	Currently married	Female	>65	Secondary	East Indian Descent	Yes	No	Housewife Househusband				No	
Secondary	11/19/2021	HOH	Never married	Female	25-39	University Tertiary	East Indian Descent	No	No						
Secondary	11/25/2021	HOH	Common law union	Female	40-65	Secondary completed	Mixed Ethnicity	Yes	Yes	Other	Transportation and Storage	Part time		Yes	Unknown
Secondary	11/25/2021	Spouse	Currently married	Female	40-65	Secondary completed	East Indian Descent	Yes	Yes	Housewife Househusband				No	
Secondary	11/26/2021	Spouse	Currently married	Female	>65	Secondary completed	East Indian Descent	Yes	No	Retired				Yes	Less frequent remittances
Secondary	11/17/2021	HOH	Currently married	Female	40-65	Secondary	Mixed Ethnicity	No	Yes	Other		Part time		No	
Secondary	11/25/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	No	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/18/2021	Spouse	Currently married	Female	40-65	Secondary completed	East Indian Descent	Yes	No	Housewife Househusband				No	
Secondary	11/19/2021	HOH	Widowed	Female	>65	Secondary	East Indian Descent	Yes	Yes	Retired				No	
Secondary	11/22/2021	HOH	Never married	Male	25-39	University Tertiary	Mixed Ethnicity	No	No	None				No	
Secondary	11/15/2021	HOH	Never married	Female	>65	Secondary completed	East Indian Descent	No	No	Retired				No	
Secondary	11/19/2021	HOH	Never married	Female	25-39	Secondary	East Indian Descent	Unsure	Yes	Other	Other	Part time	None	No	
Secondary	11/15/2021	Other relative	Currently married	Female	40-65	Secondary completed	Amerindian	No	No	None				No	
Secondary	11/17/2021	Nieces nephews	Widowed	Male	25-39	Secondary completed	East Indian Descent		No	Civil servant	Other	Full time		No	
Secondary	11/18/2021	HOH	Currently married	Male	40-65	Secondary	East Indian Descent	No	No	Retired				Yes	Unknown
Secondary	11/19/2021	HOH	Currently married	Male	>65	Secondary	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Secondary	11/23/2021	HOH	Currently married	Male	>65	University Tertiary	African Descent Black	Yes	No	Retired				No	
Secondary	11/25/2021	Child	Never married	Male	25-39	Post-secondary	African Descent Black	No	Yes	Merchant shopkeeper	Transportation and Storage	Full time	None	No	
Secondary	11/26/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	No	Yes	Other	Transportation and Storage	Full time		No	
Tertiary	11/23/2021	Child	Never married	Female	40-65	Primary	East Indian Descent	Yes	No	Other	Other	Part time		No	
Tertiary	11/24/2021	Parent	Currently married	Female	40-65	Primary	East Indian Descent	No	Yes	None			Housewife Househusband	No	
Tertiary	11/24/2021	Child	Never married	Female	25-39	University Tertiary	African Descent Black	Yes	No	Other	Other	Full time		No	
Tertiary	11/23/2021	HOH	Separated divorced	Male	40-65	Primary	East Indian Descent	No	No	Other				Yes	Unknown
Tertiary	11/23/2021	Parent	Separated divorced	Male	>65	University Tertiary	East Indian Descent	No	Yes	Retired				No Answer	
Tertiary	11/24/2021	HOH	Currently married	Male	>65	Primary	East Indian Descent	Yes	Yes	Retired				Yes	Less frequent remittances
Tertiary	11/24/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	No	No	Merchant shopkeeper	Other Services	Part time	None	No	
Tertiary	11/23/2021	In law	Never married	Female	25-39	Secondary completed	Amerindian	No	No	Housewife Househusband				Yes	Unknown
Tertiary	11/23/2021	Spouse	Currently married	Female	40-65	Secondary	East Indian Descent	No	No	Housewife Househusband				No	
Tertiary	11/23/2021	HOH	Currently married	Male	25-39	Secondary completed	East Indian Descent	Yes	No	Civil servant	Construction	Full time		No	
Tertiary	11/24/2021	HOH	Currently married	Female	40-65	University Tertiary	African Descent Black	No	No	Civil servant	Education	Full time		No	
Tertiary	11/23/2021	HOH	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Housewife Househusband		Full time		No	
Tertiary	11/24/2021	HOH	Never married	Male	25-39	Secondary	East Indian Descent	No	No	Other	Other	Full time		No	
Tertiary	11/24/2021	Common law husband	In a common law union	Female	25-39	Secondary completed	Mixed Ethnicity	No	No	Other				Yes	Less frequent remittances
Tertiary	11/23/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	No	Yes	Other				No	
Tertiary	11/24/2021	HOH	Currently married	Female	>65	Primary	East Indian Descent	Yes	Yes	Housewife Househusband				No	
Tertiary	11/24/2021	HOH	Currently married	Male	>65	Primary	East Indian Descent	Yes	Yes	Farmer	Agriculture Fishing and Forestry	Full time		No	
Tertiary	11/24/2021	HOH	Currently married	Male	40-65	Primary	East Indian Descent	Yes	Yes	Farmer	Agriculture Fishing and Forestry	Full time		No	
Tertiary	11/24/2021	HOH	Currently married	Female	25-39	Secondary completed	African Descent Black	No	No	Other	Other	Full time		No	
Tertiary	11/24/2021	HOH	Currently married	Male	40-65	Secondary completed	East Indian Descent	Yes	No	Farmer	Agriculture Fishing and Forestry	Full time		No	
Tertiary	11/23/2021	Spouse	Never married	Female	<25	Secondary	East Indian Descent	No	No	Housewife Househusband				No	
Tertiary	11/24/2021	HOH	Common law	Female	25-39	Secondary	Mixed Ethnicity	No	No	Housewife Househusband				No	
Tertiary	11/24/2021	HOH	Currently married	Female	40-65	Primary	East Indian Descent	No	No	Other	Other Services	Full time		No	
Tertiary	11/23/2021	Child	Currently married	Male	25-39	Secondary	East Indian Descent	Yes	No	Other	Mining and Quarrying (excluding oil and gas)	Full time		No	
Tertiary	11/23/2021	Spouse	Currently married	Female	25-39	Secondary	East Indian Descent	No	No	Housewife Househusband				No	

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Table 2: Socioeconomic Survey Data – Household Surveys, Part 2 of 6

Study Area	Have you or a household member lost your employment in the past 18 months due to COVID-19?	Do you or anyone in your household have a savings account?	Do you or anyone in your household have a bank loan or private loan?	Have you lost access to any core services in relation to COVID-19?	Have there been any improvements in your access to internet/wifi services as a result of COVID-19?	Is this your primary residence?	How long have you resided in the Wales Estate area?	What type of tenure do you have on this land?	Do you or anyone in your household fish?	Do you/they fish for which primary reason?	Where do you fish most often (sites, locations)?	When do you fish?	What do you do with your catch?	How do you fish?	What type of fish do you catch?	How many fishing boats are in the nearby landing site?
Primary	Yes	Yes	No	Supply Chain		Yes	Past 6 months	Lease	Yes	Recreation	Trenches in the area	Summer	Share with Friends	Fishing Traps and lines		
Primary	No	Yes	No	Supply Chain	No	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Own	Yes	Recreation	By the Trench/ Culvert	Summer	Other	Other	Other	0
Primary	Yes	No	No	None	Yes	Yes	Over 10 years ago	Own	No							
Primary	Yes	Yes	Yes	Transportation	No	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	Other	No	Yes	Over 10 years ago	Own	No							
Primary	No	No	No	None	No	Yes	5 to 10 year ago	Informal agreement	No							
Primary	No	Yes	No	None	No Answer	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	Yes	Subsistence Family Use	Cammuni Creek	Summer	Family Consumption	Fishing Traps and lines	Other	7
Primary	Yes	Yes	No	Health Services	No	Yes	5 to 10 year ago	Own	No							
Primary	No	Yes	No	None	Yes	Yes	Over 10 years ago	Own	No							
Primary						Yes	Over 10 years ago	Own	No							
Primary	Yes		Yes	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Canal	Spring	Family Consumption	Trawls	Other	0
Primary	No	Unsure	No	Supply Chain	No	No		Use land No agreement	No							
Primary																
Primary																
Primary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	Canal, land and silo	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	highwaterman catfish	
Primary	No	No	No	None	No	Yes	Over 10 years ago	Use land No agreement	No							
Primary	Yes	Yes	No	Other	No	Yes	Over 10 years ago	Informal agreement	No							
Primary	Yes	Yes	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	Yes	Commercial Business Income	Ocean	Spring	Sell in Vreed-en-Hoop	Gillnets drift seines fyke nets Chinese seins Cadell Line	small trout	30
Primary	No	Yes	No	None	No	Yes	1 to 2 years ago	Own	No							
Primary	No	Yes	Yes	None	No	Yes	Other	Other	No							
Primary	No	Yes	Yes	Groceries	No	Yes	Past 6 months	Own	Yes	Recreation	Side Damn and Canal	Summer	Family Consumption	Fishing Traps and lines	highwaterman catfish	1
Primary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Own	No							
Primary	Yes	Yes	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Primary	No	No	No	None	Yes	Yes	Over 10 years ago	Own	No							
Primary	Yes	No	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	Canal, River and dam in the area	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	0
Primary	Yes	No	No	None	Unsure	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	Canal backdam and silo	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	0
Primary	Yes	Yes	No	None	No	Yes	4 months	Informal agreement	Yes	Commercial Business Income	Back dam and canal	Summer	Sell in Vreed-en-Hoop	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary	No	Yes	No	Other	No	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	None	No	Yes	14 years	Own	No							
Primary	No	Yes	Yes	None	No	Yes	1 to 2 years ago	Informal agreement	Yes	Recreation	Canal	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary	No	Yes	No	None		Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	None		Yes	5 to 10 year ago	Informal agreement	Yes	Subsistence Family Use	Backdam	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary	No	Yes	No	None		Yes	Over 10 years ago	Own	No							
Primary	Yes	No	No	Groceries	Unsure	Yes	Over 10 years ago	Own	No							
Primary	No	No	No	Supply Chain	No	Yes	Over 10 years ago	Informal agreement	No							
Primary	No	Yes	No	None	No Answer	Yes	Over 10 years ago	Lease	No							
Primary	No	Yes	No	None	No Answer	Yes	Over 10 years ago	Informal agreement	No							
Primary	No	No	No	None	Yes	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	None	Yes	Yes	Over 10 years ago	Own	Yes	Recreation	Canal and back dam	Summer	Family Consumption	Fishing Traps and lines	Other	
Primary	No	No	No	None	No	Yes	5 to 10 year ago	Own	No							
Primary	No	Yes	No	None	No	Yes	5 to 10 year ago	Lease	No							
Primary	No	No	No		No	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	Yes	Groceries	No	Yes	5 to 10 year ago	Informal agreement	No							
Primary	No	Yes	No		Yes	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Backdam	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary	Yes	No	No	Supply Chain	No	Yes	Over 10 years ago	Lease	No							
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No Answer	Yes	No	Groceries		Yes	Over 10 years ago	Own	No							

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Study Area	Have you or a household member lost your employment in the past 18 months due to COVID-19?	Do you or anyone in your household have a savings account?	Do you or anyone in your household have a bank loan or private loan?	Have you lost access to any core services in relation to COVID-19?	Have there been any improvements in your access to internet/wifi services as a result of COVID-19?	Is this your primary residence?	How long have you resided in the Wales Estate area?	What type of tenure do you have on this land?	Do you or anyone in your household fish?	Do you/they fish for which primary reason?	Where do you fish most often (sites, locations)?	When do you fish?	What do you do with your catch?	How do you fish?	What type of fish do you catch?	How many fishing boats are in the nearby landing site?
Primary	No	Yes	No		No	Yes	Over 10 years ago	Own	No							
Primary						Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	None	No Answer	Yes	1 to 2 years ago	Lease	No							
Primary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	Yes	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	No	No	Supply Chain	No	Yes	Over 10 years ago	Own	No							
Primary	No	No	No	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Canal	Summer	Family Consumption	Other	Other	
Primary	No	Yes	No	None	Unsure	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Canal	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Own	No							
Primary	Yes	Yes	Yes	None	Yes	Yes	Over 10 years ago	Lease	No							
Primary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	No	No	None	No	Yes	Past 6 months	Lease	No							
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	Yes	Recreation	Conservancy in the back (4miles from residence)	Summer	Family Consumption	Fishing Traps and lines	Other	4
Primary	No	No	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	Yes	Subsistence Family Use	Canal in front home	Summer	Family Consumption	Fishing Traps and lines	Other	
Primary	No	No	Yes	Utilities	No	Yes	Over 10 years ago	Own	Yes	Recreation	Canal across the road	Summer	Share with Friends	Fishing Traps and lines	Other	
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	Yes	No	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	Groceries	No	Yes	1 to 2 years ago	Lease	No							
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	Yes	Recreation	Canal across the road and conservancy dam	Summer	Share with Friends	Fishing Traps and lines	Other	
Primary	No	No	No	Groceries	No	Yes	Over 10 years ago	Own	Yes	Recreation	Canal across the road	Summer	Family Consumption	Fishing Traps and lines	Other	
Primary	No	Yes	No	Transportation	No	Yes	Over 10 years ago	Own	No							
Primary	No	No	Yes	None	No	Yes	1 to 2 years ago	Lease	No							
Primary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Primary	No	No	No	Groceries	No	Yes	5 to 10 year ago	Informal agreement	Yes	Subsistence Family Use	River landing at residence	Summer	Family Consumption	Fishing Traps and lines	Other	0
Primary	No	Yes	No	Health Services	No	Yes	Over 10 years ago	Use land No agreement	Yes	Subsistence Family Use	River landing	Summer	Family Consumption	Fishing Traps and lines	Other	
Primary	No	No	No	Groceries	No	Yes	Over 10 years ago	Use land No agreement	Yes	Subsistence Family Use	Demerara river landing	Summer	Family Consumption	Fishing Traps and lines	Other	
Primary	No	No	No	None	No	Yes	Over 10 years ago	Use land No agreement	Yes	Subsistence Family Use	Sluice, river landing and canal	Summer	Family Consumption	Fishing Traps and lines	Other	
Primary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Use land No agreement	Yes	Subsistence Family Use	Demerara River	Summer	Family Consumption	Fishing Traps and lines	Other	
Primary	No	Yes	No	None	No	Yes	Past 6 months	Informal agreement	No							
Primary	No	Yes	Yes	None	No	Yes	Past 6 months	Own	No							
Primary		No	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	No	No	None	No	Yes	Unsure	Own	No							
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Use land No agreement	Yes	Subsistence Family Use	Canalpatwa	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Canal	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Canal	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	Unsure	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Primary	No	No	No	Groceries		Yes	1 to 2 years ago	Informal agreement	Yes	Subsistence Family Use		Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary	No	No	No	Transportation		Yes	Over 10 years ago	Informal agreement	No							
Primary	No	No	No	Supply Chain		Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Canal and the river	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	cuirass	
Primary	No	Yes	No	Groceries		Yes	Over 10 years ago	Informal agreement	Yes	Subsistence Family Use	Canals and river	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	cuirass	
Primary	No	Yes	No	None		Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Canal and river	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	cuirass	
Primary	No	No	No	Supply Chain		Yes	1 to 2 years ago	Informal agreement	Yes	Subsistence Family Use	Canal and the river	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	cuirass	
Primary	No	Yes	No	None		Yes	Over 10 years ago	Unknown	No							
Primary	No	Yes	No	Supply Chain		Yes	Over 10 years ago	Other	Yes	Subsistence Family Use	Canals and the river	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary	No	No	No	None		Yes	Over 10 years ago	Unknown	Yes	Subsistence Family Use	Canal	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary						Yes	1 to 2 years ago	Other	No							

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Study Area	Have you or a household member lost your employment in the past 18 months due to COVID-19?	Do you or anyone in your household have a savings account?	Do you or anyone in your household have a bank loan or private loan?	Have you lost access to any core services in relation to COVID-19?	Have there been any improvements in your access to internet/wifi services as a result of COVID-19?	Is this your primary residence?	How long have you resided in the Wales Estate area?	What type of tenure do you have on this land?	Do you or anyone in your household fish?	Do you/they fish for which primary reason?	Where do you fish most often (sites, locations)?	When do you fish?	What do you do with your catch?	How do you fish?	What type of fish do you catch?	How many fishing boats are in the nearby landing site?
Primary						Yes	Over 10 years ago	Informal agreement	No							
Primary						Yes	Over 10 years ago	Own	No							
Primary						Yes	1 to 2 years ago	Own	Yes	Subsistence Family Use	Trenches in the area	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Primary						Yes	1 to 2 years ago	Own								
Primary						Yes	5 to 10 year ago	Own								
Primary						Yes	5 to 10 year ago	Own								
Primary						Yes	1 to 2 years ago	Informal agreement	Yes	Recreation	Trench	Summer	Unknown	Fishing Traps and lines	Other	
Primary						Yes	5 to 10 year ago	Own								
Primary						Yes	5 to 10 year ago	Informal agreement								
Primary						Yes	5 to 10 year ago	Own								
Primary						Yes	1 to 2 years ago	Informal agreement								
Primary						Yes	5 to 10 year ago	Lease	No							
Primary						Yes	Past 6 months	Lease								
Primary						Yes	Over 10 years ago	Own	No							
Primary						Yes	1 to 2 years ago	Informal agreement	No							
Primary						Yes	5 to 10 year ago	Own	Yes	Recreation	Right in the area and residence	Summer	Family Consumption	Fishing Traps and lines	Other	
Primary						Yes	5 to 10 year ago	Own	No							
Primary						Yes	5 to 10 year ago	Own	No							
Primary						Yes	1 to 2 years ago	Lease	No							
Primary						Yes	Over 10 years ago	Own	No							
Primary						Yes	Over 10 years ago	Own	No							
Primary						Yes	1 to 2 years ago	Own								
Primary						Yes	Past 6 months	Own								
Primary						Yes	5 to 10 year ago	Own								
Primary						Yes	Past 6 months	Own								
Primary						Yes	1 to 2 years ago	Own								
Primary						Yes	Past 6 months	Own								
Primary						Yes	5 to 10 year ago	Own								
Primary						Yes	1 to 2 years ago	Own								
Primary						Yes	1 to 2 years ago	Own	No							
Primary						Yes	1 to 2 years ago	Own	Yes	Recreation	Canal and residence	Summer	Family Consumption	Fishing Traps and lines	Other	
Primary						Yes	1 to 2 years ago	Own	No							
Primary						Yes	1 to 2 years ago	Own	No							
Primary						Yes	5 to 10 year ago	Own	Yes	Recreation	Residence	Summer	Family Consumption	Fishing Traps and lines	Other	
Primary						Yes	Past 6 months	Informal agreement	No							
Primary						Yes	1 to 2 years ago	Own	No							
Primary						Yes	5 to 10 year ago	Informal agreement	No							
Secondary	Yes	Yes	No	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Demerara River	Summer	Sell at local market	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	6
Secondary	No	Yes	No	None	Unsure	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	Yes	None	Yes	Yes	5 to 10 year ago	Lease	No							
Secondary	No	Yes	No	Transportation	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	Yes	Yes	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	Yes	No	Yes	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	Yes	Groceries	No	Yes	1 to 2 years ago	Lease	No							
Secondary	Unsure	No	No		No Answer	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Own	Yes	Recreation	Backdam	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	Yes	Yes	No	Groceries	No	Yes	Past 6 months	Unknown	Yes	Recreation	Back Damn	Spring	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	small trout	2
Secondary	No	No	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	No	No	None	Unsure	Yes	Over 10 years ago	Own	No							
Secondary		No	No	None	No Answer	Yes	Over 10 years ago	Own	No							
Secondary	No	No	Yes	Transportation	No	Yes	Over 10 years ago	Own	Yes	Commercial Business Income	In the Atlantic	Spring	Sell at local market	Fishing Traps and lines	bangamary	4

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Study Area	Have you or a household member lost your employment in the past 18 months due to COVID-19?	Do you or anyone in your household have a savings account?	Do you or anyone in your household have a bank loan or private loan?	Have you lost access to any core services in relation to COVID-19?	Have there been any improvements in your access to internet/wifi services as a result of COVID-19?	Is this your primary residence?	How long have you resided in the Wales Estate area?	What type of tenure do you have on this land?	Do you or anyone in your household fish?	Do you/they fish for which primary reason?	Where do you fish most often (sites, locations)?	When do you fish?	What do you do with your catch?	How do you fish?	What type of fish do you catch?	How many fishing boats are in the nearby landing site?
Secondary	Yes	No	Yes	Groceries	No	Yes	5 to 10 year ago	Informal agreement	No							
Secondary	No	No	Yes	Groceries	Unsure	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Supply Chain	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Canal	Spring	Sell at local market	Fishing Traps and lines	gillbacker	2
Secondary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Unknown	No							
Secondary	No	No	No	Groceries	No	Yes	5 to 10 year ago	Other	Yes	Subsistence Family Use	Canal	Spring	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	cuirass	0
Secondary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Use land No agreement	Yes	Commercial Business Income	Atlantic	Spring	Sell at local market	Gillnets drift seines fyke nets Chinese seins Cadell Line	gillbacker	2
Secondary	No	Yes	No	Groceries	No Answer	Yes	Past 6 months	Informal agreement	Yes	Commercial Business Income	Sea	Summer	Other	Gillnets drift seines fyke nets Chinese seins Cadell Line	red snapper	
Secondary	No	Yes	Yes	Transportation	No	Yes	35 years	Informal agreement	No							
Secondary	No	Yes	No	Other	No	Yes	1 to 2 years ago	Other	No							
Secondary		No	No	None	No	Yes	Over 10 years ago	Informal agreement	Yes	Commercial Business Income	Deep sea Not too far frost the oil and gas location	Summer	Sell at local market	Trawls	Other	
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Lease	No							
Secondary	Yes	No	No	Groceries	No	Yes	Over 10 years ago	Lease	Yes	Recreation	Backdam	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	Yes	No	No	None	Unsure	Yes	5 to 10 year ago	Lease	No							
Secondary	Yes	No	No	Groceries	No	Yes	Over 10 years ago	Use land No agreement	No							
Secondary	No	Yes	Yes	None	No Answer	Yes	Over 10 years ago	Use land No agreement	No							
Secondary	No	Yes	No	None	Yes	Yes	5 to 10 year ago	Use land No agreement	Yes	Recreation	Koker	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	Yes	Unsure	Unsure	Utilities	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	Backdam	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	Yes	Yes	None	Yes	Yes	Over 10 years ago	Use land No agreement	Yes	Commercial Business Income	Sea oo	Summer	Sell in Georgetown	Trawls	Other	
Secondary	No	No	No	Health Services	No	Yes	Over 10 years ago	Use land No agreement	Yes	Subsistence Family Use	Koker	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Use land No agreement	Yes	Commercial Business Income	Sea	Summer	Other	Trawls	Other	
Secondary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Use land No agreement	Yes	Commercial Business Income	Sea	Summer	Other	Trawls	Other	
Secondary	No	Yes	No	Utilities	No	Yes	5 to 10 year ago	Use land No agreement	No							
Secondary	Yes	Yes	Yes	Other	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Estate canals	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	Yes	No	None	Yes	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	Yes	Commercial Business Income	Sea	Summer	Other	Trawls	Other	
Secondary	No	Yes	No	Other	Yes	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	Yes	None	Unsure	Yes	5 to 10 year ago	Informal agreement	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	Yes	None	No	No		Other	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	No Answer	Yes	1 to 2 years ago	Informal agreement	Yes	Recreation	Backdam	Summer	Share with Friends	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	Yes	No	Groceries	Unsure	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Groceries	No Answer	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No Answer	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	Unsure	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No Answer	Yes	Over 10 years ago	Own	Unsure							
Secondary	Unsure	Yes	No	None	Unsure	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Groceries		Yes	5 to 10 year ago	Other	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Use land No agreement	No							
Secondary	No	Yes	No	Groceries	No	Yes	1 to 2 years ago	Informal agreement	No							
Secondary		Yes	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Canal	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	Yes	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Supply Chain	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	Groceries					No							

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Study Area	Have you or a household member lost your employment in the past 18 months due to COVID-19?	Do you or anyone in your household have a savings account?	Do you or anyone in your household have a bank loan or private loan?	Have you lost access to any core services in relation to COVID-19?	Have there been any improvements in your access to internet/wifi services as a result of COVID-19?	Is this your primary residence?	How long have you resided in the Wales Estate area?	What type of tenure do you have on this land?	Do you or anyone in your household fish?	Do you/they fish for which primary reason?	Where do you fish most often (sites, locations)?	When do you fish?	What do you do with your catch?	How do you fish?	What type of fish do you catch?	How many fishing boats are in the nearby landing site?
Secondary		Yes	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	Health Services	No	Yes	5 to 10 year ago	Informal agreement	No							
Secondary	Yes	Yes	Yes	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	Unsure	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	Yes	No	None	No	Yes	1 to 2 years ago	Informal agreement	No							
Secondary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No Answer	No Answer	None	No	Yes	5 to 10 year ago	Informal agreement	Unsure							
Secondary	Unsure	No	Yes	Groceries	No Answer	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No Answer	No Answer	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	Yes	No	None	No Answer	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No Answer	Yes	1 to 2 years ago	Use land No agreement	No							
Secondary	Yes	Yes	No	Other	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	Health Services	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	Yes	Yes	No	Health Services	No	Yes	Over 10 years ago	Informal agreement	Yes	Commercial Business Income	Estate backdam	Summer	Sell at local market	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	Yes	No	Groceries		Yes	1 to 2 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	Yes	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Other	No	Yes	Over 10 years ago	Own	Yes	Recreation	Canal and River	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	Yes		None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	Utilities	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	Yes	Yes	No	None	No	Yes	1 to 2 years ago	Other	Yes	Subsistence Family Use	Backdam and koker	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Estate backdam	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Canals	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Other	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Other	No	Yes	Over 10 years ago	Informal agreement	Yes	Subsistence Family Use	Estate Backdam , River	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	Yes	Yes	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	Yes	Yes	No	None	No	Yes	Over 10 years ago	Use land No agreement	Yes	Commercial Business Income	Deep Sea fishing - Meadowbank Georgetown	Summer	Sell at local market	Fishing Traps and lines	gillbacker	15
Secondary	Yes	No	No	None	No Answer	Yes	1 to 2 years ago	Other	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	None	Unsure	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	Yes		None	No	Yes	5 to 10 year ago	Lease	No							
Secondary	Yes	No		None	No Answer	Yes	Over 10 years ago	Lease	Yes	Recreation	Backdam and river	Summer	Share with Friends	Other	cuirass	
Secondary	No	No	No		No	Yes	Over 10 years ago	Other	Yes	Commercial Business Income	Backdam	Summer	Sell at local market	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							

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Study Area	Have you or a household member lost your employment in the past 18 months due to COVID-19?	Do you or anyone in your household have a savings account?	Do you or anyone in your household have a bank loan or private loan?	Have you lost access to any core services in relation to COVID-19?	Have there been any improvements in your access to internet/wifi services as a result of COVID-19?	Is this your primary residence?	How long have you resided in the Wales Estate area?	What type of tenure do you have on this land?	Do you or anyone in your household fish?	Do you/they fish for which primary reason?	Where do you fish most often (sites, locations)?	When do you fish?	What do you do with your catch?	How do you fish?	What type of fish do you catch?	How many fishing boats are in the nearby landing site?
Secondary	Yes	No	No	None	No	No		Own	No							
Secondary	Yes	No	No	None	Yes	Yes	1 to 2 years ago	Other	Yes	Recreation	Free & Easy and Canal 2	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	No	No	None	Unsure	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	Transportation	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Lease	No							
Secondary	Yes	No	No	None	No Answer	Yes	Over 10 years ago	Informal agreement	Yes	Subsistence Family Use	Leguan	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	No	No	Other	No Answer	Yes	1 to 2 years ago	Other	No							
Secondary	No	No	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	Groceries		Yes	Over 10 years ago	Own	No							
Secondary						Yes	Over 10 years ago	Lease	No							
Secondary	No	Yes	No	Groceries	No	Yes	5 to 10 year ago	Own	No							
Secondary	No	Yes	No	Groceries	No Answer	Yes	Over 10 years ago	Informal agreement	Yes	Subsistence Family Use	Backdam	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	Yes	No	Groceries		Yes	5 to 10 year ago	Lease	No							
Secondary	No Answer	Yes	No	None	No	Yes	Over 10 years ago	Lease	No							
Secondary	No	No	No	Groceries	No Answer	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	None	No			Use land No agreement	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Other	Yes	Subsistence Family Use	Backdam/canal by Guysuco	Summer	Family Consumption	Other	Other	5
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary		Yes		None	Unsure	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	Groceries	No	Yes	Past 6 months	Lease	No							
Secondary	Yes	No	No	None	Unsure	Yes	1 to 2 years ago	Lease	Yes	Recreation	Backdam	Summer	No Response	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary		No		None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	Utilities	No Answer	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	No	No	None		Yes	Over 10 years ago	Own	Yes	Recreation	Canal	Summer	Family Consumption	Other	Other	
Secondary	Yes	No	No	None	Yes	Yes	1 to 2 years ago	Informal agreement	Yes	Recreation	In the rice field	Summer	Family Consumption	Other	Other	
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	In the canals	Summer	Family Consumption	Other	Other	
Secondary	Yes	No		None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	Yes	No	None	Unsure	Yes	Over 10 years ago	Lease	Yes	Subsistence Family Use	The estate Canals	Spring	Family Consumption	Other	Other	
Secondary						Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No		None	Unsure	Yes	Over 10 years ago	Use land No agreement	No							
Secondary	No	No	Yes	None		Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	Unsure	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Lease	No							
Secondary	No	Yes	No	None		Yes	Over 10 years ago	Own								
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement								
Secondary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No Answer	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	Yes	Recreation	Backdam	Summer	Family Consumption	Fishing Traps and lines	Other	0
Secondary		No	No	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Backdam	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	0
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	Yes	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	Unsure	Yes	Over 10 years ago	Own	Yes	Recreation	River	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	Yes	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							

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Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	Unsure	Yes	Over 10 years ago	Own	Yes	Recreation	Backdam	Summer	Other	Fishing Traps and lines	cuirass	
Secondary	No	Yes	No	None	Unsure	Yes	Over 10 years ago	Own	No							
Secondary	Yes	Yes	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	Yes	Yes	Yes	Groceries	No	Yes	Over 10 years ago	Other	Yes	Subsistence Family Use	Canal	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	Yes	No	Health Services	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	Groceries		Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	Health Services	No	Yes	5 to 10 year ago	Lease	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	Yes	No	No	None	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	Canals , backdam	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	Yes	No	None	No	Yes	5 to 10 year ago	Other	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Lease	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	Unsure	Yes	5 to 10 year ago	Informal agreement	No							
Secondary	Unsure	Unsure	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No Answer	Supply Chain	Unsure	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Past 6 months	Informal agreement	No							
Secondary	No	No	No		No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	No	Yes	5 to 10 year ago	Informal agreement	No							
Secondary	Yes	Yes	No	Supply Chain	No Answer	Yes	5 to 10 year ago	Lease	No							
Secondary	Yes	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	Yes	Yes	No	Supply Chain	No	Yes	Over 10 years ago	Other	No							
Secondary	No	Yes	No	None	No	Yes	5 to 10 year ago	Informal agreement	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	Unsure	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	Groceries	Unsure	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	No	No	Groceries	Unsure	Yes	1 to 2 years ago	Lease	No							
Secondary	No	No	No	Groceries		Yes	Over 10 years ago	Lease	No							
Secondary	No	No	No	Groceries	Unsure	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Groceries		Yes	5 to 10 year ago	Own	No							
Secondary	No	Yes	No	None		Yes	Over 10 years ago	Own	No							
Secondary	Yes	Yes	No	Groceries	Unsure	Yes	Over 10 years ago	Own	Yes	Recreation	Trench in front of the yard	Summer	Unknown	Fishing Traps and lines	Other	
Secondary	No	No	No	Utilities		Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Trenches	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	Yes	Yes	No	Groceries		Yes	1 to 2 years ago	Lease	Yes	Recreation	Trenches in the area	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	Yes	No	None		Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None		Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	Groceries		Yes	Over 10 years ago	Informal agreement	Yes	Subsistence Family Use	Trenches	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	No	No	None		Yes	Over 10 years ago	Informal agreement	Yes	Commercial Business Income	Backdam	Summer	Sell in Vreed-en-Hoop	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Yes	No	Yes	Groceries	No	Yes	Over 10 years ago	Own	Yes	Commercial Business Income	Sea	Summer	Sell at local market	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	40
Secondary	No	No Answer	No Answer	Groceries	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	Trench, koker, canals in the area	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	None	No	Yes	1 to 2 years ago	Other	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	Utilities	No	Yes	Over 10 years ago	Lease	No							
Secondary	No	Yes	No	Health Services	Unsure	Yes	Over 10 years ago	Informal agreement	No							

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Study Area	Have you or a household member lost your employment in the past 18 months due to COVID-19?	Do you or anyone in your household have a savings account?	Do you or anyone in your household have a bank loan or private loan?	Have you lost access to any core services in relation to COVID-19?	Have there been any improvements in your access to internet/wifi services as a result of COVID-19?	Is this your primary residence?	How long have you resided in the Wales Estate area?	What type of tenure do you have on this land?	Do you or anyone in your household fish?	Do you/they fish for which primary reason?	Where do you fish most often (sites, locations)?	When do you fish?	What do you do with your catch?	How do you fish?	What type of fish do you catch?	How many fishing boats are in the nearby landing site?
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	Yes	Other	No	Yes	Over 10 years ago	Own	Yes	Recreation	Rice field irrigation trench and rice fields	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	Yes	No	No	Transportation	Yes	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	Backdam	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	Yes	Subsistence Family Use	Backdam , trench and canal	Summer	Share with Friends	Fishing Traps and lines	Other	
Secondary	No	Yes	No	Transportation	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	Canals and dam	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	5 to 10 year ago	Informal agreement	No							
Secondary	No	No Answer	No Answer	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Supply Chain	Yes	Yes	5 to 10 year ago	Lease	Yes	Subsistence Family Use	Trenches in the area	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	Yes	No	None		Yes	Past 6 months	Informal agreement	No							
Secondary	No	No	No	Groceries	Unsure	Yes	Over 10 years ago	Informal agreement	No							
Secondary	Unsure	Yes	No	Unknown	No	Yes	5 to 10 year ago	Informal agreement	No							
Secondary	No	Yes	No	None	Unsure	Yes	Over 10 years ago	Own	No							
Secondary	Yes	Yes	No	Supply Chain	No	Yes	5 to 10 year ago	Lease	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	Yes	Subsistence Family Use	Backdam	Summer	Family Consumption	No answer	Other	
Secondary	No	No	No	Groceries	No	Yes	Over 10 years ago	Lease	No							
Secondary	No	Yes	No	None		Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	Groceries	No	Yes	1 to 2 years ago	Lease	Yes	Recreation	Backdam in the area	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	Yes	No	Groceries	No	Yes	1 to 2 years ago	Informal agreement	No							
Secondary	Yes	No	Yes	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	Yes	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	Vreed en hoop Backdam and Coglan dam	Summer	Family Consumption	Fishing Traps and lines	Other	
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	Health Services	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	No	No	None	No	Yes	1 to 2 years ago	Lease	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	1 to 2 years ago	Lease	No							
Secondary	No	No Answer	No Answer	Groceries	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No	No	None	No	Yes	Over 10 years ago	Informal agreement	No							
Secondary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	No							
Secondary	No	No Answer	No Answer	None	No	Yes	Over 10 years ago	Own	No							
Tertiary	No	Yes	Yes	Groceries	No	Yes	Over 10 years ago	Own	No							
Tertiary	No	No	No	None	No	Yes	1 to 2 years ago	Own	Yes	Commercial Business Income	Sea	Summer	Other	Trawls	prawns	
Tertiary	No	No Answer	No Answer	Groceries	No	Yes	Over 10 years ago	Informal agreement	No							
Tertiary	No	No Answer	No Answer	None	No	Yes	Over 10 years ago	Own	No							
Tertiary	No	Yes	No	Supply Chain	No Answer	Yes	5 to 10 year ago	Informal agreement	No							
Tertiary	No	Yes	No	None	No	Yes	1 to 2 years ago	Own	No							
Tertiary	Yes	No	No	Groceries	No	Yes	Over 10 years ago	Other	No							
Tertiary	Yes	No	No	Groceries	No Answer	Yes	5 to 10 year ago	Informal agreement	Yes	Commercial Business Income	Backdam and canal	Summer	Other	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Tertiary	Yes	No	No	None	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	In trenches around the community	Summer	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	
Tertiary	No	No	No	Groceries	No	Yes	Past 6 months	Informal agreement	No							
Tertiary	No	Yes	No	None		Yes	Over 10 years ago	Lease	No							
Tertiary	Yes	Yes	No	None	Yes	Yes	Over 10 years ago	Lease	No							

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Study Area	Have you or a household member lost your employment in the past 18 months due to COVID-19?	Do you or anyone in your household have a savings account?	Do you or anyone in your household have a bank loan or private loan?	Have you lost access to any core services in relation to COVID-19?	Have there been any improvements in your access to internet/wifi services as a result of COVID-19?	Is this your primary residence?	How long have you resided in the Wales Estate area?	What type of tenure do you have on this land?	Do you or anyone in your household fish?	Do you/they fish for which primary reason?	Where do you fish most often (sites, locations)?	When do you fish?	What do you do with your catch?	How do you fish?	What type of fish do you catch?	How many fishing boats are in the nearby landing site?
Tertiary	No	No	No	None	No	Yes	Over 10 years ago	Own	No							
Tertiary	Yes	Yes	No	None	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	Trench nearby	Spring	Family Consumption	Gillnets drift seines fyke nets Chinese seins Cadell Line	Other	0
Tertiary	Unsure	Yes	No	Groceries	No	Yes	Over 10 years ago	Informal agreement	Yes	Recreation	At the river and canal	Summer	Family Consumption	Fishing Traps and lines	Other	
Tertiary	No	Yes	Yes			Yes	Past 6 months	Lease	No							
Tertiary	No	Yes	No	None		Yes	5 to 10 year ago	Informal agreement	No							
Tertiary	No	Yes	No	Utilities		Yes	Over 10 years ago	Use land No agreement	No							
Tertiary	No	No	No	None	No	Yes	Over 10 years ago	Own	Yes	Recreation	Trenches in the area	Summer	Family Consumption	Fishing Traps and lines	Other	
Tertiary	No	No	No	Utilities		Yes	5 to 10 year ago	Lease	Yes	Subsistence Family Use	River	Summer	Family Consumption	Fishing Traps and lines	cuirass	
Tertiary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Own	No							
Tertiary	No	Yes	No	None	No	Yes	Over 10 years ago	Own	Yes	Recreation	Trenches	Summer	Family Consumption	Fishing Traps and lines	Other	
Tertiary	No	Yes	Yes	None	No	Yes	Over 10 years ago	Own	No							
Tertiary	No	Yes	No	Health Services	No	Yes	Over 10 years ago	Own	No							
Tertiary	No	No	No	Transportation	No	Yes	1 month	Other	No							

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Table 3: Socioeconomic Survey Data – Household Surveys, Part 3 of 6

Study Area	What crops do you grow?	What us the rice unit per crop	How much rice do you harvest (consider past 3 years on average)	How much of the total rice do you sell? (%)	How much of the total rice do you eat / consume? (%)	How much of the total rice do you use for animals? (%)	What is the fruit unit per crop	How much fruit do you harvest (consider past 3 years on average)	How much of the total fruit do you sell? (%)	How much of the total fruit do you eat / consume? (%)	How much of the total fruit do you use for animals? (%)	What is the Cassava / root unit per crop	How much Cassava / root veg do you harvest (consider past 3 years on average)	How much of the total Cassava / root veg do you sell? (%)	How much of the total Cassava / root veg do you eat / consume? (%)	How much of the total Cassava / root veg do you use for animals? (%)	What is the Other veg unit per crop
Primary	None																
Primary	None																
Primary	Other Vegetables																Fine leaf thyme, Lemon / Fever grass and Basil
Primary	Cassava Root Veg											25 lbs	75		99		
Primary	Fruit, Other, Cassava Root Veg						500 to 700 lbs	700	70	15	15	500 to 1000 lbs	1000	70	30	30	
Primary	Cassava Root Veg, Other											40	200	70	30	1	
Primary	Cassava Root Veg, Fruit, Other						40	1200	80	20	1	600 lbs	600	90	10		
Primary	Other, Other Vegetables																6 lbs
Primary	None																
Primary	Fruit, Cassava Root Veg, Other Vegetables, Other						3 lbs	3				15	5	1	99	1	7
Primary	Other																
Primary																	
Primary	Other Vegetables																6000 Lbs
Primary	None, Other																
Primary																	
Primary	None																
Primary	Cassava Root Veg											50 pounds	50	50	10		
Primary	Fruit						Orange	10		10							
Primary	Other Vegetables, Cassava Root Veg											Sweet cassava	400	90			Cash crop squash
Primary	None																
Primary	None																
Primary	Cassava Root Veg											Sweet cassava	5	5	3		
Primary	None																
Primary	None																
Primary	Fruit						Pineapple	800	75	5							
Primary	None																
Primary	Other Vegetables																Callalou , celery , ginger
Primary	None																
Primary	Fruit, Other						250 pounds	250		99							
Primary	Cassava Root Veg											1500 lbs		97	3		
Primary	Cassava Root Veg, Other											600 pounds	600	50	50		
Primary	Cassava Root Veg, Other											400 lbs	600	90	10		
Primary	Fruit, Other						3600	1800	20	80							
Primary	Fruit						3000 lbs mangoes	9000	75	25							
Primary	Other Vegetables, Fruit						2 bushel sorrel and 55 lbs passion fruit		80	20							50 bushel lettuce and pack choi
Primary	Other Vegetables																20 lbs pepper, 200lbs pumpkin, 150lbs Squash
Primary	None																
Primary	None																
Primary	None																
Primary	Fruit						3 acres pineapples		90	10							
Primary	Other																
Primary	Fruit						4000 lbs tangerine	12000	95	5							
Primary	None																
Primary	None																
Primary	Other, Other Vegetables																2 buckets 5 gallons
Primary	None																
Primary	Other Vegetables, Other																300 000 Pakchoy 24000 lbs Cabbage
Primary	None																
Primary	None																
Primary	None																
Primary	Other, Cassava Root Veg											2 tons	2	99	1	1	
Primary	Other																
Primary	None																

Note: In order to respect the privacy of survey participants, this summary table does Not include personal identification details or Other information that could be used to identify individual participants. Some questions/responses have therefore been excluded, and a randomized order has been applied.

Study Area	What crops do you grow?	What us the rice unit per crop	How much rice do you harvest (consider past 3 years on average)	How much of the total rice do you sell? (%)	How much of the total rice do you eat / consume? (%)	How much of the total rice do you use for animals? (%)	What is the fruit unit per crop	How much fruit do you harvest (consider past 3 years on average)	How much of the total fruit do you sell? (%)	How much of the total fruit do you eat / consume? (%)	How much of the total fruit do you use for animals? (%)	What is the Cassava / root unit per crop	How much Cassava / root veg do you harvest (consider past 3 years on average)	How much of the total Cassava / root veg do you sell? (%)	How much of the total Cassava / root veg do you eat / consume? (%)	How much of the total Cassava / root veg do you use for animals? (%)	What is the Other veg unit per crop
Primary	Cassava Root Veg, Hay											1000 pounds	1000	99	1	1	
Primary	Fruit, Other Vegetables						500 lbs	500	99	1	1						300 lbs
Primary	Cassava Root Veg, Other											5400 lbs	5400	99	1	1	
Primary	None																
Primary	Other, Fruit						3000 mangos	3000	99	1	1						
Primary	Other																
Primary	None																
Primary	Cassava Root Veg, Other											300 lbs	300	90	10	1	
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary	Fruit						Commercial quantity - 500 lemons year , 100 pounds of soursop pulp per year	600	95	5							
Primary	None																
Primary	Fruit						800 tangerine for the year , 7 tubs of pear per year	900	60	40							
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary	Fruit						Pine apple - 5000 dozens per crop every 2 years	60000	99	1							
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary	Fruit, Cassava Root Veg						400 pounds banana every 2 weeks, 500 oranges per year	10900	99	1		300 pounds plantain every 2 weeks	7800	99	1		
Primary	Cassava Root Veg, Fruit						12000 oranges per month	144000	99	1		700 pounds cassava every month	8400	99	1		
Primary	Other Vegetables, Fruit						1200 oranges per month , 300 pounds of banana week	28800	99	1							Plantain 300 pounds per week
Primary	Cassava Root Veg, Other Vegetables, Fruit						4000 oranges monthly	48000	99	1		1000 pounds cassava per month	12000	99	1		12 bags Wiri wiri pepper - 100 lbs each , 6 bag sweet pepper every week - 75 lbs per bag , 4 bag big peppers every week at 60 lbs per bag
Primary	Other																
Primary	None																
Primary	Other																
Primary	None																
Primary	Other																
Primary	Other																
Primary	Other																
Primary	Other, Other Vegetables																11000 lbs Plantains
Primary	Other, Fruit						200lbs of plantains and 200lbs bananas per week	12000	99								
Primary	Fruit, Other, Other Vegetables						50 lbs passion fruit	150	80	20							20 lbs ochra, 50lbs corila, 20lbs bora
Primary	None																
Primary	None																
Primary																	
Primary	Other																
Primary	Fruit, Other Vegetables						300 lbs bananas	900	90	10							1000lbs pumpkin, 500lbs corilla
Primary	Other																
Primary	None																
Primary	Fruit, Other						960 lbs per month	34560	80	20							
Primary	Fruit, Other						1800 lbs bananas per month		80	20							
Primary	None																

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Study Area	What crops do you grow?	What us the rice unit per crop	How much rice do you harvest (consider past 3 years on average)	How much of the total rice do you sell? (%)	How much of the total rice do you eat / consume? (%)	How much of the total rice do you use for animals? (%)	What is the fruit unit per crop	How much fruit do you harvest (consider past 3 years on average)	How much of the total fruit do you sell? (%)	How much of the total fruit do you eat / consume? (%)	How much of the total fruit do you use for animals? (%)	What is the Cassava / root unit per crop	How much Cassava / root veg do you harvest (consider past 3 years on average)	How much of the total Cassava / root veg do you sell? (%)	How much of the total Cassava / root veg do you eat / consume? (%)	How much of the total Cassava / root veg do you use for animals? (%)	What is the Other veg unit per crop
Primary	None																
Primary	Rice	1800 bags - 100 lbs per bag	1800	99													
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary																	
Primary	None																
Primary	None																
Primary	Other Vegetables																70 bushel bora, 120lbs bigan , 200lbs ochra
Primary	None																
Primary	None																
Primary	None																
Primary	None																
Primary	None															

Study Area	What crops do you grow?	What us the rice unit per crop	How much rice do you harvest (consider past 3 years on average)	How much of the total rice do you sell? (%)	How much of the total rice do you eat / consume? (%)	How much of the total rice do you use for animals? (%)	What is the fruit unit per crop	How much fruit do you harvest (consider past 3 years on average)	How much of the total fruit do you sell? (%)	How much of the total fruit do you eat / consume? (%)	How much of the total fruit do you use for animals? (%)	What is the Cassava / root unit per crop	How much Cassava / root veg do you harvest (consider past 3 years on average)	How much of the total Cassava / root veg do you sell? (%)	How much of the total Cassava / root veg do you eat / consume? (%)	How much of the total Cassava / root veg do you use for animals? (%)	What is the Other veg unit per crop
Secondary	None																
Secondary	Other, Other Vegetables, Fruit						1200	3600	80	20							1600
Secondary	None																
Secondary	None																
Secondary	None															

Study Area	What crops do you grow?	What us the rice unit per crop	How much rice do you harvest (consider past 3 years on average)	How much of the total rice do you sell? (%)	How much of the total rice do you eat / consume? (%)	How much of the total rice do you use for animals? (%)	What is the fruit unit per crop	How much fruit do you harvest (consider past 3 years on average)	How much of the total fruit do you sell? (%)	How much of the total fruit do you eat / consume? (%)	How much of the total fruit do you use for animals? (%)	What is the Cassava / root unit per crop	How much Cassava / root veg do you harvest (consider past 3 years on average)	How much of the total Cassava / root veg do you sell? (%)	How much of the total Cassava / root veg do you eat / consume? (%)	How much of the total Cassava / root veg do you use for animals? (%)	What is the Other veg unit per crop
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	Other Vegetables																50 lbs
Secondary	None																
Secondary	Other Vegetables																600 lbs Callalo
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None															

Study Area	What crops do you grow?	What us the rice unit per crop	How much rice do you harvest (consider past 3 years on average)	How much of the total rice do you sell? (%)	How much of the total rice do you eat / consume? (%)	How much of the total rice do you use for animals? (%)	What is the fruit unit per crop	How much fruit do you harvest (consider past 3 years on average)	How much of the total fruit do you sell? (%)	How much of the total fruit do you eat / consume? (%)	How much of the total fruit do you use for animals? (%)	What is the Cassava / root unit per crop	How much Cassava / root veg do you harvest (consider past 3 years on average)	How much of the total Cassava / root veg do you sell? (%)	How much of the total Cassava / root veg do you eat / consume? (%)	How much of the total Cassava / root veg do you use for animals? (%)	What is the Other veg unit per crop
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	Other Vegetables																5
Secondary	Fruit						30 lbs	90	1	99							
Secondary	None																
Secondary	Fruit, Other						50 lbs guava	150		99							
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	Other, Cassava Root Veg											100 lbs	100	30	70		
Secondary	Fruit						11lbs	11	1	99							
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	Other																
Secondary	None																
Secondary	Other																
Secondary	None																
Secondary	None																
Secondary	Cassava Root Veg, Other, Fruit						Lbs	70	1	99		Lbbs	30	1	99		
Secondary	Fruit						Lbs	10	1	99							
Secondary	None																
Secondary	None																
Secondary	None																
Secondary																	
Secondary	Other																
Secondary																	
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	Fruit, Other						Bags	1	1	99							
Secondary	Fruit						Bags	2	1	99							
Secondary	None																
Secondary	None																
Secondary	Rice	2000 bags	2000	99	1	1											
Secondary	Other Vegetables, Other																3000 lbs
Secondary																	
Secondary																	
Secondary	Fruit						1 basket	1		99							
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	Cassava Root Veg											200 pounds	200	40	60		
Secondary	None																
Secondary	None																
Secondary	Other Vegetables																Small scale - subsistence use
Secondary	None																
Secondary	Cassava Root Veg											72 lbs cassava	216	1	99		
Secondary	Fruit						60		1	99							

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Study Area	What crops do you grow?	What us the rice unit per crop	How much rice do you harvest (consider past 3 years on average)	How much of the total rice do you sell? (%)	How much of the total rice do you eat / consume? (%)	How much of the total rice do you use for animals? (%)	What is the fruit unit per crop	How much fruit do you harvest (consider past 3 years on average)	How much of the total fruit do you sell? (%)	How much of the total fruit do you eat / consume? (%)	How much of the total fruit do you use for animals? (%)	What is the Cassava / root unit per crop	How much Cassava / root veg do you harvest (consider past 3 years on average)	How much of the total Cassava / root veg do you sell? (%)	How much of the total Cassava / root veg do you eat / consume? (%)	How much of the total Cassava / root veg do you use for animals? (%)	What is the Other veg unit per crop
Secondary	Other Vegetables, Other																30
Secondary	Other, Fruit						40 lbs bananas	1200	1	99							
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	Other Vegetables																Subsistence use small scale
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	Other Vegetables																300 bundles
Secondary	None																
Secondary	Cassava Root Veg, Other Vegetables											120 lbs	360	1	99		120 lbs pumpkin
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary																	
Secondary	None																
Secondary	None																
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Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None, Other Vegetables																900 bushel of pack Choi and lettuce
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
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Secondary	None																
Secondary																	
Secondary	None																
Secondary	None																

Note: In order to respect the privacy of survey participants, this summary table does Not include personal identification details or Other information that could be used to identify individual participants. Some questions/responses have therefore been excluded, and a randomized order has been applied.

Study Area	What crops do you grow?	What us the rice unit per crop	How much rice do you harvest (consider past 3 years on average)	How much of the total rice do you sell? (%)	How much of the total rice do you eat / consume? (%)	How much of the total rice do you use for animals? (%)	What is the fruit unit per crop	How much fruit do you harvest (consider past 3 years on average)	How much of the total fruit do you sell? (%)	How much of the total fruit do you eat / consume? (%)	How much of the total fruit do you use for animals? (%)	What is the Cassava / root unit per crop	How much Cassava / root veg do you harvest (consider past 3 years on average)	How much of the total Cassava / root veg do you sell? (%)	How much of the total Cassava / root veg do you eat / consume? (%)	How much of the total Cassava / root veg do you use for animals? (%)	What is the Other veg unit per crop
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	Rice	3000 paddy bags	9000	90													
Secondary	None																
Secondary	Rice	600 bags per year	600	98	1	1											
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Secondary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	Fruit							Subsistence use - small scale			99						
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																

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Study Area	What crops do you grow?	What us the rice unit per crop	How much rice do you harvest (consider past 3 years on average)	How much of the total rice do you sell? (%)	How much of the total rice do you eat / consume? (%)	How much of the total rice do you use for animals? (%)	What is the fruit unit per crop	How much fruit do you harvest (consider past 3 years on average)	How much of the total fruit do you sell? (%)	How much of the total fruit do you eat / consume? (%)	How much of the total fruit do you use for animals? (%)	What is the Cassava / root unit per crop	How much Cassava / root veg do you harvest (consider past 3 years on average)	How much of the total Cassava / root veg do you sell? (%)	How much of the total Cassava / root veg do you eat / consume? (%)	How much of the total Cassava / root veg do you use for animals? (%)	What is the Other veg unit per crop
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	None																
Tertiary	Other Vegetables																Subsistence use - small scale
Tertiary	Other Vegetables																4000 pounds cucumber , 300 pints pepper
Tertiary	None																

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Table 4: Socioeconomic Survey Data – Household Surveys, Part 4 of 6

Study Area	How much of the total Other vegetables do you sell? (%)	How much of the total Other vegetables do you eat / consume? (%)	How much of the total Other vegetables do you use for animals? (%)	What is the Hay unit per crop	How much hay do you harvest (consider past 3 years on average)	How much of the total hay do you sell? (%)	How much of the total hay do you eat / consume? (%)	How much of the total hay do you use for animals? (%)	Do you receive assistance to harvest your crops?	From whom?	What livestock do you own?	How many cows do you own?	How many horses or donkeys do you own?	How many pigs do you own?	How many sheep or goats do you own?	How many poultry do you own?	Do they graze on your land here?
Primary											No livestock						
Primary											No livestock						
Primary									Yes	Hired labor	No livestock						
Primary																	
Primary	1	5	1						Yes		Poultry					20	Yes
Primary									No		Pigs, Sheep Goats, Poultry			4	4	36	Yes
Primary									No		Pigs, Poultry			4		250	Yes
Primary									No		No livestock						
Primary									Yes	Relative	No livestock						
Primary	30	70	1						Yes	Relative	No livestock						
Primary											No livestock						
Primary											Poultry					20	Other Land Nearby
Primary									Yes	Hired labor	Sheep Goats, Cow	12			10		Other Land Nearby
Primary																	
Primary	99	1							Yes	Relative, Other	Poultry					320	Yes
Primary											No livestock						
Primary																	
Primary																	Yes
Primary									Yes	Relative	No livestock						
Primary									No		Cow, Poultry, Sheep Goats	14			7	12	Other Land Nearby
Primary		10															
Primary											Poultry					50	Yes
Primary											No livestock						
Primary									No		No livestock						
Primary											No livestock						
Primary											No livestock						
Primary									Yes	Relative	No livestock						
Primary											No livestock						
Primary	95	5							No		Poultry					50	Other Land Nearby
Primary											No livestock						
Primary									No		No livestock						
Primary									Yes	Relative	No livestock						
Primary									Yes	Relative	Cow	2					Other Land Nearby
Primary									Yes	Hired labor	Cow	2					Other Land Nearby
Primary											Cow, Sheep Goats	4			34		No
Primary											No livestock						
Primary											No livestock						
Primary	80	20							Yes	Relative,Hired labor	No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary									Yes	Relative	Poultry					50	Yes
Primary									Yes	Hired labor	Sheep Goats				30		Yes
Primary									Yes	Relative	Poultry					400	Yes
Primary											No livestock						
Primary											No livestock						
Primary	65	35	1						No		Poultry					100	No
Primary											No livestock						
Primary	99	1	1						Yes	Relative	Poultry					65	No
Primary											No livestock						
Primary																	
Primary											Poultry					84	Yes
Primary											Poultry					100	Yes
Primary									No		No livestock						
Primary											No livestock						
Primary																	

Note: In order to respect the privacy of survey participants, this summary table does Not include personal identification details or Other information that could be used to identify individual participants. Some questions/responses have therefore been excluded, and a randomized order has been applied.

Study Area	How much of the total Other vegetables do you sell? (%)	How much of the total Other vegetables do you eat / consume? (%)	How much of the total Other vegetables do you use for animals? (%)	What is the Hay unit per crop	How much hay do you harvest (consider past 3 years on average)	How much of the total hay do you sell? (%)	How much of the total hay do you eat / consume? (%)	How much of the total hay do you use for animals? (%)	Do you receive assistance to harvest your crops?	From whom?	What livestock do you own?	How many cows do you own?	How many horses or donkeys do you own?	How many pigs do you own?	How many sheep or goats do you own?	How many poultry do you own?	Do they graze on your land here?
Primary	99	1	1						Yes	Hired labor	No livestock						
Primary									No		Cow	2					No
Primary											No livestock						
Primary									No		No livestock						
Primary									No		No livestock						
Primary											No livestock						
Primary									No		No livestock						
Primary											No livestock						
Primary																	
Primary											Poultry					200	No
Primary											No livestock						
Primary									No		No livestock						
Primary											No livestock						
Primary									Yes	Hired labor	Poultry					180	Yes
Primary											No livestock						
Primary											Cow	10					Yes
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary									Yes	Relative	No livestock						
Primary											Poultry					230	Yes
Primary											No livestock						
Primary											No livestock						
Primary											Cow	3					Yes
Primary											Cow	5					Other Land Nearby
Primary									Yes	Hired labor	Cow	13					Other Land Nearby
Primary									Yes	Hired labor	Sheep Goats, Other, Poultry, Cow	50			9	25	Yes
Primary	99	1							Yes	Relative,Hired labor	Cow	12					Other Land Nearby
Primary	99	1							Yes	Hired labor	Cow, Sheep Goats	53			20		Other Land Nearby
Primary									No		Poultry					120	No
Primary											No livestock						
Primary									No		No livestock						
Primary											No livestock						
Primary									Yes	Hired labor	Cow	50					Yes
Primary									No		Cow	10					Yes
Primary											No livestock						
Primary	99	1	1						Yes	Hired labor	No livestock						
Primary									No		No livestock						
Primary	80	20							Yes	Hired labor,Relative	No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											Cow	21					Other Land Nearby
Primary									Yes	Hired labor	Cow	7					Yes
Primary	90	10							Yes	Hired labor,Relative	Cow, Poultry	20				150	Yes
Primary									Yes	Hired labor	Cow	10					Other Land Nearby
Primary											Sheep Goats				2		Yes
Primary									Yes	Relative	Poultry, Cow	23				220	Other Land Nearby
Primary									Yes	Hired labor	Poultry, Cow	16				800	Other Land Nearby
Primary											No livestock						
Primary											No livestock						
Primary									Yes	Hired labor	No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						

Note: In order to respect the privacy of survey participants, this summary table does Not include personal identification details or Other information that could be used to identify individual participants. Some questions/responses have therefore been excluded, and a randomized order has been applied.

Study Area	How much of the total Other vegetables do you sell? (%)	How much of the total Other vegetables do you eat / consume? (%)	How much of the total Other vegetables do you use for animals? (%)	What is the Hay unit per crop	How much hay do you harvest (consider past 3 years on average)	How much of the total hay do you sell? (%)	How much of the total hay do you eat / consume? (%)	How much of the total hay do you use for animals? (%)	Do you receive assistance to harvest your crops?	From whom?	What livestock do you own?	How many cows do you own?	How many horses or donkeys do you own?	How many pigs do you own?	How many sheep or goats do you own?	How many poultry do you own?	Do they graze on your land here?
Primary											Poultry					47	Yes
Primary											No livestock						
Primary											Poultry					4	Yes
Primary	75	25							No		Poultry					15	Yes
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											Poultry					13	Yes
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Primary											No livestock						
Secondary	1	99	1						Yes	Relative	No livestock						
Secondary											Cow, Horse Donkey	60	7				Yes
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary		99							No		No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary	10	90							No		Poultry					25	Yes
Secondary											No livestock						
Secondary	80	20							Yes	Relative	Sheep Goats, Poultry				270	21	Other Land Nearby
Secondary											Poultry					12	Yes
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary									No		No livestock						
Secondary											No livestock						

Note: In order to respect the privacy of survey participants, this summary table does Not include personal identification details or Other information that could be used to identify individual participants. Some questions/responses have therefore been excluded, and a randomized order has been applied.

Study Area	How much of the total Other vegetables do you sell? (%)	How much of the total Other vegetables do you eat / consume? (%)	How much of the total Other vegetables do you use for animals? (%)	What is the Hay unit per crop	How much hay do you harvest (consider past 3 years on average)	How much of the total hay do you sell? (%)	How much of the total hay do you eat / consume? (%)	How much of the total hay do you use for animals? (%)	Do you receive assistance to harvest your crops?	From whom?	What livestock do you own?	How many cows do you own?	How many horses or donkeys do you own?	How many pigs do you own?	How many sheep or goats do you own?	How many poultry do you own?	Do they graze on your land here?
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											Poultry					25	Yes
Secondary											No livestock						
Secondary											Cow	3					No
Secondary											Poultry					30	Yes
Secondary											Poultry					250	Yes
Secondary											Pigs			5			Yes
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											Poultry					1	No
Secondary											Poultry					1	No
Secondary											No livestock						
Secondary											Poultry					100	Other Land Nearby
Secondary											Cow	3					Other Land Nearby
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											Poultry					4	Yes
Secondary											Cow, Sheep Goats	2			14		No
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock					

Study Area	How much of the total Other vegetables do you sell? (%)	How much of the total Other vegetables do you eat / consume? (%)	How much of the total Other vegetables do you use for animals? (%)	What is the Hay unit per crop	How much hay do you harvest (consider past 3 years on average)	How much of the total hay do you sell? (%)	How much of the total hay do you eat / consume? (%)	How much of the total hay do you use for animals? (%)	Do you receive assistance to harvest your crops?	From whom?	What livestock do you own?	How many cows do you own?	How many horses or donkeys do you own?	How many pigs do you own?	How many sheep or goats do you own?	How many poultry do you own?	Do they graze on your land here?
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											Poultry					10	Yes
Secondary											Poultry					10	Yes
Secondary	1	99	1						No		Poultry					10	No
Secondary											No livestock						
Secondary	97	3							Yes		Poultry					6	No
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											Poultry					75	No
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock					

Study Area	How much of the total Other vegetables do you sell? (%)	How much of the total Other vegetables do you eat / consume? (%)	How much of the total Other vegetables do you use for animals? (%)	What is the Hay unit per crop	How much hay do you harvest (consider past 3 years on average)	How much of the total hay do you sell? (%)	How much of the total hay do you eat / consume? (%)	How much of the total hay do you use for animals? (%)	Do you receive assistance to harvest your crops?	From whom?	What livestock do you own?	How many cows do you own?	How many horses or donkeys do you own?	How many pigs do you own?	How many sheep or goats do you own?	How many poultry do you own?	Do they graze on your land here?
Secondary									No		No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary									No		No livestock						
Secondary											No livestock, Poultry					7	Yes
Secondary											Poultry					3	Yes
Secondary									No								
Secondary									No		Poultry					70	Yes
Secondary																	
Secondary											No livestock						
Secondary											No livestock						
Secondary											Poultry					200	Yes
Secondary									No		No livestock						
Secondary											Poultry					55	Yes
Secondary											No livestock						
Secondary											Poultry					20	No
Secondary											No livestock						
Secondary											Poultry					7	No
Secondary											Poultry					20	
Secondary									No		Poultry					14	Yes
Secondary																	
Secondary											Cow	10					Other Land Nearby
Secondary																	
Secondary									Yes	Hired labor	Poultry					200	No
Secondary	99	1	1						No		Poultry, Other, Cow	8				150	No
Secondary																	
Secondary									No		No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary									No		Poultry					35	Yes
Secondary											Poultry					15	Yes
Secondary											No livestock						
Secondary	30	70							Yes	Relative	No livestock						
Secondary											Poultry, Cow	2				200	Other Land Nearby
Secondary									No		No livestock						
Secondary									No		No livestock						
Secondary	1	99							No		No livestock						
Secondary									No		No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											Poultry					1000	Yes
Secondary											No livestock						
Secondary		99							Yes	Relative	Poultry					50	Yes
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary	1	99	1						No		No livestock						
Secondary											No livestock						

Note: In order to respect the privacy of survey participants, this summary table does Not include personal identification details or Other information that could be used to identify individual participants. Some questions/responses have therefore been excluded, and a randomized order has been applied.

Study Area	How much of the total Other vegetables do you sell? (%)	How much of the total Other vegetables do you eat / consume? (%)	How much of the total Other vegetables do you use for animals? (%)	What is the Hay unit per crop	How much hay do you harvest (consider past 3 years on average)	How much of the total hay do you sell? (%)	How much of the total hay do you eat / consume? (%)	How much of the total hay do you use for animals? (%)	Do you receive assistance to harvest your crops?	From whom?	What livestock do you own?	How many cows do you own?	How many horses or donkeys do you own?	How many pigs do you own?	How many sheep or goats do you own?	How many poultry do you own?	Do they graze on your land here?
Secondary	1	99							No		No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											Poultry					11	Yes
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary	90	10							No		Poultry					140	Yes
Secondary											No livestock						
Secondary											No livestock						
Secondary											Poultry					200	Other
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock					

Study Area	How much of the total Other vegetables do you sell? (%)	How much of the total Other vegetables do you eat / consume? (%)	How much of the total Other vegetables do you use for animals? (%)	What is the Hay unit per crop	How much hay do you harvest (consider past 3 years on average)	How much of the total hay do you sell? (%)	How much of the total hay do you eat / consume? (%)	How much of the total hay do you use for animals? (%)	Do you receive assistance to harvest your crops?	From whom?	What livestock do you own?	How many cows do you own?	How many horses or donkeys do you own?	How many pigs do you own?	How many sheep or goats do you own?	How many poultry do you own?	Do they graze on your land here?
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary									Yes	Hired labor	No livestock						
Secondary											No livestock						
Secondary											No livestock						
Secondary									Yes	Other	No livestock						
Secondary											No livestock						
Secondary									Yes	Relative							
Secondary											No livestock						
Secondary	80	20							Yes	Relative	Poultry, Sheep Goats				4	60	Yes
Secondary											No livestock						
Secondary											Poultry, Sheep Goats				3	10	Yes
Secondary											No livestock						
Secondary											No livestock						
Secondary									No		Sheep Goats, Cow	26			17		Yes
Tertiary											No livestock						
Tertiary											No livestock						
Tertiary											No livestock						
Tertiary											No livestock						
Tertiary																	
Tertiary											Poultry					7	Yes
Tertiary											No livestock						
Tertiary											Poultry					12	Yes
Tertiary											No livestock						
Tertiary											Poultry, Pigs, Horse Donkey		3	30		100	Yes
Tertiary											No livestock						
Tertiary											No livestock						
Tertiary									No		No livestock						
Tertiary											No livestock						
Tertiary											Sheep Goats						No
Tertiary											Poultry					50	Yes
Tertiary											No livestock						
Tertiary											No livestock						
Tertiary											No livestock						
Tertiary											No livestock						
Tertiary											No livestock						
Tertiary											No livestock						
Tertiary		99							Yes	Relative	Cow	14					Yes
Tertiary	99	1							Yes	Hired labor	Poultry					33000	Other
Tertiary											Poultry					45000	Other

Table 5: Socioeconomic Survey Data – Household Surveys, Part 5 of 6

Study Area	How do you help your neighbors out from time to time?	Does anyone in your family engage in the following for home consumption or for sale?	What is your domestic water source?	What type of toilets do you have?	What type of electricity do you have?	What is your primary mode of transportation?	Do you posses any of the following at your residency?	Radio	Bicycl	Car	Motor cycle	Boat	TV	Gener ator	Refrig erator	W/M	A/C
Primary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		1	1			1			1	
Primary	Other		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Bicycle, Television, Refrigerator, Kerosene lantern	1	1				1				
Primary	Lend tools equipment tractors etc., Help with fishing, Help with harvesting, Help in house construction	Other	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Computer, Refrigerator, Radio, Motorcycle, Television, Washing machine, Air conditioner, Kerosene lantern	1		1	1		1			1	1
Primary	Help with transportation, Help with fishing, Help with harvesting, Help in house construction		Tied to main line	Latrine	Tied to main line	Taxi Shared Ride Service	Radio, Television, Generator, Refrigerator, Washing machine	1					1	1		1	

Note: In order to respect the privacy of survey participants, this summary table does Not include personal identification details or Other information that could be used to identify individual participants. Some questions/responses have therefore been excluded, and a randomized order has been applied.

Study Area	How do you help your neighbors out from time to time?	Does anyone in your family engage in the following for home consumption or for sale?	What is your domestic water source?	What type of toilets do you have?	What type of electricity do you have?	What is your primary mode of transportation?	Do you posses any of the following at your residency?	Radio	Bicycl	Car	Motor cycle	Boat	TV	Gener ator	Refrig erator	W/M	A/C
Primary	Lend tools equipment tractors etc., Help with fishing, Help in house construction, Help with plowing, Help with harvesting	Other	Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Motorcycle				3						
Primary	Help with harvesting	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	By foot	Bicycle, Radio, Refrigerator	1	1								
Primary	Lend tools equipment tractors etc., Help with harvesting, Help in house construction	Other	Tied to main line	Flush toilet	Tied to main line	Bicycle	Television, Refrigerator, Bicycle		3				1				
Primary	Lend tools equipment tractors etc.	Other	Tied to main line	Latrine	Other	Vehicle owned by family	Bicycle, Motorcycle, Radio, Television	1	1		1						
Primary	Help with fishing	Other	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Refrigerator, Washing machine			1			1			1	
Primary	Help with transportation, Lend tools equipment tractors etc.	Traditional medicine harvesting and production manicole moricut harvesting logging etc.	Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Motorcycle				1						
Primary	Help with transportation, Help with harvesting		Tied to main line	Flush toilet	Tied to main line	Bicycle	Bicycle, Television, Motorcycle, Radio, Computer, Refrigerator, Washing machine, Kerosene lantern	1	2		2		1			1	
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by Other	Radio, Television, Refrigerator	1					1				
Primary	Other, Not helping neighbors		Tied to main line	Latrine	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Motorcycle, Boat, Television, Refrigerator, Kerosene lantern	1	1	1	1	1	1				
Primary	Not helping neighbors		River canals	Latrine	Tied to main line	Vehicle owned by family	Bicycle, Car, Motorcycle, Television, Refrigerator		1	1	1		1				
Primary																	
Primary			River canals														
Primary	Other		Tied to main line	Latrine	Tied to main line	By foot	Bicycle, Boat, Television, Refrigerator		3			1	2				
Primary	Help with fishing, Help with harvesting	Other	Tied to main line	Latrine	Tied to main line	Bicycle	Bicycle, Television, Boat, Refrigerator		3			1	1				
Primary	Help with transportation, Help with harvesting, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Boat, Car, Television, Washing machine, Refrigerator, Computer			1		1	1			1	
Primary	Help with harvesting, Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Radio, Bicycle, Motorcycle, Boat, Television, Computer, Washing machine, Refrigerator	1	1		1	1	1			1	
Primary	Help with harvesting, Help with fishing, Help with transportation	Other	Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator	1					1				
Primary	Help with transportation		Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Radio, Motorcycle, Television, Refrigerator, Washing machine	1			1		1			1	
Primary			Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Motorcycle, Television, Computer, Washing machine, Refrigerator				1		1			1	
Primary	Help with transportation	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Motorcycle, Television, Computer			1	1						
Primary	Help with harvesting, Help with transportation, Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Motorcycle, Computer, Television, Refrigerator, Washing machine, Bicycle, Boat		3		3	3	1			1	
Primary	Other		Tied to main line	Flush toilet	Tied to main line	Bicycle	Bicycle, Radio, Television, Computer, Refrigerator	1	1				1				
Primary	Help with transportation, Help with harvesting		Tied to main line	Latrine	Tied to main line	By foot	Television, Refrigerator						1				
Primary	Not helping neighbors	Traditional medicine harvesting and production manicole moricut harvesting logging etc.	Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Radio, Motorcycle, Refrigerator	1			1						
Primary	Not helping neighbors		Tied to main line	Latrine	Tied to main line	Bicycle	Bicycle, Radio	1	1				1				
Primary	Other		Other	Flush toilet	Other	Motorcycle Moped	Radio, Motorcycle, Bicycle, Television, Refrigerator	1	2		1		1				
Primary	Help with transportation, Lend tools equipment tractors etc., Help in house construction, Help with harvesting		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Motorcycle, Television, Boat, Computer, Refrigerator, Washing machine		2		3	2	2			1	
Primary	Lend tools equipment tractors etc., Help in house construction, Help with transportation		Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Motorcycle, Boat, Television, Computer, Refrigerator, Washing machine				1	1	1			1	
Primary	Help with transportation, Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Motorcycle, Television, Computer, Refrigerator, Washing machine				1		1			1	
Primary	Lend tools equipment tractors etc., Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Motorcycle, Generator, Computer, Refrigerator, Washing machine				1		1	1		1	
Primary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Television, Refrigerator	1					2				
Primary	Lend tools equipment tractors etc., Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Radio, Television, Refrigerator, Computer, Kerosene lantern	1		1			1				
Primary	Help with transportation	Traditional medicine harvesting and production manicole moricut harvesting logging etc.	Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Generator, Computer, Refrigerator, Washing machine	1	1				1	1		1	
Primary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Refrigerator	1					1				
Primary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Generator, Refrigerator, Washing machine		1	1			2	1		1	
Primary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Refrigerator, Washing machine, Bicycle, Kerosene lantern		3	1			1			1	
Primary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator, Washing machine	1					1			1	
Primary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Refrigerator, Air conditioner, Washing machine, Computer	1	2	1			1			1	1
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator, Kerosene lantern						1				
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Refrigerator, Computer, Washing machine			1			1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		1	1			1			1	
Primary	Other		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Bicycle, Television, Computer, Refrigerator, Washing machine	1	1				1			1	
Primary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Boat, Television, Generator, Computer, Refrigerator, Washing machine		1	1		1	1			1	
Primary	Help with plowing	Traditional Crafts pelts, baskets use of mangroves	Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Bicycle, Television, Computer, Refrigerator	1	1				1				
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Computer, Refrigerator, Washing machine	1					1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Bicycle, Refrigerator		1				1				
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Bicycle, Television, Generator, Computer, Refrigerator, Washing machine, Air conditioner		1	1			1	1		1	1
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Refrigerator, Washing machine, Air conditioner						1			1	1

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Study Area	How do you help your neighbors out from time to time?	Does anyone in your family engage in the following for home consumption or for sale?	What is your domestic water source?	What type of toilets do you have?	What type of electricity do you have?	What is your primary mode of transportation?	Do you posses any of the following at your residency?	Radio	Bicycl	Car	Motor cycle	Boat	TV	Gener ator	Refrig erator	W/M	A/C
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Bicycle, Television, Refrigerator, Washing machine		3				1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Computer, Refrigerator, Washing machine		1				1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator						1				
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator, Washing machine		1				1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Bicycle, Television, Refrigerator, Washing machine		1				1			1	
Primary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Bicycle, Television, Computer, Refrigerator		1				1				
Primary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Motorcycle, Car, Television, Generator, Refrigerator, Washing machine			1	1			1		2	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Computer, Refrigerator, Washing machine		1				1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator, Washing machine		1				1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Bicycle, Television, Refrigerator, Washing machine		1				1			1	
Primary			Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator						1				
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Computer, Refrigerator, Washing machine	1	1				1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator, Washing machine		1				1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Television, Car, Computer, Refrigerator, Washing machine	1		1			2			1	
Primary	Other		No Answer	Flush toilet	No electricity	By foot	Kerosene lantern, Radio	1									
Primary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Washing machine, Refrigerator, Computer, Television, Car			3			2			1	
Primary	Help with transportation, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Computer, Refrigerator, Washing machine	1		1			1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Car, Computer, Refrigerator, Washing machine			1			1			1	
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator						1				
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Computer, Car, Refrigerator			1							
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Car, Refrigerator			1			1				
Primary	Help with transportation, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Computer, Refrigerator, Washing machine			1			1			1	
Primary	Help with transportation, Lend tools equipment tractors etc., Help with harvesting		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Computer, Refrigerator, Washing machine	1	1	1			2			1	
Primary	Lend tools equipment tractors etc., Help with transportation		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Computer, Refrigerator, Washing machine	1	2	1			2			1	
Primary	Not helping neighbors		Tied to main line	Latrine	Tied to main line	Taxi Shared Ride Service	Radio, Television, Refrigerator	1					1				
Primary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Refrigerator	1					1				
Primary	Lend tools equipment tractors etc., Other		River canals	Flush toilet	Other	Boat	Radio, Boat, Television, Generator, Refrigerator	1				2	1	1			
Primary	Other		Other	Latrine	Other	Boat	Boat, Television, Computer, Refrigerator					1	1				
Primary	Other, Lend tools equipment tractors etc.		River canals	Flush toilet	Other	Boat	Radio, Boat, Television, Refrigerator	1				2	1				
Primary	Help in house construction, Other, Help with transportation		River canals	Flush toilet	Other	Boat	Radio, Television, Generator, Refrigerator, Boat	1				2	1	1			
Primary	Help with transportation, Lend tools equipment tractors etc.		Other	Latrine	Other	Boat	Radio, Television, Boat, Computer, Refrigerator	1				2	1				
Primary	Lend tools equipment tractors etc., Help with transportation, Help in house construction		Other	Flush toilet	Other	Boat	Television, Boat, Generator, Computer, Refrigerator, Washing machine					3	2	1		1	
Primary	Not helping neighbors		Other	Flush toilet	Other	Boat	Radio, Boat, Television, Refrigerator	1					1				
Primary	Other		Other	Flush toilet	No electricity	Boat											
Primary	Not helping neighbors		Other	Latrine	Other	Boat	Radio, Bicycle, Boat, Television, Refrigerator	1	1			1	1				
Primary	Help in house construction, Help with harvesting, Lend tools equipment tractors etc., Help with fishing		Other	Latrine	No electricity	Boat	Kerosene lantern										
Primary	Not helping neighbors		Other	Flush toilet	Other	Boat	Radio, Bicycle, Boat, Television, Computer, Refrigerator, Washing machine	1	1			1	1			1	
Primary	Help with harvesting, Lend tools equipment tractors etc.		Other	Latrine	Other	Boat	Boat, Radio	1				1					
Primary	Help with harvesting, Help with transportation		Other	Flush toilet	Other	Boat	Radio, Boat, Television, Generator	1				1	1	1			
Primary			Other	Latrine	Other	Boat	Boat, Television, Refrigerator					1					
Primary	Not helping neighbors		Other	Latrine	No electricity	Vehicle owned by family	Radio, Boat, Kerosene lantern	1				1					
Primary			Other	Flush toilet	No electricity	Vehicle owned by family	Boat, Radio, Television, Computer, Refrigerator, Washing machine	1				1	1			1	
Primary	Help in house construction, Lend tools equipment tractors etc.		Other	Latrine	Other	Boat	Boat, Radio, Television	1				1	1				
Primary	Not helping neighbors		River canals	Latrine	No electricity	Boat	Kerosene lantern, Radio	1									
Primary	Help in house construction, Help with transportation		Other	Latrine	Other	Vehicle owned by family	Boat, Radio, Television, Bicycle, Computer, Generator	1	1			1	1	1			
Primary	Help in house construction, Lend tools equipment tractors etc.		Other	Latrine	No electricity	Vehicle owned by family	Boat, Radio, Kerosene lantern	1				1					
Primary	Other, Lend tools equipment tractors etc.		Other	Latrine	Generator	Vehicle owned by family	Generator, Motorcycle, Television, Refrigerator, Kerosene lantern, Boat				1	1	1	1			
Primary	Other, Lend tools equipment tractors etc.		Other	Latrine	Generator	Boat	Radio, Generator	1						1			
Primary	Lend tools equipment tractors etc., Help in house construction		Other	Flush toilet	Generator	No Response	Generator, Washing machine, Television, Radio, Refrigerator	1					1	1		1	
Primary	Other, Help in house construction		Other	Flush toilet	Generator	Vehicle owned by family	Radio, Bicycle, Car, Television, Generator, Refrigerator, Washing machine	1	1	1			1	1		1	
Primary	Help in house construction, Lend tools equipment tractors etc.		Other	Latrine	Generator	Vehicle owned by family	Boat, Television, Bicycle, Generator, Refrigerator		1			1	1	1			
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family											
Primary			Tied to main line	Flush toilet	Tied to main line	Bus											
Primary			Tied to main line	Flush toilet	Tied to main line	Bus											
Primary			Other	No Answer	Other												
Primary			Tied to main line	Latrine	Tied to main line	Vehicle owned by family											
Primary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service											

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Study Area	How do you help your neighbors out from time to time?	Does anyone in your family engage in the following for home consumption or for sale?	What is your domestic water source?	What type of toilets do you have?	What type of electricity do you have?	What is your primary mode of transportation?	Do you posses any of the following at your residency?	Radio	Bicycl	Car	Motor cycle	Boat	TV	Gener ator	Refrig erator	W/M	A/C
Primary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service											
Primary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service											
Primary			Tied to main line	Latrine	Tied to main line	Taxi Shared Ride Service											
Primary			Other	Flush toilet	Tied to main line	Bicycle											
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family											
Primary	Other		Tied to main line	Flush toilet	Tied to main line	Bicycle											
Primary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service											
Primary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service											
Primary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service											
Primary			Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped											
Primary			Tied to main line	Flush toilet	Tied to main line	By foot											
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family											
Primary			Tied to main line	Flush toilet	Unknown												
Primary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service											
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family											
Primary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service											
Primary			Other	Flush toilet	Tied to main line	Bicycle											
Primary			Tied to main line	Latrine	Tied to main line	Taxi Shared Ride Service											
Primary			Tied to main line	Flush toilet	Tied to main line	Bicycle											
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family											
Primary			Tied to main line	Latrine	Tied to main line	Taxi Shared Ride Service											
Primary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service											
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family											
Primary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service											
Primary			Tied to main line	Flush toilet	Tied to main line	By foot											
Primary			Tied to main line	Flush toilet	Tied to main line	Bicycle											
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family											
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family											
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family											
Primary			Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped											
Primary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family											
Primary			Tied to main line	Flush toilet	Tied to main line	By foot											
Secondary	Help with fishing, Other		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Motorcycle, Boat, Television, Refrigerator, Washing machine		1		1	1	1			1	
Secondary	Other	Other	Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Computer, Refrigerator, Washing machine		1				1			1	
Secondary	Help with transportation, Help with plowing	Other	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Computer, Refrigerator, Washing machine	1		1			1			1	
Secondary	Help in house construction, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Bicycle, Television, Generator, Refrigerator, Washing machine		1				1	1		1	
Secondary	Other	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Computer, Refrigerator, Washing machine, Air conditioner	1					3			1	3
Secondary	Help with transportation, Lend tools equipment tractors etc.	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Computer, Washing machine, Refrigerator	1	1	1			1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Generator, Refrigerator, Washing machine						1	1		1	
Secondary	Help with transportation, Lend tools equipment tractors etc.	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Generator, Television, Computer, Refrigerator, Washing machine, Bicycle		1	2			1	1		1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Refrigerator		1								
Secondary	Help in house construction, Lend tools equipment tractors etc., Other	Traditional medicine harvesting and production manicole moricut harvesting logging etc.	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine, Air conditioner		2	1			1			1	1
Secondary	Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Computer, Refrigerator, Washing machine	1	1	1			1			1	
Secondary	Lend tools equipment tractors etc., Help with transportation, Other	Traditional medicine harvesting and production manicole moricut harvesting logging etc.	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Generator, Refrigerator, Washing machine			1			1	1		1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator						1				
Secondary	Lend tools equipment tractors etc.	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Computer, Refrigerator, Washing machine						2			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator, Washing machine	1					1			1	
Secondary		Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Refrigerator	1									
Secondary	Help with fishing, Help with harvesting, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bicycle	Bicycle, Radio, Television, Washing machine	1	1				1			1	
Secondary	Lend tools equipment tractors etc.	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Bicycle, Motorcycle, Television, Refrigerator, Washing machine		3		1		1			1	
Secondary	Lend tools equipment tractors etc.	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Refrigerator, Washing machine, Generator	1						1		1	
Secondary	Help with fishing, Lend tools equipment tractors etc., Help with harvesting	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Bicycle	Radio, Bicycle, Television, Refrigerator	1	1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Refrigerator						1				
Secondary	Lend tools equipment tractors etc., Help with transportation		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Bicycle, Radio, Television, Refrigerator, Washing machine	3	2	1			1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Latrine	No electricity	Taxi Shared Ride Service	Kerosene lantern										

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Study Area	How do you help your neighbors out from time to time?	Does anyone in your family engage in the following for home consumption or for sale?	What is your domestic water source?	What type of toilets do you have?	What type of electricity do you have?	What is your primary mode of transportation?	Do you posses any of the following at your residency?	Radio	Bicycl	Car	Motor cycle	Boat	TV	Gener ator	Refrig erator	W/M	A/C
Secondary	Lend tools equipment tractors etc.		Other	Latrine	Tied to main line	Bicycle	Bicycle, Radio, Television, Refrigerator, Kerosene lantern	1	1				1				
Secondary	Help with fishing, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Bicycle, Boat, Television, Refrigerator, Kerosene lantern	1	1			1	1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Refrigerator, Kerosene lantern	1	1								
Secondary	Help with transportation	Traditional Crafts pelts, baskets use of mangroves, Wild plants Nuts Mushrooms	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		2	3			2			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Refrigerator, Washing machine			1			1			1	
Secondary	Other	Fruit vegetable preserving Honey	Other	Latrine	No electricity	Bicycle	Bicycle		1								
Secondary	Other	Wild plants Nuts Mushrooms	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Computer, Refrigerator, Washing machine			1			1			1	
Secondary	Help in house construction, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator, Washing machine	1					1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	By foot	Television, Refrigerator										
Secondary	Not helping neighbors	Traditional Crafts pelts, baskets use of mangroves	Tied to main line	Latrine	Tied to main line	Bicycle	Radio, Bicycle, Television	1	1				1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		1	1			1			1	
Secondary	Help in house construction	Traditional Crafts pelts, baskets use of mangroves	Tied to main line	Latrine	Tied to main line	Vehicle owned by family	Car, Bicycle, Radio, Television, Refrigerator, Kerosene lantern	1	1	1			1				
Secondary	Not helping neighbors		Tied to main line	Latrine	Tied to main line	Bus	Radio, Bicycle, Refrigerator	1	1								
Secondary	Other, Help with transportation	Traditional medicine harvesting and production manicole moricut harvesting logging etc.	Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Computer, Refrigerator, Washing machine, Kerosene lantern	1	2				2			1	
Secondary	Other		Tied to main line	Latrine	Tied to main line	Bus	Bicycle, Television, Refrigerator		1				1				
Secondary	Not helping neighbors	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Bus	Motorcycle, Television, Refrigerator, Washing machine, Air conditioner				1		1			1	1
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator, Computer						1				
Secondary	Other		Tied to main line	Latrine	No electricity	Bus	Radio, Television, Kerosene lantern	1					1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Computer, Refrigerator, Washing machine		1				1			1	
Secondary			Tied to main line	Flush toilet	Tied to main line	Bus	Car, Bicycle, Television, Refrigerator, Washing machine										
Secondary	Lend tools equipment tractors etc., Other		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Refrigerator	1	1				1				
Secondary	Help with transportation	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Boat, Car, Television, Refrigerator, Washing machine		1	1		1	1			1	
Secondary	Help with harvesting, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Refrigerator, Washing machine, Computer, Kerosene lantern		1	1						1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Bicycle, Motorcycle, Television, Computer, Refrigerator, Washing machine		3		1		1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		1	1			1			1	
Secondary	Not helping neighbors	Traditional medicine harvesting and production manicole moricut harvesting logging etc.	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		1	1			1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bicycle	Bicycle, Television, Refrigerator, Kerosene lantern		1				1				
Secondary	Help in house construction, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Computer, Refrigerator, Washing machine			1			1			1	
Secondary	Help in house construction, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Motorcycle, Refrigerator, Kerosene lantern				1		1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Radio, Television, Refrigerator, Washing machine, Kerosene lantern	1		1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Refrigerator						1				
Secondary	Lend tools equipment tractors etc., Help with harvesting		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Refrigerator, Washing machine						1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator						1				
Secondary	Lend tools equipment tractors etc., Help in house construction, Help with harvesting		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Refrigerator, Washing machine						1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator	1					1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Bicycle, Television, Refrigerator	1	2				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator	1					1				
Secondary	Lend tools equipment tractors etc., Help in house construction, Help with harvesting		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Computer, Refrigerator, Washing machine, Air conditioner	1	1				1			1	1
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Bicycle, Television, Refrigerator		1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Refrigerator	1					1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bicycle	Radio, Bicycle, Television, Refrigerator	1	1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Refrigerator, Washing machine	1		2			1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator, Washing machine						1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television										
Secondary	Lend tools equipment tractors etc.	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Bicycle, Television, Computer, Refrigerator		1	1			1				
Secondary	Help in house construction		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Computer, Refrigerator, Washing machine		1				1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television	1					1				
Secondary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Computer, Refrigerator, Washing machine	1		2			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Refrigerator	1	1	1			1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		1	1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Computer, Refrigerator, Kerosene lantern, Bicycle	1	1				1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator, Kerosene lantern		1				1				
Secondary	Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Refrigerator						1				

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Study Area	How do you help your neighbors out from time to time?	Does anyone in your family engage in the following for home consumption or for sale?	What is your domestic water source?	What type of toilets do you have?	What type of electricity do you have?	What is your primary mode of transportation?	Do you posses any of the following at your residency?	Radio	Bicycl	Car	Motor cycle	Boat	TV	Gener ator	Refrig erator	W/M	A/C
Secondary	Other, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator						1				
Secondary	Lend tools equipment tractors etc., Help with transportation		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Computer, Refrigerator, Washing machine			1			1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Refrigerator, Kerosene lantern		1								
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Other	Television, Refrigerator						1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Radio, Motorcycle, Television, Computer, Refrigerator, Washing machine	1			1		2			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator, Washing machine		1				1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Refrigerator, Washing machine	1		1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Refrigerator, Kerosene lantern	1									
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Radio, Car, Television, Computer, Refrigerator, Washing machine, Air conditioner, Kerosene lantern	1	1	1			2			1	1
Secondary			Tied to main line	Flush toilet	Tied to main line	Bus	Television, Washing machine, Refrigerator						1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Refrigerator, Car, Bicycle		1	1			1				
Secondary			Tied to main line	Flush toilet	Tied to main line	Bus	Television, Bicycle, Refrigerator		1				1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Bicycle, Television, Refrigerator, Washing machine	1	1				1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Refrigerator, Washing machine, Computer, Kerosene lantern, Radio	1	2	1			2			1	
Secondary	Not helping neighbors		Tied to main line	Latrine	Tied to main line	Bus	Bicycle, Television, Refrigerator		1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Refrigerator, Kerosene lantern						1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Motorcycle, Television, Refrigerator, Washing machine, Computer		2	3	1		1			1	
Secondary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Refrigerator, Washing machine	1		1			1			1	
Secondary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		1	2			2			1	
Secondary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Computer, Refrigerator, Washing machine			1			1			1	
Secondary			Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator, Kerosene lantern						1				
Secondary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Computer, Refrigerator, Car			1			1				
Secondary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Computer, Refrigerator, Washing machine, Air conditioner, Kerosene lantern	1		1			1			1	1
Secondary			Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator						1				
Secondary	Help in house construction, Help with transportation		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Refrigerator, Washing machine			1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator		1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Refrigerator, Washing machine						1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator	1					1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator, Washing machine						1			1	
Secondary	Help with transportation		Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Radio, Television, Computer, Refrigerator, Washing machine, Motorcycle	1			1		1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Refrigerator										
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Refrigerator, Washing machine	1		1			1			1	
Secondary	Help with transportation, Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Computer, Refrigerator, Washing machine, Radio, Car	1		3			3			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bicycle	Radio, Bicycle, Television, Refrigerator	1	1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Computer, Refrigerator, Kerosene lantern	1					1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Bicycle, Television, Refrigerator, Washing machine		1	1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator, Washing machine						1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Refrigerator, Washing machine			1			1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Computer, Refrigerator, Washing machine						1			1	
Secondary	Lend tools equipment tractors etc., Help with transportation		Tied to main line	Flush toilet	Tied to main line		Bicycle, Television, Refrigerator		2				1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television	1					1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Car, Television, Refrigerator, Washing machine		1	1			1			1	
Secondary			Tied to main line	Flush toilet	Tied to main line	Bus	Car, Television, Refrigerator, Washing machine, Air conditioner										
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Boat	Radio, Bicycle, Television, Refrigerator, Washing machine	1	1				1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus											
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator, Washing machine, Radio	1	1				1			1	
Secondary	Help with fishing, Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus											
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Bicycle, Television, Refrigerator, Washing machine, Air conditioner	1	2	2			1			1	1
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Generator, Computer, Refrigerator, Washing machine						1	1		1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator	1					1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Refrigerator, Washing machine						1			1	
Secondary	Not helping neighbors		Tied to main line	Latrine	Tied to main line	Vehicle owned by Other	Bicycle, Refrigerator		2								
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Refrigerator	1					1				
Secondary	Lend tools equipment tractors etc., Help in house construction		Tied to main line	Latrine	Tied to main line	Taxi Shared Ride Service	Bicycle, Television, Refrigerator, Washing machine		2				1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Television, Refrigerator		1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	No Response	Bicycle, Television, Refrigerator, Washing machine		1				1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Radio, Refrigerator, Kerosene lantern	1					1				
Secondary	Not helping neighbors		Tied to main line	Latrine	Tied to main line	Bus	Bicycle, Television, Computer, Refrigerator, Washing machine		1				1			1	

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Study Area	How do you help your neighbors out from time to time?	Does anyone in your family engage in the following for home consumption or for sale?	What is your domestic water source?	What type of toilets do you have?	What type of electricity do you have?	What is your primary mode of transportation?	Do you posses any of the following at your residency?	Radio	Bicycl	Car	Motor cycle	Boat	TV	Gener ator	Refrig erator	W/M	A/C
Secondary	Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator, Washing machine	1					1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Radio, Television, Refrigerator, Washing machine	1	1				1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Computer, Refrigerator, Washing machine						1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Television, Computer, Refrigerator, Washing machine, Kerosene lantern	1					2			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator						1				
Secondary	Not helping neighbors		Other	Latrine	No electricity	Bus											
Secondary	Help with fishing, Lend tools equipment tractors etc., Other		Tied to main line	Latrine	Tied to main line	Bus	Radio, Bicycle, Motorcycle, Boat, Television, Refrigerator, Washing machine	1			1	1	1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Television						1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Boat	Bicycle, Car, Television, Refrigerator, Washing machine		1	1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Bicycle, Television, Computer, Refrigerator	1	1				1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Computer, Refrigerator	1	1				1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Refrigerator, Kerosene lantern	1	1				1				
Secondary	Lend tools equipment tractors etc., Help with harvesting		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator, Washing machine		1				1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		3	2			2			2	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Refrigerator, Washing machine	1	1				1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus											
Secondary	Help with harvesting, Lend tools equipment tractors etc., Help with plowing		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Refrigerator, Washing machine, Kerosene lantern	1					1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Computer, Refrigerator, Kerosene lantern		1				1				
Secondary			Tied to main line	Flush toilet	Tied to main line	Bicycle	Bicycle, Television, Refrigerator		1				1				
Secondary	Help with transportation		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Car, Television, Computer, Washing machine, Refrigerator, Kerosene lantern	1	1	1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	By foot	Television, Refrigerator, Washing machine, Kerosene lantern						1			1	
Secondary			Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Refrigerator, Washing machine									1	
Secondary	Not helping neighbors		Tied to main line	Latrine	Tied to main line	Bus	Bicycle, Television, Refrigerator		1				1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus											
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Computer, Refrigerator, Washing machine, Car			1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Radio, Television, Refrigerator	1	1	1			1				
Secondary	Not helping neighbors		Tied to main line	Latrine	Tied to main line	Vehicle owned by family	Bicycle, Television, Refrigerator		1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator, Washing machine		1				1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator		1				1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus											
Secondary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Refrigerator	1	1	1							
Secondary			Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Car, Television, Generator, Computer, Refrigerator, Washing machine	1	1	2			1	1		1	
Secondary			Tied to main line	Flush toilet	Tied to main line	Bus											
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Motorcycle, Refrigerator, Computer, Washing machine, Car			1	1					1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator		1				1				
Secondary																	
Secondary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Refrigerator, Washing machine	1	1	1			1			1	
Secondary	Other	Wild plants Nuts Mushrooms	Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator, Washing machine	1					1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator	1					1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Refrigerator, Washing machine						1			1	
Secondary	Other, Help with transportation, Lend tools equipment tractors etc., Help with harvesting		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Refrigerator, Washing machine, Kerosene lantern			1			1			1	
Secondary	Help with transportation, Lend tools equipment tractors etc.	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Refrigerator, Washing machine, Kerosene lantern	1		1			1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Computer, Refrigerator, Washing machine						1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator	1					1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Television, Bicycle, Car, Refrigerator, Washing machine	1	1	1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Car, Television, Refrigerator	1		1			1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bicycle	Bicycle, Washing machine, Refrigerator, Kerosene lantern		1							1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Radio, Bicycle, Television, Refrigerator, Washing machine	1	1				1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Bicycle, Television, Refrigerator, Washing machine	1	1				1			1	
Secondary		Traditional medicine harvesting and production manicole moricut harvesting logging etc.	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Television, Refrigerator, Kerosene lantern		1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Refrigerator	1					1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Refrigerator, Washing machine						1				
Secondary	Help with harvesting, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Computer, Refrigerator, Washing machine, Kerosene lantern	1	1	1			1			1	
Secondary	Other	Traditional medicine harvesting and production manicole moricut harvesting logging etc., Traditional Crafts pelts, baskets use of mangroves	Tied to main line	Flush toilet	Tied to main line	Bicycle	Radio, Bicycle, Television, Refrigerator, Computer	1	1				1				

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Study Area	How do you help your neighbors out from time to time?	Does anyone in your family engage in the following for home consumption or for sale?	What is your domestic water source?	What type of toilets do you have?	What type of electricity do you have?	What is your primary mode of transportation?	Do you posses any of the following at your residency?	Radio	Bicycl	Car	Motor cycle	Boat	TV	Gener ator	Refrig erator	W/M	A/C
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Refrigerator						1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Bicycle, Motorcycle, Computer, Refrigerator, Washing machine	1	1	1	1		1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Bicycle	Radio, Bicycle	1	1								
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Computer, Refrigerator, Washing machine	1					1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Refrigerator, Washing machine, Air conditioner			1			1			1	1
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Refrigerator, Washing machine, Kerosene lantern	1	1				1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Refrigerator, Washing machine	1					1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator, Washing machine	1					1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Motorcycle, Television, Computer, Refrigerator, Washing machine		1		1		1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Computer, Refrigerator, Washing machine	1		1			2			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Computer, Washing machine, Air conditioner	1					3			1	1
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Computer, Refrigerator, Washing machine, Air conditioner	1		1			2			1	2
Secondary	Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Television, Computer, Refrigerator, Washing machine	1					1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Bicycle, Television, Refrigerator, Computer, Washing machine		1	1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Television, Computer, Refrigerator, Washing machine	1					1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Computer, Refrigerator, Washing machine	1	3				1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Computer, Refrigerator, Washing machine	1	1	2			3			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Computer, Refrigerator, Washing machine	1					2			1	
Secondary			Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		1	1						1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Motorcycle, Car, Television, Refrigerator, Washing machine			1	1		1			1	
Secondary	Lend tools equipment tractors etc., Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Refrigerator			1							
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator						1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Radio, Refrigerator, Washing machine	1					1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Radio, Television, Washing machine, Refrigerator	1		1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Computer, Refrigerator, Washing machine			1			1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Latrine	Tied to main line	Vehicle owned by family	Radio, Television	1					1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Washing machine, Refrigerator, Television	1					1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Latrine	Tied to main line	Bus	Bicycle, Television, Refrigerator, Kerosene lantern		1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Refrigerator	1									
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Motorcycle, Television, Refrigerator, Washing machine				1		1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bicycle	Radio, Bicycle, Television, Washing machine, Refrigerator	1	1				1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bicycle	Bicycle, Refrigerator, Washing machine, Television		1				1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator		1				1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bicycle	Bicycle, Television, Computer, Refrigerator		1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Computer, Refrigerator, Washing machine	1	1	1			1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Computer, Refrigerator, Washing machine		1				1			1	
Secondary	Not helping neighbors	Traditional medicine harvesting and production manicole moricut harvesting logging etc., Wild plants Nuts Mushrooms	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		1	1			1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Computer, Refrigerator, Washing machine, Television	1		1						1	
Secondary	Lend tools equipment tractors etc., Help with transportation		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Radio, Television, Computer, Refrigerator, Washing machine, Car, Kerosene lantern	1	1	1			1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Computer, Refrigerator						3				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Computer, Refrigerator, Washing machine						1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by Other	Television, Refrigerator						1				
Secondary	Not helping neighbors	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Refrigerator, Washing machine						2			2	
Secondary	Lend tools equipment tractors etc., Help in house construction	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Bicycle, Television, Refrigerator, Kerosene lantern	1	1	2			3				
Secondary	Help with transportation, Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Computer, Car, Television, Refrigerator, Washing machine, Air conditioner			3			2			1	3
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Television, Refrigerator		1				1				
Secondary	Lend tools equipment tractors etc., Help in house construction	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Refrigerator, Washing machine	1	1				1			1	
Secondary	Lend tools equipment tractors etc., Help with transportation		Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Bicycle, Motorcycle, Television, Refrigerator, Washing machine		1		1		1			1	
Secondary	Lend tools equipment tractors etc., Help with transportation		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Refrigerator			1			1				
Secondary	Help in house construction, Lend tools equipment tractors etc., Help with transportation		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Television, Refrigerator, Kerosene lantern, Bicycle	1	1				1				
Secondary	Help with transportation	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Motorcycle, Computer, Refrigerator, Washing machine				1		1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	By foot	Television, Refrigerator, Washing machine, Kerosene lantern						1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Bicycle, Refrigerator, Computer		1				1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Computer, Washing machine, Refrigerator			1			1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Computer, Refrigerator	1	1				1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio	1									

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Study Area	How do you help your neighbors out from time to time?	Does anyone in your family engage in the following for home consumption or for sale?	What is your domestic water source?	What type of toilets do you have?	What type of electricity do you have?	What is your primary mode of transportation?	Do you posses any of the following at your residency?	Radio	Bicycl	Car	Motor cycle	Boat	TV	Gener ator	Refrig erator	W/M	A/C
Secondary	Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator		1				1				
Secondary	Help in house construction		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Motorcycle, Computer, Refrigerator, Washing machine	1	1							1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Television, Computer, Generator, Refrigerator, Washing machine, Air conditioner, Kerosene lantern	1	3				2	1		1	1
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator, Washing machine		2				2			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Television, Computer, Refrigerator, Kerosene lantern						1				
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Bicycle, Television, Refrigerator, Washing machine	1	1				1			1	
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Refrigerator, Washing machine, Kerosene lantern	1		1			1			1	
Secondary	Help with transportation, Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Refrigerator	1	1	1			1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Bicycle	Radio, Bicycle, Television, Refrigerator	1	1				1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	By foot	Radio, Television, Computer, Refrigerator, Washing machine, Air conditioner	1					1			1	1
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Computer, Refrigerator, Washing machine, Car, Air conditioner			1			2			1	3
Secondary	Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Motorcycle Moped	Motorcycle, Television, Computer, Refrigerator, Washing machine				1		1			1	
Secondary	Lend tools equipment tractors etc., Other		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Computer, Refrigerator	1					1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Computer, Radio, Car, Television, Refrigerator	1		1			1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	By foot											
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Refrigerator, Washing machine, Radio	1					1			1	
Secondary	Lend tools equipment tractors etc., Help with transportation		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Generator, Computer, Refrigerator, Washing machine, Air conditioner	1	1	2			2	1		1	2
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Bicycle, Refrigerator, Washing machine		1				1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Computer, Refrigerator, Washing machine, Air conditioner, Bicycle		2	3			1			1	3
Secondary	Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Refrigerator, Washing machine, Car			2			2			1	
Secondary	Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Motorcycle, Television, Computer, Refrigerator, Washing machine	1		1	1		1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Refrigerator, Washing machine	1					1			1	
Secondary	Lend tools equipment tractors etc., Help with transportation		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Car, Bicycle, Refrigerator, Computer, Washing machine		1	1			1			1	
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Bicycle, Television, Computer, Refrigerator, Washing machine, Kerosene lantern	1	1				1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Washing machine, Refrigerator, Television						1			1	
Secondary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Radio, Bicycle, Car, Computer, Refrigerator, Air conditioner, Washing machine	1	1	1			1			1	3
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Refrigerator			1			1				
Secondary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Television, Computer, Refrigerator, Washing machine	1	1	1			2			1	
Secondary	Not helping neighbors		Tied to main line	Latrine	No electricity	Bus	Television, Radio, Kerosene lantern	1					1				
Secondary	Other		Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Bicycle, Television, Computer, Refrigerator, Washing machine		1				2			1	
Tertiary	Help with transportation		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Washing machine		1	3			3			1	
Tertiary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Refrigerator										
Tertiary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Car, Television, Computer, Refrigerator	1		1			1				
Tertiary	Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Refrigerator, Television			1			1				
Tertiary	Lend tools equipment tractors etc.		Tied to main line	Latrine	Tied to main line	Bus	Television, Refrigerator						1				
Tertiary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Television, Computer, Refrigerator, Washing machine	1	1				1			1	
Tertiary	Lend tools equipment tractors etc.		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Television, Refrigerator	1					1				
Tertiary	Not helping neighbors		Other	Latrine	No electricity	Bicycle	Bicycle, Radio	1	1								
Tertiary	Other		Tied to main line	Flush toilet	Tied to main line	Bus	Television, Computer, Refrigerator, Washing machine						1			1	
Tertiary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Kerosene lantern	1									
Tertiary	Other		Tied to main line	Latrine	Tied to main line	Bus	Television, Refrigerator						1				
Tertiary	Lend tools equipment tractors etc.	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Taxi Shared Ride Service	Radio, Television, Refrigerator	1					1				
Tertiary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Television, Refrigerator, Bicycle, Car, Kerosene lantern		1	1			1				
Tertiary	Lend tools equipment tractors etc.	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Television, Computer, Refrigerator, Washing machine	1					1			1	
Tertiary	Lend tools equipment tractors etc., Help in house construction		Tied to main line	Flush toilet	Tied to main line	Bus	Radio, Bicycle, Television, Refrigerator, Washing machine	1	1				1			1	
Tertiary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Bus	Bicycle, Television, Computer, Refrigerator, Washing machine		1				1			1	
Tertiary	Lend tools equipment tractors etc.	Traditional Crafts pelts, baskets use of mangroves	Tied to main line	Flush toilet	Tied to main line	Bus	Television, Refrigerator, Washing machine						1			1	
Tertiary	Other		Other	Latrine	No electricity	Bus	Radio	1									
Tertiary	Lend tools equipment tractors etc.		Other	Flush toilet	Tied to main line	Vehicle owned by family	Car, Bicycle, Television, Generator, Refrigerator		1	1			1	1			
Tertiary	Lend tools equipment tractors etc.		Other	Flush toilet	Tied to main line	Bus	Bicycle, Television		1				1				
Tertiary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Computer, Refrigerator, Washing machine			1			1			1	
Tertiary	Not helping neighbors		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Bicycle, Car, Television, Computer, Refrigerator, Kerosene lantern		1	2			1				
Tertiary	Help with transportation, Other		Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Car, Television, Computer, Refrigerator, Washing machine, Air conditioner, Kerosene lantern			2			3			1	3
Tertiary	Help with transportation, Help with harvesting, Lend tools equipment tractors etc., Help in house construction	Fruit vegetable preserving Honey	Tied to main line	Flush toilet	Tied to main line	Vehicle owned by family	Radio, Bicycle, Car, Boat, Television, Generator, Computer, Refrigerator, Washing machine, Kerosene lantern	1	3	3		2	3	2		2	
Tertiary	Other		River canals	Flush toilet	Tied to main line	Bus	Bicycle, Television, Refrigerator		1				1				

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Table 6: Socioeconomic Survey Data – Household Surveys, Part 6 of 6

Study Area	What is your primary mode of communication?	How do you receive your information about community events or news?	Number of people currently living in this household	Number of household members below the age of 18 (children)	Number of household members over the age of 65	Do you know of any cultural heritage or cultural services in the area (natural spaces of religious importance, or places that hold value for recreation or tourism?	Do you know of any guest houses or rented accommodations in the area?	How do you use the canals, if at all?
Primary	Cell phone	Face to face meeting	4	3		No	No	
Primary	Cell phone	TV, Face to face meeting	4		2	No	No	
Primary	Cell phone	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube, SMS, Cell phone call, Email	5	2	0	No	No	Farming, Bring out crops via boats
Primary	WIFI Internet	Digital media such as Facebook LinkedIn or YouTube	6	4	0	Yes	No	Transport
Primary	Cell phone	Face to face meeting	7	2	1	Yes	No	Transport
Primary	Cell phone	Radio, Face to face meeting	2	0	0	Yes	No	Use for ponds, Water Use and Swimming
Primary	Cell phone	Face to face meeting, Cell phone call	3	0	0	Yes	No	Transport
Primary	Cell phone	Cell phone call, Face to face meeting	2	0	0	Yes	No	Swimming
Primary	Cell phone	Face to face meeting	1	0	0	Yes	No	Fishing and Transport
Primary	Cell phone	Face to face meeting	4	2	0	Yes	No	Nil
Primary	Cell phone	Cell phone call, Digital media such as Facebook LinkedIn or YouTube	3			No	No	Transportation
Primary	Cell phone	Face to face meeting, Cell phone call	3		1	No	No	Water for bathing
Primary		Radio, TV	4	4		Yes	No	Fishing transportation to farm
Primary	Cell phone	Face to face meeting	5	3		No	No	Water in drought periods
Primary			5	3	0			
Primary						No Answer		
Primary	Cell phone	Face to face meeting	13	4	0	Yes	No	Traverse in back dam to farm
Primary	Cell phone	No answer	4	2		Yes	No	Fishing , animal farming
Primary	Cell phone	Face to face meeting	3	0	0	Yes	No	Go to farm
Primary	Cell phone	Face to face meeting	6	4		No	No	For water purposes
Primary	Cell phone	Face to face meeting	7	2	0	No	No	Farming
Primary	Cell phone	Face to face meeting	7	2	1	Yes	No	To go into the back dam for farming
Primary	Cell phone	Face to face meeting	4	2		Yes	No	
Primary	Cell phone	Face to face meeting	3	1	0	No	No	Often
Primary	Cell phone	Face to face meeting	5	1	0	No	No	Farming
Primary	Cell phone	Face to face meeting	4	1	1	Yes	No	Washing
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	2	1		No	No	Farming
Primary	Cell phone	Other, Face to face meeting	1	0	0	Yes	Yes	Fishing
Primary	Cell phone	Do Not know	2	1	0	Unsure	Unsure	Fishing
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting, TV	7	2	1	Yes	No	Fish
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV, Face to face meeting, Cell phone call	4	2	0	No	No	Transportation for farming and recreation
Primary	Cell phone	Cell phone call, Face to face meeting	5	3	0	Yes	No	Transportation of produce
Primary	Cell phone	Face to face meeting	4	2	0	Yes	No	Fishing, recreation
Primary	Cell phone	None	5		1	Yes	No	
Primary	Cell phone	Cell phone call, Face to face meeting	3	1		Yes	No	No
Primary	Cell phone	Face to face meeting	10	3	2	Yes	No	
Primary	Cell phone	Face to face meeting	11	3	1	Yes	No	
Primary	Cell phone	Face to face meeting, Cell phone call	6	1	1	Yes	No	
Primary	Cell phone	Face to face meeting	4			Yes	No	
Primary	Cell phone	Face to face meeting, TV	6	2		Yes	No	
Primary	Cell phone	Face to face meeting, Cell phone call			1	Yes	No	
Primary	Cell phone	Face to face meeting	3			Yes	No	Fishing
Primary	In Person	Face to face meeting	8	5		No	No	
Primary	Cell phone	Face to face meeting	3	1		No	No	
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	5	1		No	No	
Primary	Cell phone	Face to face meeting	5	3		No	Yes	
Primary	Cell phone	Face to face meeting, Other	10	4		No	No	
Primary	Cell phone	Face to face meeting	5	3			Yes	
Primary	Cell phone	Face to face meeting	2		2	No	No	
Primary	Cell phone	TV	4	1		Yes	No	
Primary	Cell phone	TV	4	2		No	No	
Primary	Cell phone	Face to face meeting	4		2	No	No	
Primary	Cell phone	Face to face meeting	16	9	1	Yes	No	
Primary	Cell phone	Face to face meeting	2			No	No	
Primary	Cell phone	Face to face meeting	2		1	No	No	
Primary	Cell phone	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	6	2	1	No	No	

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Primary	Cell phone	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	3		1	No	No	Fish
Primary	Cell phone	Face to face meeting	5	3	1	No	Yes	Fish
Primary	Cell phone	Face to face meeting	7	4	1	No	No	Swim
Primary	Cell phone	Face to face meeting, Cell phone call	11	3		No	No	
Primary	Cell phone	Face to face meeting	10		1	No	No	
Primary	Cell phone	TV, Radio	5	2		No	No	
Primary	Cell phone	Face to face meeting	4	1	1	No	No	
Primary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	8	4	1	Unsure	No	
Primary	Cell phone	Face to face meeting, Other	5	2		No	No	
Primary	Cell phone	Printed materials, TV, Digital media such as Facebook LinkedIn or YouTube	2	0	1	Yes	Yes	Drainage
Primary	Cell phone	Radio	3	0	0	Yes	No	Fishing
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	9	1	0	Yes	Yes	Fishing
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	1	0	0	Yes	No	No use
Primary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	5	2	1	Yes	No	Do Not use
Primary	Cell phone	TV	3	0	1	Yes	No	Do Not use
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	3	0	0	Yes	No	Do Not use
Primary	Cell phone	TV	4	2	0	Yes	Yes	Do Not use
Primary	Cell phone	TV, Printed materials	2	0	0	Yes	Yes	Do Not use
Primary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	3	0	0	Yes	Yes	Fishing
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	11	3	0	Unsure	No	Fishing
Primary	Cell phone	Radio	2	0	1	Yes	No	Do Not use
Primary	Cell phone	Printed materials, Digital media such as Facebook LinkedIn or YouTube, TV	4	0	0	No	Yes	Does Not use
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	6	1	1	Yes	No	Domestic home use and farming use for feeding cows
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV	4	2	0	Yes	No	To take children to school by boat
Primary	Cell phone	TV	2	0	0	Yes	No	Transportation to get to backdam and domestic household use
Primary	Cell phone	TV	2	0	0	Yes	No	Domestic and household usage , farming use
Primary	Cell phone	TV, Radio, Digital media such as Facebook LinkedIn or YouTube	6	1	0	Yes	No	For farming purposes
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV	5	1	0	Yes	No	None
Primary	Cell phone	Do Not know	3	1		No	No	Transportation to farm
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	1	0	1	Yes	No	River for travel, I h
Primary	Cell phone	Face to face meeting	7	3	1	No	No	
Primary	Cell phone	Face to face meeting	2			No	No	
Primary	Cell phone	Face to face meeting, Cell phone call	7	5		No	No	Transport
Primary	Cell phone	Face to face meeting, Cell phone call	7	4		No	No	Fish transportation
Primary	Cell phone	Cell phone call, Face to face meeting	3	1		No	No	Fish transportation
Primary	Cell phone	Cell phone call	2			No	No	Fish
Primary	Cell phone	Face to face meeting	1		1	Yes	No	For transportation
Primary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	3			No	No	Transportation of produce
Primary	Cell phone	Face to face meeting		3		No	No	Fishing
Primary	Cell phone	Face to face meeting	1			Yes	No	To get water to due house chores
Primary	Cell phone	Face to face meeting, Cell phone call	3	1		Yes	No	Fishing
Primary	Cell phone	Face to face meeting	4	1	1	No	No	Fishing
Primary	Cell phone	Face to face meeting, Cell phone call	8	4		Yes	No	Fishing
Primary	Cell phone	Face to face meeting	6	2		Yes	No	Fishing
Primary	Cell phone	Face to face meeting, Cell phone call	2			Yes	No	Transportation
Primary	Cell phone	Face to face meeting, Cell phone call	6	1	2	Yes	No	Fishing
Primary	Cell phone	Face to face meeting	4	1		Yes	No	Fishing
Primary	Cell phone	Radio, TV, Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	4	2	0			
Primary	Landline	Radio, Digital media such as Facebook LinkedIn or YouTube	5	2	0			
Primary	Landline	TV, Digital media such as Facebook LinkedIn or YouTube	5	2	0			
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV	4	2			No	Fishing
Primary	WIFI Internet	Cell phone call, Digital media such as Facebook LinkedIn or YouTube	4	1				
Primary	Cell phone	Face to face meeting	5					
Primary	Cell phone	TV, Cell phone call	2					
Primary	Cell phone	TV	5	2				
Primary	Cell phone	No answer	4	2				

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Study Area	What is your primary mode of communication?	How do you receive your information about community events or news?	Number of people currently living in this household	Number of household members below the age of 18 (children)	Number of household members over the age of 65	Do you know of any cultural heritage or cultural services in the area (natural spaces of religious importance, or places that hold value for recreation or tourism?	Do you know of any guest houses or rented accommodations in the area?	How do you use the canals, if at all?
Primary	Cell phone	Face to face meeting, Cell phone call	1					
Primary	Cell phone	Face to face meeting	4	2				
Primary	Cell phone	Radio, Cell phone call	4					
Primary	Cell phone	Cell phone call, Digital media such as Facebook LinkedIn or YouTube	2		1			
Primary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	3	1				
Primary	Landline	TV	1		1			
Primary	Cell phone	TV	2	0	0			Does Not use
Primary	Cell phone	TV	7	6	0			Fishing
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	5	1	0			Domestic use when there is water shortage
Primary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	7	3	0			Domestic use
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting, Cell phone call	5	3	0			
Primary	Cell phone	TV	5	2	0			Does Not use
Primary	Landline	Digital media such as Facebook LinkedIn or YouTube, TV, Radio, Printed materials	1	0	1			
Primary	Cell phone	Other	1					
Primary	Cell phone	Face to face meeting, Radio	1		1			
Primary	Cell phone	Face to face meeting, Radio, TV	3	1				
Primary	Cell phone	None	5	1				
Primary	Cell phone	Face to face meeting	3	2				
Primary	Cell phone	Face to face meeting	5	2				
Primary	Cell phone	Face to face meeting, Other	4	1				
Primary	Cell phone	Face to face meeting, Cell phone call	1					
Primary	Cell phone	Radio, Printed materials, TV, Digital media such as Facebook LinkedIn or YouTube	1	0	0			Does Not use
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	3	1	0			Fishing
Primary	Cell phone	Printed materials, TV, Digital media such as Facebook LinkedIn or YouTube	4	2	0			Does Not use
Primary	Cell phone	Printed materials, Radio, TV, Digital media such as Facebook LinkedIn or YouTube	4	2	0			Does Not use
Primary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	6	3	0			Does Not use
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	4	2	0			Does Not use
Primary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV, Cell phone call	1	0	0			Does Not use
Primary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	4	2	0			Does Not use
Secondary	Cell phone	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	4	1		No	No	None
Secondary	Cell phone	Face to face meeting	3	0	0	Yes	No	No
Secondary	Landline	Face to face meeting	4	2	0	No	No	No
Secondary	Cell phone	Face to face meeting	1	0	1	No	No	No
Secondary	Landline	Face to face meeting, TV	2	0	2	Yes	No	No
Secondary	WIFI Internet	Face to face meeting	2	0	0	No	No	No
Secondary	Cell phone	Face to face meeting	5	3	1	Yes	No	No
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	3	1	0	Yes	No	No
Secondary	Cell phone	Cell phone call, Face to face meeting	7	2		Yes	No	
Secondary	WIFI Internet	Digital media such as Facebook LinkedIn or YouTube	4	2	0	No	No	No
Secondary	WIFI Internet	Face to face meeting, Printed materials	3	0	2	Yes	No	Fishing
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	5	3	0	No	No	No
Secondary	Cell phone	Face to face meeting	8	1	0	No	No	No
Secondary	Cell phone	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	3	1	0	Yes	No	No
Secondary	Landline	Face to face meeting, Cell phone call	2	1	1	Yes	No	
Secondary	In Person	Face to face meeting	1			Yes	No	
Secondary	In Person	Face to face meeting	1	0	0	Yes	No	No
Secondary	Cell phone	Face to face meeting	10	5		No	No	No
Secondary	Cell phone	Cell phone call	7	1		Yes	No	Transport
Secondary	Cell phone	Face to face meeting	2	0	1	Yes	No	No
Secondary	Cell phone	Face to face meeting	7	3	0	No	No	No
Secondary	Cell phone	Face to face meeting	6	1	0	No	No	No
Secondary	Cell phone	Face to face meeting	6	2		No	No	No
Secondary	Cell phone	Face to face meeting	12	4	0	No	No	Fishing
Secondary	Cell phone	Face to face meeting, Radio, TV, Printed materials	3		1	No	No	Transport of boat
Secondary	Cell phone	Cell phone call	3	1		Yes	No	Transportation in and out to go to sea
Secondary	Landline	Digital media such as Facebook LinkedIn or YouTube	4	2		No	No	
Secondary	Cell phone	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	5		1	Yes	No	
Secondary	Cell phone	Face to face meeting	1			Yes	No	Recreation

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Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	6	1		Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	5	1	0	Yes	No	Fishing
Secondary	Cell phone	Face to face meeting, Cell phone call	5	1	0	Yes	No	
Secondary	Cell phone	Radio, TV	3	0	0	Yes	Yes	
Secondary	Cell phone	Other, Face to face meeting	4	1	0	Yes	No	
Secondary	Cell phone	Face to face meeting, TV	6	3	1	Yes	No	
Secondary	Cell phone	Radio, Printed materials, Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	9	5		Yes	Yes	Washing
Secondary	Cell phone	TV, Printed materials, Digital media such as Facebook LinkedIn or YouTube	5	1	1	Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	10	7		Yes	No	No canals are blocked. Up
Secondary	Cell phone	Face to face meeting, Other	2			Yes	Unsure	Selling of plants brown in canal - calalou
Secondary	Cell phone	Other	5	2		Yes	No	
Secondary	Cell phone	TV, Face to face meeting	3	2		Yes	No	Nil
Secondary	In Person	Digital media such as Facebook LinkedIn or YouTube	4	2		Yes	No	Recreation
Secondary	Landline	Printed materials	5	3		Yes	No	Fish
Secondary	Landline	Printed materials, Radio, TV, Face to face meeting	2		1	Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Printed materials	2			Yes	No	Farming
Secondary	Landline	Printed materials, Radio, Digital media such as Facebook LinkedIn or YouTube, TV	3			Yes	No	
Secondary	Cell phone	Face to face meeting	8	3		Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	5	1		Yes	No	
Secondary	Cell phone	Face to face meeting	6	3	1	Yes	Yes	
Secondary	Cell phone	Face to face meeting	6			Yes	No	
Secondary	Cell phone	Face to face meeting, Printed materials	6	3		Yes	No	
Secondary	In Person	Face to face meeting	5	1	1	Yes	No	Transport grass and animal feed
Secondary	In Person	Face to face meeting, Cell phone call	4	1	0	Yes	No	
Secondary	Landline	Face to face meeting	1		1	Yes	No	
Secondary	WIFI Internet	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	6	2	1	Yes	No	
Secondary	Landline	Face to face meeting	1		1	No	No	
Secondary	Cell phone	Face to face meeting, Printed materials	14	4	1	Yes	No	
Secondary	In Person	Face to face meeting	1		1	No	No	No
Secondary	Cell phone	Face to face meeting	4	2		Yes	No	
Secondary	Cell phone	Face to face meeting	3	1	1	No	No	No
Secondary	Cell phone	Face to face meeting, Printed materials	5	2		No	No	
Secondary	Landline	Cell phone call	2			Yes	No	
Secondary	Landline	Face to face meeting	1		1	No	No	
Secondary	Cell phone	Face to face meeting, TV	1			No	Yes	Fishing
Secondary	Landline	Cell phone call, TV	10	3	1	Yes	No	
Secondary	Cell phone	Face to face meeting	6	1		Yes	No	
Secondary	Landline	Face to face meeting	5	2	1	No	No	
Secondary	Cell phone	Cell phone call	4	1	1	Yes	No	
Secondary	Cell phone	Face to face meeting	3			No	No	
Secondary	Cell phone	Printed materials, Face to face meeting	8	2	1			
Secondary	Landline	Printed materials, TV, Digital media such as Facebook LinkedIn or YouTube, Cell phone call	7	2	1	Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	8	3		No	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	4	2		Yes	No	
Secondary	Landline	Radio, Digital media such as Facebook LinkedIn or YouTube, TV, Printed materials	5		1	No	No	
Secondary	Cell phone	TV	3			Yes	No	
Secondary	Landline	TV, Printed materials	3			Yes	No	
Secondary	Landline	TV	2		1	Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	5	2		Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting, Cell phone call	9	4		Yes	No	
Secondary	Other	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting, Other	1		1	Yes	No	
Secondary	Landline	Digital media such as Facebook LinkedIn or YouTube, Printed materials, TV	6	2	1	Yes	No	
Secondary	Landline	Printed materials, Digital media such as Facebook LinkedIn or YouTube, TV	9	1		Yes	No	
Secondary	Landline	Printed materials, Face to face meeting, Cell phone call	2			Yes	No	
Secondary	Cell phone	Radio, Printed materials	7	2		Yes	Unsure	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Radio, TV	4		1	Yes	No	
Secondary	Landline	Printed materials, TV	3		1	Yes	No	
Secondary	Landline	TV	2			Yes	Yes	

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Secondary	Cell phone	Face to face meeting, Printed materials, TV	6		1	Yes	Yes	Fishing
Secondary	Cell phone	TV, Radio	2			Yes	No	
Secondary	Cell phone	Radio, TV, Digital media such as Facebook LinkedIn or YouTube	3		1	Yes	Yes	
Secondary	Cell phone	TV	5	1		Unsure	No	
Secondary	Cell phone	TV, Face to face meeting, Cell phone call	1		1	No Answer	Yes	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	10			Yes	No	Fish
Secondary	Landline	TV	2			Yes	No	
Secondary	Landline	TV	6	2		No	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	4	1		Yes	Yes	
Secondary	Landline	Face to face meeting, TV	1		1	Yes	Yes	
Secondary	Landline	TV, Printed materials	6	2		Yes	Yes	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Radio	3	1		Yes	Yes	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	6	2		Yes	Yes	
Secondary	Landline	TV, Digital media such as Facebook LinkedIn or YouTube	2			Yes	No	
Secondary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	2		1	Yes	No	
Secondary	Landline	TV, Radio	2		1	Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	2			No	No	Fishing
Secondary	Landline	Printed materials, TV	1		1	Yes	No	
Secondary	Landline	Printed materials, Radio, TV, Digital media such as Facebook LinkedIn or YouTube	3			Yes		
Secondary	Landline	Digital media such as Facebook LinkedIn or YouTube	3			Yes	No	
Secondary	Cell phone	TV, Radio, Digital media such as Facebook LinkedIn or YouTube	2			No	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	6	1	1	Yes	No	
Secondary	Landline	TV	2		2	Yes	No	
Secondary	Cell phone	Radio, TV	1		1	Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV	6	2		Yes	No	
Secondary	Cell phone	TV	8	3		Yes	No	Fishing
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	6	3		Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Printed materials	3			Yes	No	
Secondary	Landline	Face to face meeting	6	1		No	No	No
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	2	0	0	Yes	No	No
Secondary	Cell phone	Face to face meeting, Cell phone call, TV	8	1		No	No	No
Secondary	Landline	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	5	2		Yes	No	
Secondary	Cell phone	Cell phone call	3			No	No	Recreation
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	11	4		No	No	For drainage
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	8	6		No	No	
Secondary	Landline	Face to face meeting	2		1	Yes	No	
Secondary	Landline	Digital media such as Facebook LinkedIn or YouTube, Printed materials	6	2	1	Yes	No	
Secondary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	7	2	1	No	No	
Secondary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	4	2		Yes	Yes	
Secondary	Other	TV	1		1	No	No	
Secondary	Other	Face to face meeting	9	3	2	Yes	No	
Secondary	In Person	Face to face meeting	1		1	No	No	
Secondary	Cell phone	Face to face meeting	3	1		Yes	No	
Secondary	Cell phone	Face to face meeting	4	2		Yes	No	
Secondary	In Person	Face to face meeting	8	2	2	Yes	No	
Secondary	Landline	Face to face meeting	2				No	
Secondary	Cell phone	Face to face meeting	2			No	No	No
Secondary	Cell phone	Face to face meeting	3			Yes	No	
Secondary	Landline	Digital media such as Facebook LinkedIn or YouTube	2	0	2	Yes	No	Fishing
Secondary	Cell phone	Face to face meeting	3	2		Yes	No	
Secondary	Cell phone	Other	6	1	2	Yes	No	
Secondary	Cell phone	No answer	6	3		Yes	No	
Secondary	In Person	Face to face meeting	8	6		No	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting, TV	3			No	No	Fishing
Secondary	Cell phone	Face to face meeting	2		66	No	No	No
Secondary	Cell phone	Face to face meeting	5		2	Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	4	3		Yes	No	
Secondary	Cell phone	Face to face meeting, Cell phone call	8	4			No	Fishing, swimming

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Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Radio, TV, Face to face meeting	3	1	1	No	No	
Secondary	Landline	Face to face meeting	13	2	1	Yes	No	
Secondary	Cell phone	Face to face meeting	7	3		No	No	No
Secondary	Cell phone	Face to face meeting	5	1	1	Yes	No	Fishing
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV, Cell phone call	7	1		No	No	Swim
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	6	2		No	No	
Secondary	Cell phone	TV, Printed materials, Digital media such as Facebook LinkedIn or YouTube	11	4	2	No	No	
Secondary	Landline	TV	2		2	No	No	
Secondary	Landline	Digital media such as Facebook LinkedIn or YouTube, Printed materials, Radio	4	1		No	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	11	4	1	No	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	5	1		No	No	
Secondary	Cell phone	TV	6	2	1	No	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Printed materials	9	1		No		
Secondary	Cell phone	Face to face meeting	2		2	No	Yes	
Secondary	Cell phone	TV	6	3			No	
Secondary	Cell phone	Face to face meeting	5	3		No	Yes	
Secondary	Landline	TV, Face to face meeting	1			Unsure	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV, None	5	2	1	No	No	
Secondary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	2		72	No	No	
Secondary	Cell phone	TV, Radio, Printed materials	2		2	No	No	
Secondary	Cell phone	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	17	5	1	No	No	
Secondary	WIFI Internet	Digital media such as Facebook LinkedIn or YouTube	2			Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube		3		No	Yes	
Secondary	Cell phone	Face to face meeting	7	1	1	No	No	
Secondary	Cell phone	Face to face meeting, TV, Digital media such as Facebook LinkedIn or YouTube	3		1	No	No	
Secondary	Cell phone	Email, Cell phone call, Face to face meeting	2		2	No	No	
Secondary	Cell phone	TV, Radio	7	1		Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Radio	7	1		No	No	
Secondary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	2		1	Yes	No	
Secondary	Cell phone	Face to face meeting, Printed materials	2			Yes	No	
Secondary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	2		2	Yes	No	
Secondary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	3		2	Yes	No	
Secondary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	7	4	1	No	No	
Secondary	Cell phone	Radio, TV, Digital media such as Facebook LinkedIn or YouTube	5	2		Yes	No	
Secondary	Cell phone	No answer	7	2	2	No	No	
Secondary	Cell phone	Face to face meeting, Cell phone call	6	2	2	No	No	
Secondary	In Person	Face to face meeting	1		1	Unsure	No	
Secondary	Cell phone	Face to face meeting	8	2		Yes	No	Fishing
Secondary	Cell phone	No answer	5	2		Yes	No	
Secondary	Cell phone	No answer	2		1	No	No	
Secondary	Cell phone	Do Not know	5	2		Yes	No	
Secondary	Cell phone	Face to face meeting	3			Yes		
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	2			Yes	No	Fishing
Secondary	Landline	TV, Face to face meeting	1		1	Yes	Unsure	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV, Face to face meeting	4			Yes	Yes	
Secondary	Cell phone	TV, Radio, Printed materials	2			Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Radio, TV	8	4	1	Yes	No	Bathe in the river
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV	5			Yes	No	
Secondary	Landline	Face to face meeting	6	2	1	Yes	No	
Secondary	No Response	Face to face meeting	3	1	1	No	No	
Secondary	Cell phone	Face to face meeting	3			Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV	3	1			No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV	4	1		No	No	
Secondary	Cell phone	Face to face meeting	1			Yes	No	
Secondary	Cell phone	Cell phone call, Digital media such as Facebook LinkedIn or YouTube	2			No	No	
Secondary	WIFI Internet	TV	3	1		Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	5	3		No	No	
Secondary	Cell phone	Do Not know	2			No	No	

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Study Area	What is your primary mode of communication?	How do you receive your information about community events or news?	Number of people currently living in this household	Number of household members below the age of 18 (children)	Number of household members over the age of 65	Do you know of any cultural heritage or cultural services in the area (natural spaces of religious importance, or places that hold value for recreation or tourism?	Do you know of any guest houses or rented accommodations in the area?	How do you use the canals, if at all?
Secondary	Cell phone	Face to face meeting	2			No	No	
Secondary	Other	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	5	2		Yes		
Secondary	Cell phone	Do Not know	2			Yes	No	
Secondary	Cell phone	Face to face meeting	7	2	1	No	No	
Secondary	Cell phone	Face to face meeting	4			No	No	
Secondary	Cell phone	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	2	1		Yes	No	
Secondary	Cell phone	Do Not know	2			Yes	No	
Secondary	Cell phone		2		1	No	No	
Secondary	Cell phone	Face to face meeting	3	1	1	No	Unsure	
Secondary	Cell phone	Face to face meeting, Cell phone call	2		2	Yes	No	
Secondary	Cell phone	Face to face meeting, Cell phone call	1		1	No	No	
Secondary	Cell phone	TV, Printed materials, Face to face meeting	4	2		No	No	
Secondary	Landline	Face to face meeting	4	2		Yes	No	Fishing
Secondary	Cell phone	Face to face meeting	6	4		Yes	No	
Secondary	Cell phone	Face to face meeting, Cell phone call	5	2		Yes	No	
Secondary	Cell phone	Cell phone call, Face to face meeting	1		1	No	No	
Secondary	Cell phone	Face to face meeting	5			Yes	No	
Secondary	Cell phone	Face to face meeting, Cell phone call	4	2		No	No	Fishing
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	1			Yes	No	Don't use
Secondary	Cell phone	TV	5	2	0	Yes	Yes	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	2	1		Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV, Printed materials	5	2		Yes	No	Park the boat ins goed fortune
Secondary	Cell phone	Radio, Digital media such as Facebook LinkedIn or YouTube	6	3		Yes	Yes	Fishing
Secondary	Landline	TV	5		1	Yes	Yes	
Secondary	Cell phone	TV	4	2		Yes	Yes	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV	5	0	0	Yes	No	
Secondary	Cell phone	TV	1	0	0	Yes	No	Do Not use
Secondary	Cell phone	TV	4	0	0	Yes	Yes	No reason
Secondary	Cell phone	TV, Face to face meeting	3	0	2	Yes	Yes	
Secondary	In Person	Cell phone call, Digital media such as Facebook LinkedIn or YouTube	7	3	0	Yes	Unsure	No use
Secondary	Cell phone	TV	3	0	0	Yes	No	Irrigation and drainage
Secondary	Landline	Digital media such as Facebook LinkedIn or YouTube, Printed materials	4	1	0	No	No	Fishing and drainage
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	4	0	0	Yes	Yes	Fishing
Secondary	Landline	TV	2	0	0	Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	6	2	0	Yes	No	Fishing
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	4		1	Yes	Yes	Drainage
Secondary	Cell phone	TV	6	2	0	Yes	No	
Secondary	Landline	TV, Digital media such as Facebook LinkedIn or YouTube	6	3	0	Yes	No	Drainage
Secondary	Landline	TV	3		1	Yes	No	
Secondary	Landline	Face to face meeting	3	1		Yes	No	Fishing
Secondary	Cell phone	Do Not know	1			No	No	
Secondary	Cell phone	Face to face meeting	5	1		Yes	No	
Secondary	Cell phone	Face to face meeting	4	1		Yes	Yes	
Secondary	Landline	Face to face meeting	6	3	2	Yes	No	
Secondary	Cell phone	Face to face meeting	6	1		No	No	
Secondary	Cell phone	Face to face meeting	3	1		No	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	4	1	1	Yes	No	
Secondary	Cell phone	Face to face meeting	2		2	No	No	
Secondary	Landline	TV, Printed materials	4	0	0	Yes	No	
Secondary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	2	0	0	Yes	Yes	Do Not use
Secondary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube, Radio	2	0	1	Yes	Yes	
Secondary	Landline	Digital media such as Facebook LinkedIn or YouTube	5	1	2	Yes	Yes	
Secondary	Landline	Digital media such as Facebook LinkedIn or YouTube	4	1	0	Yes	Yes	
Secondary	Landline	Radio	2		1	Yes	No	
Secondary	Cell phone	TV	3	0	0	Yes	No	
Secondary	Cell phone	Printed materials	1	0	0	Yes	Unsure	
Secondary	Landline	TV, Radio	2	0	2	Yes	No	
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV	6	2	0	Yes	Yes	Drainage and irrigation for rice fields

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Study Area	What is your primary mode of communication?	How do you receive your information about community events or news?	Number of people currently living in this household	Number of household members below the age of 18 (children)	Number of household members over the age of 65	Do you know of any cultural heritage or cultural services in the area (natural spaces of religious importance, or places that hold value for recreation or tourism?	Do you know of any guest houses or rented accommodations in the area?	How do you use the canals, if at all?
Secondary	Landline	TV, Printed materials	3	0	1	Yes	No	
Secondary	Landline	Face to face meeting	4	1	0	Yes	Unsure	No use
Secondary	Cell phone	Face to face meeting	6	1	1	Yes	No	Irregration and drainage
Secondary	Cell phone	Face to face meeting	4	1	1	Yes	No	No use
Secondary	Cell phone	Face to face meeting	4	2	0	Unsure	Unsure	None
Secondary	Landline	Printed materials, TV, Face to face meeting, Cell phone call	2	0	2	Yes	Yes	None
Secondary	Cell phone	Do Not know	7	5	1	Yes	No	None
Secondary	Cell phone	Face to face meeting	6		0	Yes	No	No use
Secondary	Cell phone	Do Not know	6	0	0	Yes	No	No use
Secondary	Landline	Face to face meeting	3	0	2	Yes	Unsure	No use
Secondary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	4	2	0	Yes	No	None
Secondary	In Person	Face to face meeting	7	1	0	Yes	No	None
Secondary	Landline	None	7	1	1	Yes	Yes	
Tertiary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	7	3		Yes	No	
Tertiary	Cell phone	Printed materials	4	2		Yes	No	
Tertiary	Cell phone	TV	4	1		Yes	No	
Tertiary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, TV	3	1	1	Yes	No Answer	
Tertiary	Cell phone	Face to face meeting	8	3		No	No	
Tertiary	Cell phone	Do Not know	4	2		Yes	No	
Tertiary	Cell phone	Face to face meeting	2			No	No	
Tertiary	Cell phone	Face to face meeting, Cell phone call	1			No	No	Fishing
Tertiary	Cell phone	Face to face meeting	6	2		Yes	No	Fishing
Tertiary	In Person	Other, Face to face meeting	3			No	No	
Tertiary	Cell phone	Face to face meeting, Printed materials	4		1	No	No	
Tertiary	Landline	Digital media such as Facebook LinkedIn or YouTube	3	0	0	Yes	Yes	No
Tertiary	Landline	Printed materials, Digital media such as Facebook LinkedIn or YouTube	5	2	2	Yes	Yes	
Tertiary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	6	0	0	Yes	No	Do Not use
Tertiary	Cell phone	Face to face meeting	8	1		No	Yes	Fishing
Tertiary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	3	1		No	Yes	
Tertiary	WIFI Internet	Face to face meeting	5	3		No	Yes	
Tertiary	Cell phone	Face to face meeting	4			Yes	Yes	
Tertiary	Cell phone	Face to face meeting, Cell phone call	4		1	Yes	No	Fishing
Tertiary	Cell phone	Face to face meeting	2				No	
Tertiary	Cell phone	Cell phone call	8	6		No	Yes	
Tertiary	Cell phone	Printed materials, TV, Digital media such as Facebook LinkedIn or YouTube	6	2	2	No	No	Irrigation, personal use
Tertiary	Cell phone	Digital media such as Facebook LinkedIn or YouTube, Printed materials	7	1	0	Yes	No	For farming - irrigation and drainage , personal use - bathing , washing , crops and livestock
Tertiary	Cell phone	Digital media such as Facebook LinkedIn or YouTube	8	3	2	Yes	No	Poultry purposes mainly
Tertiary	Cell phone	TV, Digital media such as Facebook LinkedIn or YouTube	5	3		No	Yes	To wash clothes

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Table 7: Socioeconomic Survey Data – Commercial Surveys, Part 1 of 2

Date	What is the business Study Area?	What type of business?	What is your firm size?	What percentage of your staff is female?	Please indicate the operational / geographic service area of your business	How do your clients or customers hear / connect with you and your services?	Specify Other	For those with a physical storefront, how do clients arrive at your location?
11/16/2021	Food	Shopping Mart	1 5 employees	99	Vrees Land residents	Reputation		By foot
11/15/2021	Food	Shopping Mart	1 5 employees	50	Patentia	Only service provider in area		By foot
11/15/2021	Food	Shopping Mart	1 5 employees	99	Patentia out of town visitors	Reputation		By foot
11/15/2021	Food	Super Market	1 5 employees	50	Patentia area	Reputation		By foot
11/16/2021	Food	Shopping Mart	1 5 employees	99	In the area	Referral		By foot
11/16/2021	Food	Shopping Mart	1 5 employees	99	In the area	Referral		By foot
11/16/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	50	In the area and a few outside customers	Reputation		By foot
11/16/2021	Miscellaneous	Cosmetology Beauty Salon	1 5 employees	99	In the area and outside customers	Referral, Only service provider in area, Online		By foot
11/16/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	In the area	Referral, Reputation		Car
11/16/2021	Transport	Automobile Spare Part Shop	1 5 employees	90	People within the area and outside the area	Only service provider in area, Online, Reputation		By foot
11/16/2021	Food	Market Food Stall Dry and Packaged Goods	5 20 employees	60	Number 1 canal, Wales, Patentia , Vriesland , Belle Vue, Number 2 Canal, Belle West	Reputation		By foot
11/16/2021	Miscellaneous	General Store	1 5 employees	50	Retail customers in the area, canal 1 and 2 , Nismes , West Bank and West coast area	Reputation, Referral, Other	Advertise wholesale promotions	Car
11/17/2021	Clothing Footwear	Tailoring Shops	1 5 employees		Patentia, sisters, Stanleytown	Referral, Reputation		Car
11/17/2021	Food	Super Market	1 5 employees	50	Patentia area	Reputation, Referral		By foot
11/17/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	Persons in the area	Referral		By foot
11/17/2021	Transport	Automobile Service Station	1 5 employees		In and out of area	Reputation, Referral		Car
11/17/2021	Recreational		1 5 employees		In and out of the area	Only service provider in area, Reputation		By foot
11/17/2021	Miscellaneous	General Store	1 5 employees		In the area	Referral		By foot
11/19/2021	Food	Market Food Stall Butchery meats	1 5 employees		Sisters Village	Reputation, Referral		Car
11/19/2021	Transport	Automobile Service Station	1 5 employees		Sisters village and surrounding areas	Referral, Reputation, Only service provider in area		Car
11/19/2021	Food	Super Market	1 5 employees	50	Sisters village	Reputation		Car
11/19/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	Sisters village and surrounding areas	Reputation		Car
11/19/2021	Food	Shopping Mart	1 5 employees	99	Sisters	Reputation		By foot
11/19/2021	Transport	Automobile Spare Part Shop	1 5 employees		Region 3	Reputation, Referral, Specialized expertise		
11/19/2021	Food	Shopping Mart	1 5 employees	99	Sisters village	Referral		By foot
11/18/2021	Transport	Automobile Spare Part Shop	1 5 employees		In and out of area	Referral, Reputation		Car
11/18/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	90	In and out of the area	Referral, Reputation		Car
11/18/2021	Food	Market Food Stall Dry and Packaged Goods	21 100 employees	99	In the area	Only service provider in area, Referral		By foot
11/19/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	In the area mostly	Only service provider in area, Reputation		By foot
11/19/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	Mostly people in the area	Reputation, Referral		By foot
11/19/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	In the area	Referral, Reputation		Bicycle
11/19/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	Mostly in the area	Referral, Reputation		By foot
11/16/2021	Recreational	Recreational Cultural Facility	1 5 employees		Patentia area	Reputation		By foot
11/16/2021	Food	Market Food Stall Butchery meats	1 5 employees	99	Patentia scheme	Referral, Reputation		By foot
11/16/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	50	Patentia scheme	Reputation, Referral		By foot
11/16/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	Patentia scheme	Referral, Reputation		By foot
11/16/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	Patentia scheme	Referral, Only service provider in area		By foot
11/18/2021	Food	Shopping Mart	1 5 employees	50	Patentia	Referral, Reputation		By foot
11/19/2021	Furniture Appliance	Furniture Store	1 5 employees	50	Region 3	Referral, Reputation		
11/22/2021	Food	Shopping Mart	1 5 employees	99	Stanleytown	Referral, Reputation		By foot
11/22/2021	Furniture Appliance	Furniture Store	1 5 employees		Stanleytown and West Bank	Referral		Car
11/23/2021	Transport	Automobile Service Station	1 5 employees		People within the area and housing scheme	Reputation, Referral, Only service provider in area		Car
11/23/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	In the area and the main road	Reputation, Referral, Other	People know the family well	Car
11/23/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	50	In the area , public rd, all cross the different communities	Referral, Reputation		Car
11/23/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	50	In the area and public road	Reputation		By foot
11/23/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees		In the area / street	Other	Community support	By foot
11/23/2021	Food	Shopping Mart	1 5 employees	99	Stanleytown	Referral		By foot
11/23/2021	Clothing Footwear	Clothing Store	1 5 employees	50	Stanleytown drive and stop customers	Reputation, Referral		By foot
11/23/2021	Recreational	Bar	1 5 employees	50	Stanleytown Region 3	Referral, Reputation		Car
11/23/2021	Food	Shopping Mart	1 5 employees	99	Stanleytown out of towners	Referral, Reputation		By foot
11/23/2021	Miscellaneous	Gift Store	1 5 employees	99	Region 3	Referral, Reputation, Only service provider in area, Specialized expertise		Car
11/24/2021	Recreational	Bar	1 5 employees	99	Areas throughout the West Bank	Referral		Car
11/24/2021	Transport	Gas Station	1 5 employees	99	Along the West Bank Area	Reputation		Car
11/24/2021	Food	Super Market	1 5 employees		The La Grange Area	Referral, Reputation		By foot
11/24/2021	Food		1 5 employees	50	Land of Canaan	Referral		Car
11/24/2021	Food	Market Food Stall Fruits Vegetables	1 5 employees	99	Land of Canaan area	Referral		By foot
11/24/2021	Food	Shopping Mart	1 5 employees	99	Land of Canaan Area	Referral, Reputation		By foot

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Date	What is the business Study Area?	What type of business?	What is your firm size?	What percentage of your staff is female?	Please indicate the operational / geographic service area of your business	How do your clients or customers hear / connect with you and your services?	Specify Other	For those with a physical storefront, how do clients arrive at your location?
11/24/2021	Food	Shopping Mart	1 5 employees	99	Land of Canaan	Reputation		By foot
11/24/2021	Miscellaneous	General Store	1 5 employees	1	Land of Canaan area	Reputation, Referral		By foot
11/24/2021	Food	Shopping Mart	1 5 employees	50	Land of Canaan	Reputation, Referral		By foot
11/24/2021	Miscellaneous	General Store	1 5 employees	60	Land of Canaan area	Referral		By foot
11/24/2021	Miscellaneous	General Store	1 5 employees	99	Dairy, la grange and surrounding areas	Referral, Reputation		Car
11/24/2021	Medical Health	Pharmacy	1 5 employees	60	The entire West Bank area.	Other, Referral	Advertising	Car
11/24/2021	Transport	Automobile Service Station	1 5 employees	1	West coast and West Bank	Referral, Reputation		Car
11/24/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	50	Villagers within the area	Referral, Reputation		By foot
11/24/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	In the area and from the public road	Reputation, Referral, Online		By foot
11/24/2021	Recreational	Sports Store	1 5 employees		In the area and from the public rd	Reputation, Referral, Only service provider in area		By foot
11/24/2021	Clothing Footwear	Clothing Store	1 5 employees	99	In the area	Referral, Reputation		By foot
11/24/2021	Miscellaneous	Money Transfer Service	1 5 employees	99	In the area and different communities	Referral, Reputation, Only service provider in area		Car
11/25/2021	Recreational	Restaurant	1 5 employees	99	La grange and surrounding	Referral		By foot
11/25/2021	Recreational	Recreational Cultural Facility	1 5 employees	99	La grange and surrounding areas	Referral, Reputation		By foot
11/25/2021	Transport	Automobile Service Station	1 5 employees		La grange and surrounding areas	Referral, Reputation		Car
11/25/2021	Miscellaneous	General Store	1 5 employees	50	La grange and surrounding areas	Reputation, Referral		By foot
11/25/2021	Food	Shopping Mart	1 5 employees	50		Referral, Reputation		By foot
11/25/2021	Transport	Automobile Spare Part Shop	1 5 employees		In the area and different communities	Reputation		Car
11/25/2021	Transport	Automobile Spare Part Shop	1 5 employees	30	Mainly from canal number 1 and 2	Reputation, Referral		Car
11/25/2021	Transport	Automobile Spare Part Shop	1 5 employees		Mostly from the community and West Bank area	Reputation, Referral		Car
11/25/2021	Transport	Automobile Service Station	1 5 employees		In the area and outside of the area	Reputation, Referral		Car
11/25/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	50	In the Dam mainly	Reputation, Referral		By foot
11/26/2021	Recreational	Bar	1 5 employees	40	West coast and West Bank areas.	Referral, Other	Advertising	Car
11/26/2021	Transport	Automobile Spare Part Shop	1 5 employees		All surrounding areas.	Reputation, Only service provider in area		Car
11/26/2021	Recreational	Computer IT Store	1 5 employees			Referral		By foot
11/26/2021	Furniture Appliance	Furniture Store	5 20 employees	25	West coast Demerara	Referral, Other, Reputation	Advertising	Car
11/26/2021	Transport	Automobile Spare Part Shop	1 5 employees	99		Referral, Other	Advertising on Facebook	Car
11/26/2021	Recreational	Restaurant	1 5 employees	99	West coast.	Referral, Reputation		Car
11/26/2021	Recreational	Bar	1 5 employees		New road and surrounding area.	Referral, Reputation		
11/26/2021	Transport	Automobile Service Station	1 5 employees		West coast.	Referral, Reputation		Car
11/26/2021	Miscellaneous	General Store	1 5 employees	33	West Demerara.	Referral, Reputation		Car
11/26/2021	Furniture Appliance	Ware Store	1 5 employees		West Demerara	Online, Referral, Reputation		Car
11/26/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	Surrounding area	Referral, Reputation		By foot
11/26/2021	Food	Market Food Stall Butchery meats	1 5 employees	99		Referral		Car
11/25/2021	Transport	Automobile Spare Part Shop	1 5 employees		Entire West Bank	Referral, Reputation		Car
11/25/2021	Recreational	Restaurant	1 5 employees	99	From Patentia to La Grange	Referral, Reputation		Car
11/25/2021	Food	Shopping Mart	1 5 employees	50	La Grange area	Referral		By foot
11/25/2021	Transport	Automobile Spare Part Shop	1 5 employees		Along the West Bank	Referral		Car
11/25/2021	Food	Super Market	1 5 employees	66	La Grange area	Reputation, Referral		By foot
11/26/2021	Transport	Automobile Spare Part Shop	1 5 employees		Entire West Bank	Reputation, Referral		Car
11/26/2021	Housing	Real Estate Agency Agent	1 5 employees	50	Region 3, 4 and 6	Online, Reputation, Referral		Car
11/26/2021	Food	Super Market	1 5 employees	50	Parika to Wales	Referral		Car
11/26/2021	Recreational	Fast Food Pizza Outlet	1 5 employees	99	Vreed en Hoop area	Referral, Online		By foot
11/26/2021	Food	Super Market	1 5 employees	99	Around Vreed-en-Hoop New Road	Reputation		By foot
11/26/2021	Transport	Automobile Service Station	1 5 employees		Along the West Bank and Georgetown	Referral		Car
11/26/2021	Recreational	Restaurant	1 5 employees	99	Throughout Guyana	Reputation, Online		Car
11/26/2021	Transport	Automobile Spare Part Shop	1 5 employees		Berbice, Essequibo, Georgetown, West Bank	Referral, Online, Reputation		Car
11/26/2021	Food		1 5 employees	50	Mostly in the community and a few from Other communities	Reputation, Only service provider in area		Car
11/26/2021	Furniture Appliance	Furniture Store	1 5 employees	50	Mostly outside of Vreed en hoop and a few in the community	Online, Referral		Car
11/26/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	50	Mostly imediate community supports	Reputation		By foot
11/26/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	50	Mostly down the coast and from crane scheme	Reputation, Referral		Car
11/26/2021	Clothing Footwear	Clothing Store	1 5 employees	99	Mostly out of the area	Referral, Online		Car
11/26/2021	Transport	Automobile Service Station	1 5 employees	5	Mostly out of the area	Referral, Reputation		Car
11/30/2021	Furniture Appliance	Ware Store	5 20 employees	40	West Bank	Referral, Reputation		Car
11/26/2021			1 5 employees		All over the area	Reputation, Referral		Car
11/26/2021	Food	Market Food Stall Fruits Vegetables	1 5 employees	99	In the area mostly	Reputation, Referral		By foot
11/30/2021	Food	Market Food Stall Butchery meats	1 5 employees		West Bank	Referral		Car
11/26/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	50	In and out of the area	Reputation, Referral		By foot

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Date	What is the business Study Area?	What type of business?	What is your firm size?	What percentage of your staff is female?	Please indicate the operational / geographic service area of your business	How do your clients or customers hear / connect with you and your services?	Specify Other	For those with a physical storefront, how do clients arrive at your location?
11/30/2021	Miscellaneous	General Store	5 20 employees	25	Canal and surrounding areas	Reputation, Referral		By foot
11/30/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	Mainly in the area and off the road	Referral, Other	People passing and seeing the shop	By foot
11/30/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	50	Mostly from the area	Reputation		By foot
11/30/2021	Recreational	Bar	1 5 employees		Mostly in the area and a few out of the area	Referral, Reputation		Car
12/2/2021	Miscellaneous		1 5 employees		Mostly from the area and a few out the area	Reputation, Referral, Online		By foot
12/2/2021	Recreational		1 5 employees	50	Mostly in the vreed hoop area and a few out of the area	Online, Reputation, Referral		By foot
12/2/2021	Food	Market Food Stall Fruits Vegetables	1 5 employees	50	Mixture of in and out of the area	Reputation		Car
12/1/2021	Transport	Automobile Spare Part Shop	1 5 employees		West Coast and West Bank.	Referral, Reputation		Car
12/1/2021	Furniture Appliance	Ware Store	1 5 employees	99	West coast and West Bank	Reputation, Referral		Car
12/1/2021			1 5 employees	50	West coast and West Bank	Referral, Reputation		Car
12/1/2021	Recreational	Bar	1 5 employees	50	West coast and new road.	Referral, Reputation		By foot
12/1/2021	Transport	Automobile Service Station	1 5 employees		West coast	Referral, Reputation		Car
12/1/2021	Miscellaneous	General Store	1 5 employees	99	New road	Reputation, Referral		By foot
12/1/2021	Miscellaneous	General Store	1 5 employees	50	New road.	Referral, Reputation		By foot
12/1/2021	Recreational	Sports Club	1 5 employees		West coast	Referral, Reputation		Car
12/1/2021			1 5 employees	99	West coast Demerara	Other	Advertisement on T.V and posters	By foot
12/1/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees	99	West coast	Referral		By foot
12/1/2021	Furniture Appliance	Furniture Store	1 5 employees	80	Georgetown, west coast and West Bank.	Reputation, Referral		Car
12/1/2021			5 20 employees	14	Berbice, Essequibo, Demerara.	Referral		Car
12/1/2021	Communication	Telephone Company	1 5 employees	99	Vreed-En-Hoop, WBD and WCD	Only service provider in area, Referral, Reputation		Car
12/1/2021	Food	Super Market	5 20 employees	60		Reputation		By foot
12/1/2021	Education	Stationary Store	1 5 employees	50	Vreed-en-hoop	Reputation		By foot
12/1/2021	Clothing Footwear	Clothing Store	1 5 employees	75	Unknown	Other	Passing on the road and see.	By foot
12/1/2021	Recreational	Restaurant	1 5 employees	99	In and out the area	Online, Referral		Car
12/1/2021	Food		1 5 employees	50	Around the area	Referral		By foot
12/1/2021	Recreational	Bar	1 5 employees		Customers from Georgetown, Essequibo, Berbice, and throughout West Bank area	Reputation, Referral		Car
12/1/2021	Education	Education Institution	1 5 employees	99	Parika to Veed en Hoop area	Reputation, Referral, Other	Promotional Flyers	Car
12/1/2021	Food	Market Food Stall Dry and Packaged Goods	1 5 employees		In the area mostly	Referral, Reputation		By foot
12/1/2021	Miscellaneous	Barber Shop	1 5 employees		Mostly in area	Referral		By foot
12/1/2021	Clothing Footwear	Clothing Store	1 5 employees	99	Mostly in the area and a few out of town	Referral, Online		By foot
12/1/2021	Miscellaneous		1 5 employees		Mostly in the area and a few out of the area	Reputation, Referral, Other	TV ads	By foot
12/1/2021	Medical Health	Pharmacy	1 5 employees	95	Mostly out of the area and a few in the area	Online, Reputation, Referral		Car
12/2/2021	Recreational	Electronic Store	1 5 employees	50	Vreed-en-hoop and west Demerara	Referral		By foot
12/2/2021	Miscellaneous	Cosmetology Beauty Salon	1 5 employees	99	Vreed-en-hoop and west Demerara.	Reputation, Referral		By foot
12/2/2021	Miscellaneous	Gift Store	1 5 employees	99	West Demerara	Referral		By foot

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Table 8: Socioeconomic Survey Data – Commercial Surveys, Part 2 of 2

Date	What is your primary operational challenge?	How do you receive your information about community events or news?	How would you rate your level of understanding about the proposed Project?	Are you expecting any benefits from the Project in terms of your business?	What type of benefits?	Do you know of any guest houses or rented accommodations in the area?	Where are the accommodations?
11/16/2021	None	Face to face meeting	Limited understanding	Yes	Workers buying from stores	No	
11/15/2021	Economic recession	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Multiplier effects to community members increased spending power	No	
11/15/2021	None	Face to face meeting	Limited understanding	Unsure		No	
11/15/2021	None	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting, TV	Limited understanding	Yes	Development And Employment	No	
11/16/2021	None	Face to face meeting	Limited understanding	Unsure		No	
11/16/2021	Don't have enough finances to sell Other products in the shop	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Customers to increase	No	
11/16/2021	Unlicensed shops in the area	Printed materials, TV	Limited understanding	Yes	Increase in sales	No	
11/16/2021	None	Digital media such as Facebook LinkedIn or YouTube, Printed materials	Limited understanding	Yes	Increase in customers	No	
11/16/2021	None	Face to face call	Limited understanding	Yes	Increase in sales with new customers	No	
11/16/2021	None	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	Great understanding	No		No	
11/16/2021	None	Digital media such as Facebook LinkedIn or YouTube, TV, Radio	Limited understanding	Yes	Increase in Sales	Yes	In the area
11/16/2021	Access to business , competition	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting, Printed materials, Radio, Cell phone call	Limited understanding	Unsure		No	
11/17/2021	Competition with places selling readymade clothing.	Face to face meeting, Cell phone call	Limited understanding	Yes	More persons in the area, which can lead to more business for the shop.	No	
11/17/2021	Price of goods going up.	Face to face meeting, Cell phone call	Limited understanding	Yes	Increased sales	No	
11/17/2021	None	Face to face meeting	Limited understanding	Unsure		No	
11/17/2021	Disruption due to COVID-19 , decrease in customers	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in activity and in customers	No	
11/17/2021	Not sure	Digital media such as Facebook LinkedIn or YouTube, Printed materials, Radio	Limited understanding	Yes	Increase in sales	No	
11/17/2021	No business due to closure of estate	TV, Digital media such as Facebook LinkedIn or YouTube, Cell phone call	Limited understanding	Yes	Increase in sales and jobs	No	
11/19/2021	Neighbours	Face to face meeting	Limited understanding	Yes	Increase in sales	No	
11/19/2021	Maintenance and servicing of equipment	Face to face meeting	Great understanding	Yes	Short term contracts to do emergency repairs.	No	
11/19/2021	Competition with Other supermarkets and stands on the road.	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	Limited understanding	Yes	Greater sales due to more persons in the area.	No	
11/19/2021	No challenges	Face to face meeting, Printed materials	No information	Yes	More customers	No	
11/19/2021	No challenge	Face to face meeting	No information	Yes	More spending due to job creation	No	
11/19/2021	None	Cell phone call, Face to face meeting	No information	Yes	People in the community have more spending power	No	
11/19/2021	Raising price of groceries	TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Jobs for persons so they will have more money to spend.	No	
11/18/2021	Financial Challenges	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in customers	No	
11/18/2021	Not enough sales and customers	Digital media such as Facebook LinkedIn or YouTube, Printed materials	Limited understanding	Yes	Increase in sales	No	
11/18/2021	At the back of the area , Not enough customers.	Digital media such as Facebook LinkedIn or YouTube, TV,Face to face meeting	Great understanding	Yes	Increase in sales , better businesses	No	
11/19/2021	Business is slow and expenses	Printed materials, TV,Radio	Limited understanding	Yes	Increase in sales	No	
11/19/2021	Not enough customers	Printed materials, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in sales	No	
11/19/2021	Financially unstable, No business	Digital media such as Facebook LinkedIn or YouTube	Great understanding	Yes	Increase in customers and employment	Yes	In the area
11/19/2021	Decrease in sales	Printed materials, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in business	No	
11/16/2021	Getting business name more recognized	Printed materials, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Greater income	No	
11/16/2021	Unsure	Printed materials, Cell phone call	No information	Yes	Unsure	No	
11/16/2021	Grocery price increase/ COVID	Face to face meeting	Limited understanding	Yes	Increased sales	No	
11/16/2021	Competition	Cell phone call	Limited understanding	Yes	Increased sale	Unsure	
11/16/2021	Cost of goods.	Printed materials, Face to face meeting, Cell phone call	Limited understanding	Yes	Increased sales	No	
11/18/2021	None	Face to face meeting	Limited understanding	Yes	Workers spending in shop.	Unsure	
11/19/2021		Digital media such as Facebook LinkedIn or YouTube	No information	Yes	Contractor	Yes	House at the back street
11/22/2021	None	Face to face meeting	No information	Yes	People buying from shop	No	
11/22/2021	Cost of raw materials. Availability of material	Face to face meeting, Radio	Limited understanding	Unsure		No	
11/23/2021	None	Printed materials, TV	Great understanding	Yes	Increase in business	Yes	Rented house in the area
11/23/2021	None	Digital media such as Facebook LinkedIn or YouTube, TV	Limited understanding	Yes	Increase in sales	No	
11/23/2021	Decrease in sales and competition with Other businesses	Printed materials, Radio, TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in sales	No	
11/23/2021	None	TV, Digital media such as Facebook LinkedIn or YouTube	No information	Yes	Increase in sales and business	No	
11/23/2021	None	TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in sales and livelihood	No	
11/23/2021	Recession in the village	Face to face meeting	No information	Yes	Through reduced cost in electricity and expanding into agro processing. Improved road in the community.	Yes	In the yard of the business. In the process of setting up apartments.
11/23/2021	None	Face to face meeting	No information	Unsure		No	
11/23/2021	None	Face to face meeting	No information	Unsure		No	
11/23/2021	None	Face to face meeting, Cell phone call		Yes	People passing through stopping	No	
11/23/2021	None	Face to face meeting	No information	Yes	Workers purchasing items.	No	
11/24/2021	More bars established around the area	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in customers at the bar	Yes	In the area
11/24/2021	Crime	Radio, TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Decrease in fuel prices	Yes	In the area

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Date	What is your primary operational challenge?	How do you receive your information about community events or news?	How would you rate your level of understanding about the proposed Project?	Are you expecting any benefits from the Project in terms of your business?	What type of benefits?	Do you know of any guest houses or rented accommodations in the area?	Where are the accommodations?
11/24/2021	Curfew results in decrease in sales	Digital media such as Facebook LinkedIn or YouTube	Great understanding	Yes	Employed presons supporting business	Yes	Next door
11/24/2021	Sales being slow	Digital media such as Facebook LinkedIn or YouTube	No information	Unsure		Yes	On the old road.
11/24/2021	Business slow, lack of customers	Face to face meeting	No information	Yes	Potential for more sales.	Yes	The old road
11/24/2021	Competition from Other businesses in the area.	Face to face meeting	No information	Unsure		Yes	On the old road.
11/24/2021	Competition with Other businesses.	No answer	No information	Unsure		Yes	
11/24/2021	Competition with supermarkets and trucks that drive and sell	None	Limited understanding	No		Yes	
11/24/2021	Lack of finance to buy goods	None	Limited understanding			Yes	By the church on the old road.
11/24/2021	No challenge	Face to face meeting, Cell phone call	No information	Yes	Increased sales and expansion to sell Other products.	Yes	Secret villa hotel
11/24/2021	Thieves breaking into the business, competition with Chinese supermarket.	Face to face meeting	Limited understanding	Yes	Increased sales	Yes	In canal
11/24/2021	Space to expand the business.	Face to face meeting, Printed materials	Limited understanding	Yes	Hopefully contracts to supply and distribute products.	Unsure	
11/24/2021	No challenges	Face to face meeting	Limited understanding	Yes	More work opportunities for the businesses	No	
11/24/2021	Competition from Other businesses	Digital media such as Facebook LinkedIn or YouTube, TV, Radio, Face to face meeting	No information	Yes	Increase in sales	Yes	In the area has guest houses - e.g secret ville
11/24/2021	None	Digital media such as Facebook LinkedIn or YouTube	No information	No		Yes	Guest house behind the church in the area - secret villa
11/24/2021	None	Digital media such as Facebook LinkedIn or YouTube	No information	Yes	Increase in sales and employment	Yes	In the area - secret ville guest house
11/24/2021	Competition and slow sales	Digital media such as Facebook LinkedIn or YouTube, TV	No information	Yes	Increase in business and sales	Yes	In the area secret villa
11/24/2021	None	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in business sales and new customers, traffic flow	No	
11/25/2021	Competition with Other food vendors, the cost and accessibility of raw materials.	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increased sales due to increased traffic in the area.	No	
11/25/2021	Sometimes business is very slow.	Do Not know	Limited understanding	Yes	Increased activity.	Yes	One at bagotville, Tropical Paradise.
11/25/2021	Getting employees and competition with surrounding wash bays	Face to face meeting	Limited understanding	Yes	More customers	No	
11/25/2021	Lack of customers.	Radio	Limited understanding	Unsure		No	
11/25/2021	Competition and cost of goods.	Face to face meeting	Limited understanding	No		No	
11/25/2021	None	TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in business	Yes	Behind business residence
11/25/2021	None	Digital media such as Facebook LinkedIn or YouTube, TV, Printed materials	No information	Yes	Increase employment and increase in sales	Yes	House behind shop is renting
11/25/2021	None	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in work and customers	Yes	Apartment building 5-6 buildings down
11/25/2021	Competition	TV	No information	Yes	Increase in customers	Yes	Houses in the area rents
11/25/2021	None	TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in business and sales	No	
11/26/2021	No challenge	Face to face meeting	Limited understanding	Unsure		No	
11/26/2021	No challenge	Face to face meeting	Limited understanding	Yes	Opportunity to do business	Yes	Aracari on the public road.
11/26/2021	No challenge		No information	Yes	Opportunity to do business with developers	No	
11/26/2021	Finding skilled employees, regular supply of electricity		Limited understanding	Yes	Opportunity to supply furniture.	No	
11/26/2021	Lack of customers.	Cell phone call, Face to face meeting	No information	Yes	Increased exposure and customers.	No	
11/26/2021		Face to face meeting, TV	Limited understanding	Yes	More customers.	Unsure	
11/26/2021	No challenges		No information	Yes	More customers.	No	
11/26/2021	Flooding		No information	Unsure		No	
11/26/2021	Labour and security.	Face to face meeting	Limited understanding	No		No	
11/26/2021	No challenges	Digital media such as Facebook LinkedIn or YouTube	No information	Yes	Persons will have more spending power, leading to more purchases.	Yes	Aracari at versalies
11/26/2021	Competition with Other shops and Massey supermarket	Face to face meeting	No information	No		No	
11/26/2021	Lack of constant power supply due to power outages.	TV, Radio	No information	Yes	Extension of customer base.	No	
11/25/2021	Competition from similar businesses; fluctuation in prices	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Reduced electricity costs	Yes	In the area
11/25/2021	The pandemic: increase in prices and cost of living	Radio, TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Employers coming to support business	Yes	Walking distance from the business
11/25/2021	Competition from supermarkets recently established	TV, Printed materials	Limited understanding	No		Yes	In the area
11/25/2021	Weather conditions limiting work	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	No		Yes	In the area
11/25/2021	Competition from Other businesses	Printed materials, Cell phone call	Limited understanding	Yes	Cheaper prices	Yes	Within the area/ 3 storey apartment
11/26/2021	No electricity to operate tools, poor drainage	Digital media such as Facebook LinkedIn or YouTube, Face to face meeting	Limited understanding	No		No	
11/26/2021	None	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	No		Yes	Next door
11/26/2021	Competition	Face to face meeting	Limited understanding	Yes	Reduced costs of products	No	
11/26/2021	Competition	None	Unknown	Unsure		No	
11/26/2021	Competition from Other businesses and small population	Face to face meeting	No information	No		No	
11/26/2021	None as yet	Face to face meeting	Limited understanding	Unsure		Unsure	
11/26/2021	Curfew	Face to face meeting	No information	Yes	Increase support of business	Yes	Close by
11/26/2021	Electricity cost is expensive	Face to face meeting	Limited understanding	Yes	More customers	No	
11/26/2021	None	Radio, Digital media such as Facebook LinkedIn or YouTube, TV, Printed materials	Limited understanding	Yes	Increase in business in the area	No	
11/26/2021	None	Printed materials, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in business and sales	No	
11/26/2021	None	Digital media such as Facebook LinkedIn or YouTube, TV	Limited understanding	Yes	Increase in sales and business	No	

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Date	What is your primary operational challenge?	How do you receive your information about community events or news?	How would you rate your level of understanding about the proposed Project?	Are you expecting any benefits from the Project in terms of your business?	What type of benefits?	Do you know of any guest houses or rented accommodations in the area?	Where are the accommodations?
11/26/2021	Competition with Other businesses in the area	Radio, TV	Limited understanding	Yes	Increase in sales	Yes	Rented houses in the area
11/26/2021	None	Digital media such as Facebook LinkedIn or YouTube	No information	Yes	Increase in business	Yes	In the area
11/26/2021	None	TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in customers for welding work	Yes	In the area
11/30/2021	Business slow due to lack of investment.	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Unsure		No	
11/26/2021	None	Digital media such as Facebook LinkedIn or YouTube	No information	Unsure		Yes	In the area
11/26/2021	None	TV	No information	Yes	Increase in business	Yes	In the area
11/30/2021	Drainage.	Face to face meeting	Limited understanding	Yes	Increased sales	No	
11/26/2021	Competition with Other businesses	Printed materials, TV	Limited understanding	Yes	Increase in businesses and customers	Yes	In the area
11/30/2021	No challenges.	Face to face meeting	Limited understanding	Yes	Increased sales.	No	
11/30/2021	None	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in sales and customers	No	
11/30/2021	Decline in business and customers	Digital media such as Facebook LinkedIn or YouTube, TV	Limited understanding	Yes	Increase in business and sales	Yes	Residence and Others in the area rents houses
11/30/2021	Decrease in business	TV	No information	Yes	Increase in sales	No	
12/2/2021	None	Digital media such as Facebook LinkedIn or YouTube, TV	Limited understanding	Unsure		No	
12/2/2021	None	Digital media such as Facebook LinkedIn or YouTube, TV	No information	Yes	Reduce in electricity bills from the project	No	
12/2/2021	Vehicular Traffic in the area	TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Decrease in electrical bills and increase in sales	No	
12/1/2021	Customers reaching the location in a timely manner due to traffic.	TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	No		No	
12/1/2021	No challenge	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	No		No	
12/1/2021	Lack of customers	Digital media such as Facebook LinkedIn or YouTube	No information	Unsure		No	
12/1/2021	No challenge.	Radio, TV	No information	Unsure		No	
12/1/2021	Unsure	Face to face meeting	Limited understanding	No		No	
12/1/2021	Competition with Other businesses.	Face to face meeting	No information	No		No	
12/1/2021	Flooding and competition with Other businesses.	Face to face meeting	Limited understanding	Yes	Doing more business in general.	No	
12/1/2021	No	Face to face meeting	No information	Yes	More customers.	No	
12/1/2021	No challenge	Face to face meeting	No information	Unsure		No	
12/1/2021	Competition with Other business of the same type		No information	Yes	Increased business prospects.	No	
12/1/2021	Transportation of furniture	None	Limited understanding	Yes	More sales.	No	
12/1/2021	Transportation of fertilizers and chemicals.	None	No information	Unsure		No	
12/1/2021	Distant from highly populated centers	Printed materials, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Unsure		No	
12/1/2021	Cost of utilities.	Face to face meeting	No information	Unsure		No	
12/1/2021	Traffic on the roads and blackout	Face to face meeting	Limited understanding	Unsure		No	
12/1/2021	Lack of sales	Face to face meeting	Limited understanding	Yes	More sales.	No	
12/1/2021	Business has Not picked up	Digital media such as Facebook LinkedIn or YouTube	No information	Unsure		No	
12/1/2021	None	Digital media such as Facebook LinkedIn or YouTube, Printed materials	No information	Yes	Increase in sales and employment for community members	Yes	In the area
12/1/2021	COVID-19 decrease in profit	Printed materials	Limited understanding	Yes	Boost business support	No	
12/1/2021	None	Digital media such as Facebook LinkedIn or YouTube	No information	Yes	Increase in business	Unsure	
12/1/2021	None	Printed materials, TV, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in sales and reduction in electricity	Yes	Rented houses in the area
12/1/2021	None	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in sales and support	Yes	Rented houses in the area
12/1/2021	None	TV, Digital media such as Facebook LinkedIn or YouTube	Great understanding	Yes	Increase in sales and economic benefit	Yes	Rented houses in the area
12/1/2021	None	Face to face meeting, Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in sales and business	Yes	Rented houses in the area
12/1/2021	Extensive competition in the area , Downfall of economy and sourcing of products	Digital media such as Facebook LinkedIn or YouTube	Limited understanding	Yes	Increase in business and sales	No	
12/2/2021	No challenges	Face to face meeting	No information	Yes	Increased sales.	No	
12/2/2021	Minor disputes with vagrants.	Face to face meeting	No information	Yes	More traffic in the area will lead to more customers	No	
12/2/2021	Constant loss of power	Face to face meeting	No information	Unsure		No	

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APPENDIX Q

Gas to Energy Traffic Study Guyana: Vistro Report

Resubmitted without changes

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AM Peak

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Gas to Energy Traffic Study Guyana

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Report File: C:\...\2022.04.07 Gas to Energy Traffic Study Guyana - Vistro Report AM peak.pdf

Scenario 4: Balance AM 6:30
07/04/2022

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	West Demerara Highway - North	Two-way stop	HCM 2010	WB Right	0.132	27.9	D
2	Vreed en Hoop	All-way stop	HCM 2010	EB Right		121.3	F
3	Cogland Dam	Two-way stop	HCM 2010	EB Right	0.159	43.8	E
4	Demerara Harbour Bridge	All-way stop	HCM 2010	SWB Thru		143.1	F
5	La Grange	Two-way stop	HCM 2010	EB Right	0.282	389.8	F
6	Nismes	Two-way stop	HCM 2010	WB Right	0.058	18.8	C
7	Stanleytown	Two-way stop	HCM 2010	EB Right	0.040	17.7	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: West Demerara Highway - North

Control Type:	Two-way stop	Delay (sec / veh):	27.9
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.132

Intersection Setup

Name	West Demerara Highway			Shell Station Road			Crane Temple Road			West Demerara Highway		
Approach	Northbound			Southbound			Westbound			Southeastbound		
Lane Configuration												
Turning Movement	Thru	Right	Right2	Left	Thru	Right	Left	Right	Right2	Left2	Left	Thru
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			No			No			Yes		

Volumes

Name	West Demerara Highway			Shell Station Road			Crane Temple Road			West Demerara Highway		
Base Volume Input [veh/h]	158	0	1	0	3	1	1	20	1	0	15	755
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	158	0	1	0	3	1	1	20	1	0	15	755
Peak Hour Factor	0.8290	0.8290	0.8290	0.8290	0.8290	0.8290	0.8290	0.8290	0.8290	0.8290	0.8290	0.8290
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	48	0	0	0	1	0	0	6	0	0	5	228
Total Analysis Volume [veh/h]	191	0	1	0	4	1	1	24	1	0	18	911
Pedestrian Volume [ped/h]	5			0			0			4		

Intersection Settings

Priority Scheme	Free	Stop	Stop	Free
Flared Lane		No	No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance		No	No	
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.13	0.01	0.00	0.00	0.01
d_M, Delay for Movement [s/veh]	0.00	9.90	9.90	16.42	22.95	25.05	19.30	27.89	27.69	0.00	0.00	0.00
Movement LOS	A	A	A	C	C	D	C	D	D	A	A	A
95th-Percentile Queue Length [veh]	1.04	1.04	1.04	0.08	0.08	0.08	0.48	0.48	0.48	0.00	0.00	0.00
95th-Percentile Queue Length [m]	7.94	7.94	7.94	0.58	0.58	0.58	3.64	3.64	3.64	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.05			23.37			27.55			0.00		
Approach LOS	A			C			D			A		
d_I, Intersection Delay [s/veh]	0.73											
Intersection LOS	D											

Intersection Level Of Service Report
Intersection 2: Vreed en Hoop

Control Type:	All-way stop	Delay (sec / veh):	121.3
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes		

Intersection Setup

Name	West Demerara Highway			West Bank Road			West Demerara Highway			Stelling Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	West Demerara Highway			West Bank Road			West Demerara Highway			Stelling Road		
Base Volume Input [veh/h]	142	0	296	3	3	2	1	376	699	293	229	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	142	0	296	3	3	2	1	376	699	293	229	1
Peak Hour Factor	0.9364	0.9364	0.9364	0.9364	0.9364	0.9364	0.9364	0.9364	0.9364	0.9364	0.9364	0.9364
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	38	0	79	1	1	1	0	100	187	78	61	0
Total Analysis Volume [veh/h]	152	0	316	3	3	2	1	402	746	313	245	1
Pedestrian Volume [ped/h]	42			57			3			44		

Intersection Settings

Lanes

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	1.27	5.91	0.06	7.83	42.12	3.98	2.98
95th-Percentile Queue Length [m]	9.71	45.05	0.45	59.68	320.95	30.34	22.71
Approach Delay [s/veh]	25.26		11.84	210.81		19.20	
Approach LOS	D		B	F		C	
Intersection Delay [s/veh]	121.28						
Intersection LOS	F						

Intersection Level Of Service Report
Intersection 3: Cogland Dam

Control Type:	Two-way stop	Delay (sec / veh):	43.8
Analysis Method:	HCM 2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.159

Intersection Setup

Name	West Bank Road		West Bank Road		Cogland Dam Road	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Bank Road		West Bank Road		Cogland Dam Road	
Base Volume Input [veh/h]	5	458	986	9	8	15
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	458	986	9	8	15
Peak Hour Factor	0.9049	0.9049	0.9049	0.9049	0.9049	0.9049
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	127	272	2	2	4
Total Analysis Volume [veh/h]	6	506	1090	10	9	17
Pedestrian Volume [ped/h]	5		11		10	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.01	0.01	0.02	0.16
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	8.51	16.80	43.76
Movement LOS	A	A	A	A	C	E
95th-Percentile Queue Length [veh]	0.00	0.00	24.78	24.78	0.61	0.61
95th-Percentile Queue Length [m]	0.00	0.00	188.86	188.86	4.68	4.68
d_A, Approach Delay [s/veh]	0.00		0.08		34.43	
Approach LOS	A		F		D	
d_I, Intersection Delay [s/veh]	0.60					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 4: Demerara Harbour Bridge

Control Type:	All-way stop	Delay (sec / veh):	143.1
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes		

Intersection Setup

Name	West Bank Road		West Bank Road		Demerara Harbor Bridge	
Approach	Northeastbound		Southwestbound		Northwestbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		No	

Volumes

Name	West Bank Road		West Bank Road		Demerara Harbor Bridge	
Base Volume Input [veh/h]	170	605	1101	172	67	117
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	170	605	1101	172	67	117
Peak Hour Factor	0.8206	0.8206	0.8206	0.8206	0.8206	0.8206
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	52	184	335	52	20	36
Total Analysis Volume [veh/h]	207	737	1342	210	82	143
Pedestrian Volume [ped/h]	0		39		0	

Intersection Settings

Lanes

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	12.28	13.12	35.04	36.72	1.07	1.21
95th-Percentile Queue Length [m]	93.60	100.01	267.03	279.78	8.12	9.22
Approach Delay [s/veh]	63.24		210.22		15.19	
Approach LOS	F		F		C	
Intersection Delay [s/veh]	143.10					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 5: La Grange

Control Type:	Two-way stop	Delay (sec / veh):	389.8
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.282

Intersection Setup

Name	West Bank Road			West Bank Road			Canal #1 Polder Road			Access Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	West Bank Road			West Bank Road			Canal #1 Polder Road			Access Road		
Base Volume Input [veh/h]	0	111	53	47	529	1	0	5	2	261	6	42
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	111	53	47	529	1	0	5	2	261	6	42
Peak Hour Factor	0.7230	0.7230	0.7230	0.7230	0.7230	0.7230	0.7230	0.7230	0.7230	0.7230	0.7230	0.7230
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	38	18	16	183	0	0	2	1	90	2	15
Total Analysis Volume [veh/h]	0	154	73	65	732	1	0	7	3	361	8	58
Pedestrian Volume [ped/h]	0			17			6			12		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.09	0.00	0.01	0.00	0.00	0.04	0.28	0.92	0.04	0.35
d_M, Delay for Movement [s/veh]	0.00	0.00	9.90	0.00	0.00	7.55	56.15	71.52	389.78	190.76	200.36	203.30
Movement LOS	A	A	A	A	A	A	F	F	F	F	F	F
95th-Percentile Queue Length [veh]	1.15	1.15	1.15	3.72	3.72	3.72	1.02	1.02	1.02	20.47	20.47	20.47
95th-Percentile Queue Length [m]	8.80	8.80	8.80	28.36	28.36	28.36	7.77	7.77	7.77	155.97	155.97	155.97
d_A, Approach Delay [s/veh]	3.18			0.01			167.00			192.64		
Approach LOS	A			A			F			F		
d_I, Intersection Delay [s/veh]	57.91											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 6: Nismes

Control Type:	Two-way stop	Delay (sec / veh):	18.8
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.058

Intersection Setup

Name	West Bank Road			West Bank Road			Ni Vi			Gaico Yard Access Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	West Bank Road			West Bank Road			Ni Vi			Gaico Yard Access Road		
Base Volume Input [veh/h]	0	519	10	8	99	3	3	1	3	9	0	12
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	519	10	8	99	3	3	1	3	9	0	12
Peak Hour Factor	0.7720	0.7720	0.7720	0.7720	0.7720	0.7720	0.7720	0.7720	0.7720	0.7720	0.7720	0.7720
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	168	3	3	32	1	1	0	1	3	0	4
Total Analysis Volume [veh/h]	0	672	13	10	128	4	4	1	4	12	0	16
Pedestrian Volume [ped/h]	9			3			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.06
d_M, Delay for Movement [s/veh]	0.00	0.00	7.51	0.00	0.00	8.94	13.25	17.54	18.70	9.72	17.86	18.81
Movement LOS	A	A	A	A	A	A	B	C	C	A	C	C
95th-Percentile Queue Length [veh]	2.63	2.63	2.63	0.55	0.55	0.55	0.08	0.08	0.08	0.23	0.23	0.23
95th-Percentile Queue Length [m]	20.03	20.03	20.03	4.16	4.16	4.16	0.64	0.64	0.64	1.75	1.75	1.75
d_A, Approach Delay [s/veh]	0.14			0.25			16.15			14.91		
Approach LOS	A			A			C			B		
d_I, Intersection Delay [s/veh]	0.81											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 7: Stanleytown

Control Type:	Two-way stop	Delay (sec / veh):	17.7
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.040

Intersection Setup

Name	West Bank Road		West Bank Road		Canal #2 Polder Road	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Bank Road		West Bank Road		Canal #2 Polder Road	
Base Volume Input [veh/h]	10	255	63	38	226	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	255	63	38	226	14
Peak Hour Factor	0.7480	0.7480	0.7480	0.7480	0.7480	0.7480
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	85	21	13	76	5
Total Analysis Volume [veh/h]	13	341	84	51	302	19
Pedestrian Volume [ped/h]	7		10		3	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.04	0.45	0.04
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	8.14	15.40	17.67
Movement LOS	A	A	A	A	C	C
95th-Percentile Queue Length [veh]	0.00	0.00	0.38	0.38	2.68	2.68
95th-Percentile Queue Length [m]	0.00	0.00	2.89	2.89	20.40	20.40
d_A, Approach Delay [s/veh]	0.00		3.07		15.53	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	6.67					
Intersection LOS	C					

Gas to Energy Traffic Study Guyana

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Scenario 4: Balance AM 6:30
07/04/2022

Turning Movement Volume: Summary

ID	Intersection Name	Northbound			Southbound			Westbound			Southeastbound			Total Volume
		Thru	Right	2	Left	Thru	Right	Left	Right	2	2	Left	Thru	
1	West Demerara Highway - North	158	0	1	0	3	1	1	20	1	0	15	755	955

ID	Intersection Name	Northbound			Southbound			Eastbound			Westbound			Total Volume
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	Vreed en Hoop	142	0	296	3	3	2	1	376	699	293	229	1	2045

ID	Intersection Name	Northbound		Southbound		Eastbound		Total Volume
		Left	Thru	Thru	Right	Left	Right	
3	Cogland Dam	5	458	986	9	8	15	1481

ID	Intersection Name	Northeastbound		Southwestbound		Northwestbound		Total Volume
		Thru	Right	Left	Thru	Left	Right	
4	Demerara Harbour Bridge	170	605	1101	172	67	117	2232

ID	Intersection Name	Northbound			Southbound			Eastbound			Westbound			Total Volume
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
5	La Grange	0	111	53	47	529	1	0	5	2	261	6	42	1057

ID	Intersection Name	Northbound			Southbound			Eastbound			Westbound			Total Volume
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
6	Nismes	0	519	10	8	99	3	3	1	3	9	0	12	667

ID	Intersection Name	Northbound		Southbound		Eastbound		Total Volume
		Left	Thru	Thru	Right	Left	Right	
7	Stanleytown	10	255	63	38	226	14	606

Gas to Energy Traffic Study Guyana

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Scenario 4: Balance AM 6:30
07/04/2022

Turning Movement Volume: Detail

ID	Intersection Name	Volume Type	Northbound			Southbound			Westbound			Southeastbound			Total Volume
			Thru	Right	2	Left	Thru	Right	Left	Right	2	2	Left	Thru	
1	West Demerara Highway - North	Final Base	158	0	1	0	3	1	1	20	1	0	15	755	955
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	**158**	**0**	**1**	**0**	**3**	**1**	**1**	**20**	**1**	**0**	**15**	**755**	**955**

ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	Vreed en Hoop	Final Base	142	0	296	3	3	2	1	376	699	293	229	1	2045
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	**142**	**0**	**296**	**3**	**3**	**2**	**1**	**376**	**699**	**293**	**229**	**1**	**2045**

ID	Intersection Name	Volume Type	Northbound		Southbound		Eastbound		Total Volume
			Left	Thru	Thru	Right	Left	Right	
3	Cogland Dam	Final Base	5	458	986	9	8	15	1481
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0
		Future Total	**5**	**458**	**986**	**9**	**8**	**15**	**1481**

ID	Intersection Name	Volume Type	Northeastbound		Southwestbound		Northwestbound		Total Volume
			Thru	Right	Left	Thru	Left	Right	
4	Demerara Harbour Bridge	Final Base	170	605	1101	172	67	117	2232
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0
		Future Total	**170**	**605**	**1101**	**172**	**67**	**117**	**2232**

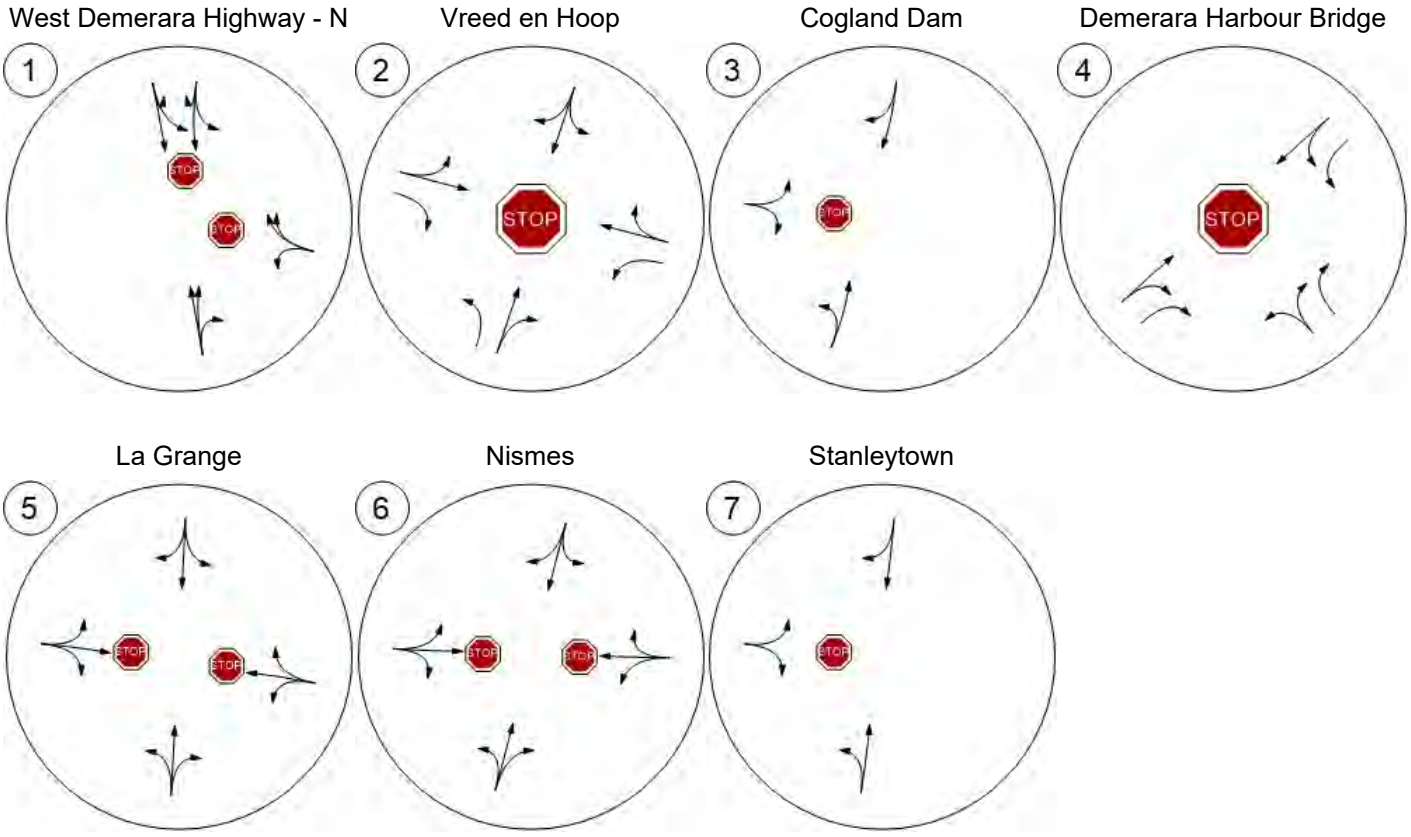
ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
5	La Grange	Final Base	0	111	53	47	529	1	0	5	2	261	6	42	1057
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	**0**	**111**	**53**	**47**	**529**	**1**	**0**	**5**	**2**	**261**	**6**	**42**	**1057**

ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
6	Nismes	Final Base	0	519	10	8	99	3	3	1	3	9	0	12	667
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	**0**	**519**	**10**	**8**	**99**	**3**	**3**	**1**	**3**	**9**	**0**	**12**	**667**

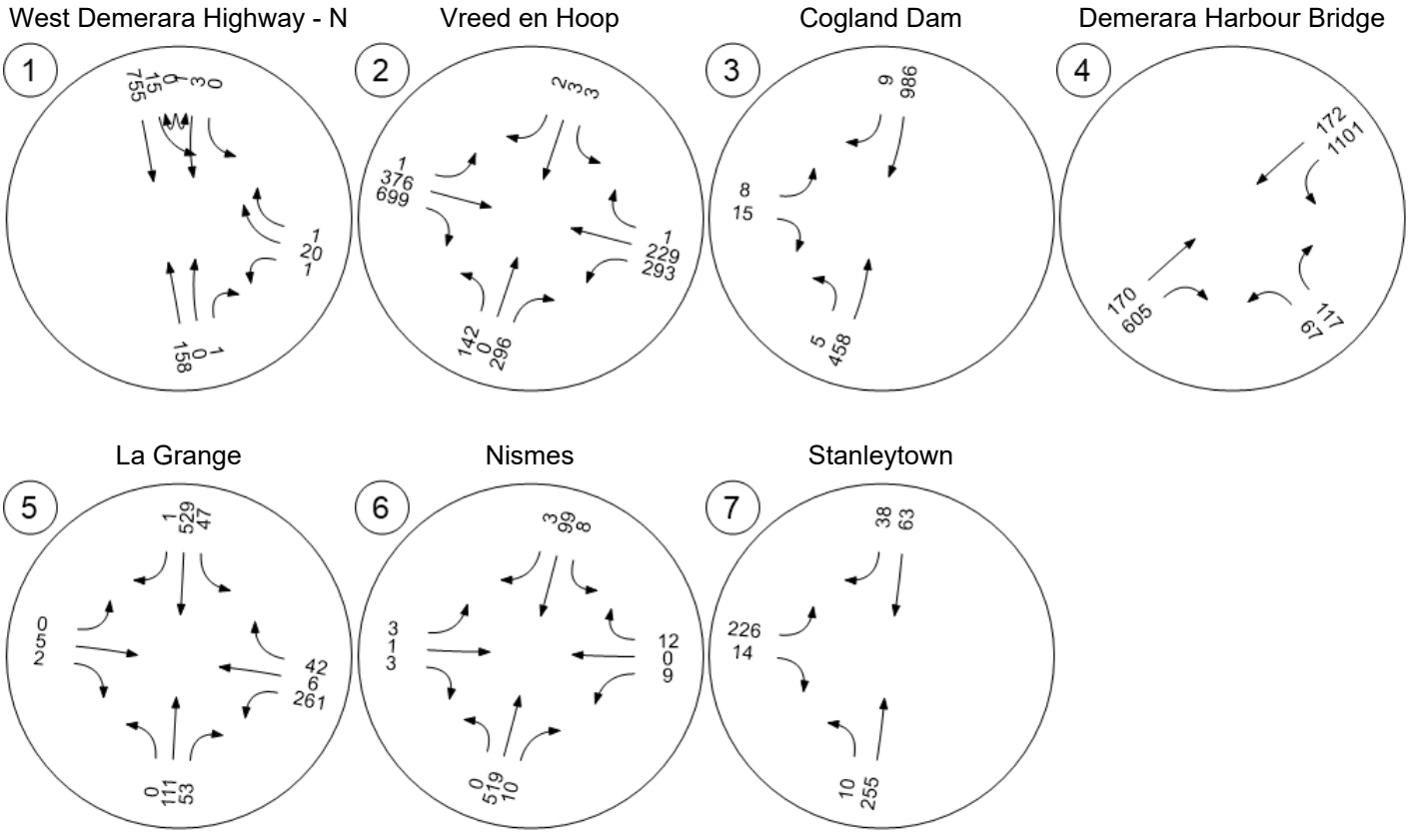
ID	Intersection Name	Volume Type	Northbound		Southbound		Eastbound		Total Volume
			Left	Thru	Thru	Right	Left	Right	
7	Stanleytown	Final Base	10	255	63	38	226	14	606
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0
		Future Total	**10**	**255**	**63**	**38**	**226**	**14**	**606**

Report Figure 1: Study Intersections

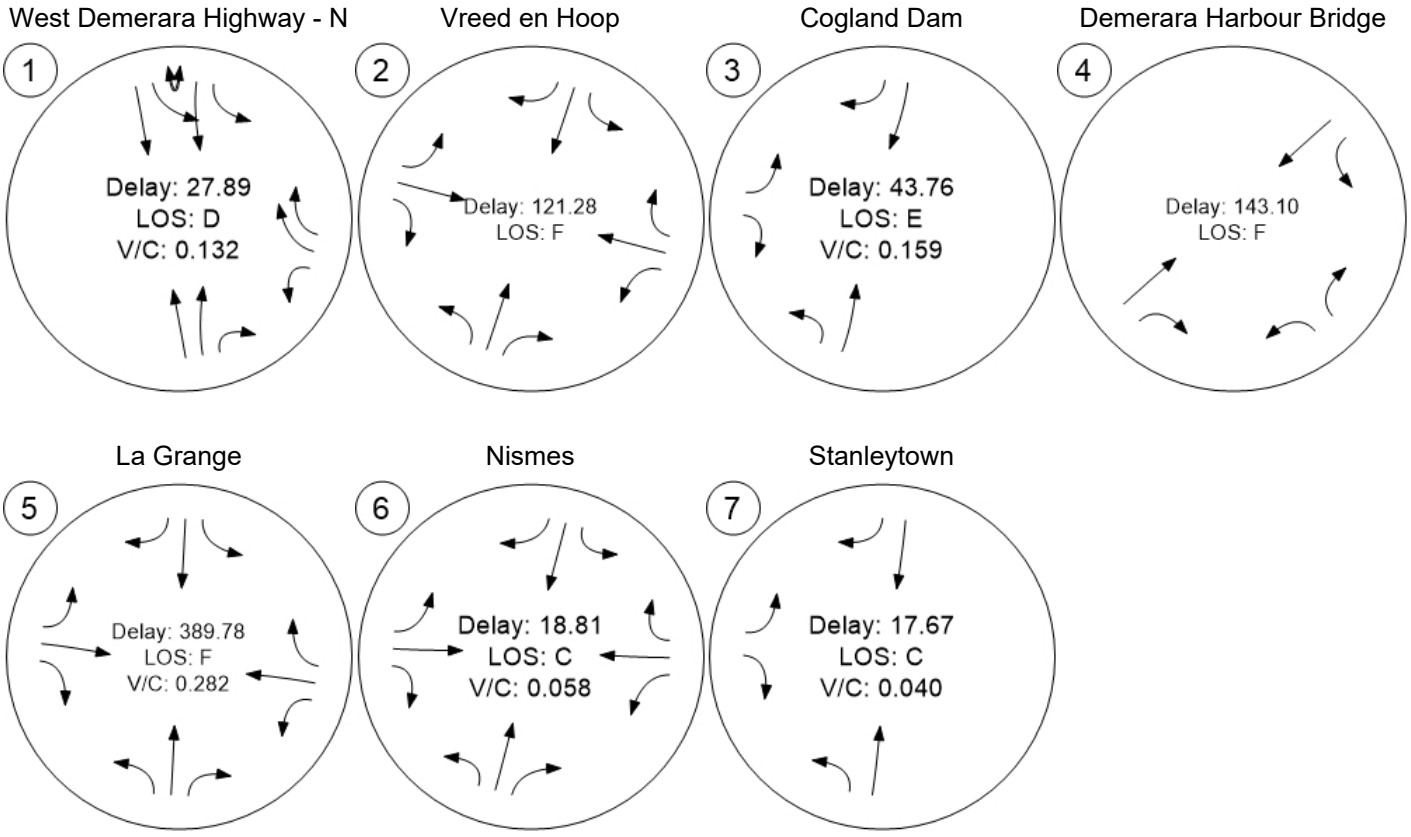
Report Figure 2: Lane Configuration and Traffic Control



Report Figure 3a: Traffic Volume - Base Volume



Report Figure 4: Traffic Conditions



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PM Peak

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Gas to Energy Traffic Study Guyana

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Scenario 3: Balance PM 4:15
07/04/2022

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	West Demerara Highway - North	Two-way stop	HCM 2010	WB Right	0.133	23.0	C
2	Vreed en Hoop	All-way stop	HCM 2010	NB Left		60.1	F
3	Cogland Dam	Two-way stop	HCM 2010	EB Right	0.080	44.6	E
4	Demerara Harbour Bridge	All-way stop	HCM 2010	NWB Right		95.9	F
5	La Grange	Two-way stop	HCM 2010	EB Right	0.118	52.6	F
6	Nismes	Two-way stop	HCM 2010	WB Right	0.020	15.5	C
7	Stanleytown	Two-way stop	HCM 2010	EB Right	0.075	17.6	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: West Demerara Highway - North

Control Type:	Two-way stop	Delay (sec / veh):	23.0
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.133

Intersection Setup

Name	West Demerara Highway			Shell Station Road			Crane Temple Road			West Demerara Highway		
Approach	Northbound			Southbound			Westbound			Southeastbound		
Lane Configuration												
Turning Movement	Thru	Right	Right2	Left	Thru	Right	Left	Right	Right2	Left2	Left	Thru
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			No			No			Yes		

Volumes

Name	West Demerara Highway			Shell Station Road			Crane Temple Road			West Demerara Highway		
Base Volume Input [veh/h]	611	1	4	2	1	0	6	30	4	1	28	304
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	611	1	4	2	1	0	6	30	4	1	28	304
Peak Hour Factor	0.9763	0.9763	0.9763	0.9763	0.9763	0.9763	0.9763	0.9763	0.9763	0.9763	0.9763	0.9763
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	156	0	1	1	0	0	2	8	1	0	7	78
Total Analysis Volume [veh/h]	626	1	4	2	1	0	6	31	4	1	29	311
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Stop	Stop	Free
Flared Lane		No	No	
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance		No	No	
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.13	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	7.97	7.97	10.09	19.21	20.42	12.66	23.04	23.04	0.00	0.00	0.00
Movement LOS	A	A	A	B	C	C	B	C	C	A	A	A
95th-Percentile Queue Length [veh]	3.09	3.09	3.09	0.02	0.02	0.02	0.55	0.55	0.55	0.00	0.00	0.00
95th-Percentile Queue Length [m]	23.58	23.58	23.58	0.15	0.15	0.15	4.22	4.22	4.22	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.06			13.13			21.52			0.00		
Approach LOS	A			B			C			A		
d_I, Intersection Delay [s/veh]	0.95											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 2: Vreed en Hoop

Control Type:	All-way stop	Delay (sec / veh):	60.1
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes		

Intersection Setup

Name	West Bank Road			West Bank Road			West Demerara Highway			Stelling Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	West Bank Road			West Bank Road			West Demerara Highway			Stelling Road		
Base Volume Input [veh/h]	604	4	275	2	10	10	3	246	323	283	295	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	604	4	275	2	10	10	3	246	323	283	295	6
Peak Hour Factor	0.9726	0.9726	0.9726	0.9726	0.9726	0.9726	0.9726	0.9726	0.9726	0.9726	0.9726	0.9726
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	155	1	71	1	3	3	1	63	83	73	76	2
Total Analysis Volume [veh/h]	621	4	283	2	10	10	3	253	332	291	303	6
Pedestrian Volume [ped/h]	194			107			0			23		

Intersection Settings

Lanes

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	24.08	4.70	0.18	3.45	6.78	3.81	5.16
95th-Percentile Queue Length [m]	183.47	35.84	1.36	26.26	51.67	29.00	39.33
Approach Delay [s/veh]	105.39		12.78	29.04		23.64	
Approach LOS	F		B	D		C	
Intersection Delay [s/veh]	60.07						
Intersection LOS	F						

Intersection Level Of Service Report
Intersection 3: Cogland Dam

Control Type:	Two-way stop	Delay (sec / veh):	44.6
Analysis Method:	HCM 2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.080

Intersection Setup

Name	West Bank Road		Cogland Dam Road		West Bank Road	
Approach	Southbound		Eastbound		Northeastbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Right	Left	Thru
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Bank Road		Cogland Dam Road		West Bank Road	
Base Volume Input [veh/h]	642	17	22	8	16	898
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	642	17	22	8	16	898
Peak Hour Factor	0.9687	0.9687	0.9687	0.9687	0.9687	0.9687
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	166	4	6	2	4	232
Total Analysis Volume [veh/h]	663	18	23	8	17	927
Pedestrian Volume [ped/h]	23		19		10	

Intersection Settings

Priority Scheme	Free	Stop	Free
Flared Lane		No	
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance		No	
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.03	0.08	0.08	0.00	0.01
d_M, Delay for Movement [s/veh]	0.00	10.26	20.77	44.61	0.00	0.00
Movement LOS	A	B	C	E	A	A
95th-Percentile Queue Length [veh]	14.70	14.70	0.55	0.55	0.00	0.00
95th-Percentile Queue Length [m]	111.99	111.99	4.21	4.21	0.00	0.00
d_A, Approach Delay [s/veh]	0.27		26.92		0.00	
Approach LOS	A		D		A	
d_I, Intersection Delay [s/veh]	0.62					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 4: Demerara Harbour Bridge

Control Type:	All-way stop	Delay (sec / veh):	95.9
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes		

Intersection Setup

Name	West Bank Road		West Bank Road		Demerara Harbor Bridge	
Approach	Northeastbound		Southwestbound		Northwestbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Bank Road		West Bank Road		Demerara Harbor Bridge	
Base Volume Input [veh/h]	338	99	199	301	441	668
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	338	99	199	301	441	668
Peak Hour Factor	0.9237	0.9237	0.9237	0.9237	0.9237	0.9237
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	91	27	54	81	119	181
Total Analysis Volume [veh/h]	366	107	215	326	477	723
Pedestrian Volume [ped/h]	2		10		3	

Intersection Settings

Lanes

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	7.73	1.00	2.16	5.69	21.42	27.00
95th-Percentile Queue Length [m]	58.92	7.61	16.49	43.37	163.26	205.74
Approach Delay [s/veh]	32.81		23.38		153.47	
Approach LOS	D		C		F	
Intersection Delay [s/veh]	95.90					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 5: La Grange

Control Type:	Two-way stop	Delay (sec / veh):	52.6
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.118

Intersection Setup

Name	West Bank Road			West Bank Road			Canal #1 Polder Road			Access Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	West Bank Road			West Bank Road			Canal #1 Polder Road			Access Road		
Base Volume Input [veh/h]	0	63	44	98	685	6	0	3	10	244	3	25
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	63	44	98	685	6	0	3	10	244	3	25
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	16	11	25	171	2	0	1	3	61	1	6
Total Analysis Volume [veh/h]	0	63	44	98	685	6	0	3	10	244	3	25
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.05	0.00	0.01	0.00	0.00	0.01	0.12	0.58	0.01	0.10
d_M, Delay for Movement [s/veh]	0.00	0.00	9.55	0.00	0.00	7.35	13.88	24.95	52.59	31.96	37.12	38.05
Movement LOS	A	A	A	A	A	A	B	C	F	D	E	E
95th-Percentile Queue Length [veh]	0.44	0.44	0.44	3.05	3.05	3.05	0.43	0.43	0.43	5.08	5.08	5.08
95th-Percentile Queue Length [m]	3.34	3.34	3.34	23.27	23.27	23.27	3.28	3.28	3.28	38.73	38.73	38.73
d_A, Approach Delay [s/veh]	3.93			0.06			46.21			32.58		
Approach LOS	A			A			E			D		
d_I, Intersection Delay [s/veh]	8.40											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 6: Nismes

Control Type:	Two-way stop	Delay (sec / veh):	15.5
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.020

Intersection Setup

Name	West Bank Road			West Bank Road			Ni Vi			Gaico Yard Access Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00			50.00			50.00			50.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	West Bank Road			West Bank Road			Ni Vi			Gaico Yard Access Road		
Base Volume Input [veh/h]	1	212	2	3	402	4	0	2	1	3	2	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	212	2	3	402	4	0	2	1	3	2	6
Peak Hour Factor	0.9077	0.9077	0.9077	0.9077	0.9077	0.9077	0.9077	0.9077	0.9077	0.9077	0.9077	0.9077
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	58	1	1	111	1	0	1	0	1	1	2
Total Analysis Volume [veh/h]	1	234	2	3	443	4	0	2	1	3	2	7
Pedestrian Volume [ped/h]	3			2			2			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			No	No
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance			No	No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.02
d_M, Delay for Movement [s/veh]	0.00	0.00	8.24	0.00	0.00	7.72	9.60	15.00	15.42	11.19	15.18	15.47
Movement LOS	A	A	A	A	A	A	A	B	C	B	C	C
95th-Percentile Queue Length [veh]	0.80	0.80	0.80	1.52	1.52	1.52	0.03	0.03	0.03	0.09	0.09	0.09
95th-Percentile Queue Length [m]	6.13	6.13	6.13	11.56	11.56	11.56	0.19	0.19	0.19	0.71	0.71	0.71
d_A, Approach Delay [s/veh]	0.07			0.07			15.14			14.35		
Approach LOS	A			A			C			B		
d_I, Intersection Delay [s/veh]	0.38											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 7: Stanleytown

Control Type:	Two-way stop	Delay (sec / veh):	17.6
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.075

Intersection Setup

Name	West Bank Road		West Bank Road		Canal #2 Polder Road	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [m]	3.50	3.50	3.50	3.50	3.50	3.50
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [m]	30.48	30.48	30.48	30.48	30.48	30.48
Speed [km/h]	50.00		50.00		50.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	West Bank Road		West Bank Road		Canal #2 Polder Road	
Base Volume Input [veh/h]	28	141	232	125	65	21
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	141	232	125	65	21
Peak Hour Factor	0.8835	0.8835	0.8835	0.8835	0.8835	0.8835
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	40	66	35	18	6
Total Analysis Volume [veh/h]	32	160	263	141	74	24
Pedestrian Volume [ped/h]	37		57		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.10	0.10	0.08
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	7.90	11.02	17.60
Movement LOS	A	A	A	A	B	C
95th-Percentile Queue Length [veh]	0.00	0.00	1.23	1.23	0.62	0.62
95th-Percentile Queue Length [m]	0.00	0.00	9.35	9.35	4.70	4.70
d_A, Approach Delay [s/veh]	0.00		2.76		12.63	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	3.39					
Intersection LOS	C					

Gas to Energy Traffic Study Guyana

Vistro File: C:\...\2022.03.25 - G-T TS Guyana.vistro
Report File: C:\...\2022.04.07 Gas to Energy Traffic Study Guyana - Vistro Report PM peak.pdf

Scenario 3: Balance PM 4:15
07/04/2022

Turning Movement Volume: Summary

ID	Intersection Name	Northbound			Southbound			Westbound			Southeastbound			Total Volume
		Thru	Right	2	Left	Thru	Right	Left	Right	2	2	Left	Thru	
1	West Demerara Highway - North	611	1	4	2	1	0	6	30	4	1	28	304	992

ID	Intersection Name	Northbound			Southbound			Eastbound			Westbound			Total Volume
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	Vreed en Hoop	604	4	275	2	10	10	3	246	323	283	295	6	2061

ID	Intersection Name	Southbound		Eastbound		Northeastbound		Total Volume
		Thru	Right	Left	Right	Left	Thru	
3	Cogland Dam	642	17	22	8	16	898	1603

ID	Intersection Name	Northeastbound		Southwestbound		Northwestbound		Total Volume
		Thru	Right	Left	Thru	Left	Right	
4	Demerara Harbour Bridge	338	99	199	301	441	668	2046

ID	Intersection Name	Northbound			Southbound			Eastbound			Westbound			Total Volume
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
5	La Grange	0	63	44	98	685	6	0	3	10	244	3	25	1181

ID	Intersection Name	Northbound			Southbound			Eastbound			Westbound			Total Volume
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
6	Nismes	1	212	2	3	402	4	0	2	1	3	2	6	638

ID	Intersection Name	Northbound		Southbound		Eastbound		Total Volume
		Left	Thru	Thru	Right	Left	Right	
7	Stanleytown	28	141	232	125	65	21	612

Gas to Energy Traffic Study Guyana

Vistro File: C:\...\2022.03.25 - G-T TS Guyana.vistro
Report File: C:\...\2022.04.07 Gas to Energy Traffic Study Guyana - Vistro Report PM peak.pdf

Scenario 3: Balance PM 4:15
07/04/2022

Turning Movement Volume: Detail

ID	Intersection Name	Volume Type	Northbound			Southbound			Westbound			Southeastbound			Total Volume
			Thru	Right	2	Left	Thru	Right	Left	Right	2	2	Left	Thru	
1	West Demerara Highway - North	Final Base	611	1	4	2	1	0	6	30	4	1	28	304	992
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	**611**	**1**	**4**	**2**	**1**	**0**	**6**	**30**	**4**	**1**	**28**	**304**	**992**

ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	Vreed en Hoop	Final Base	604	4	275	2	10	10	3	246	323	283	295	6	2061
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	**604**	**4**	**275**	**2**	**10**	**10**	**3**	**246**	**323**	**283**	**295**	**6**	**2061**

ID	Intersection Name	Volume Type	Southbound		Eastbound		Northeastbound		Total Volume
			Thru	Right	Left	Right	Left	Thru	
3	Cogland Dam	Final Base	642	17	22	8	16	898	1603
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0
		Future Total	**642**	**17**	**22**	**8**	**16**	**898**	**1603**

ID	Intersection Name	Volume Type	Northeastbound		Southwestbound		Northwestbound		Total Volume
			Thru	Right	Left	Thru	Left	Right	
4	Demerara Harbour Bridge	Final Base	338	99	199	301	441	668	2046
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0
		Future Total	**338**	**99**	**199**	**301**	**441**	**668**	**2046**

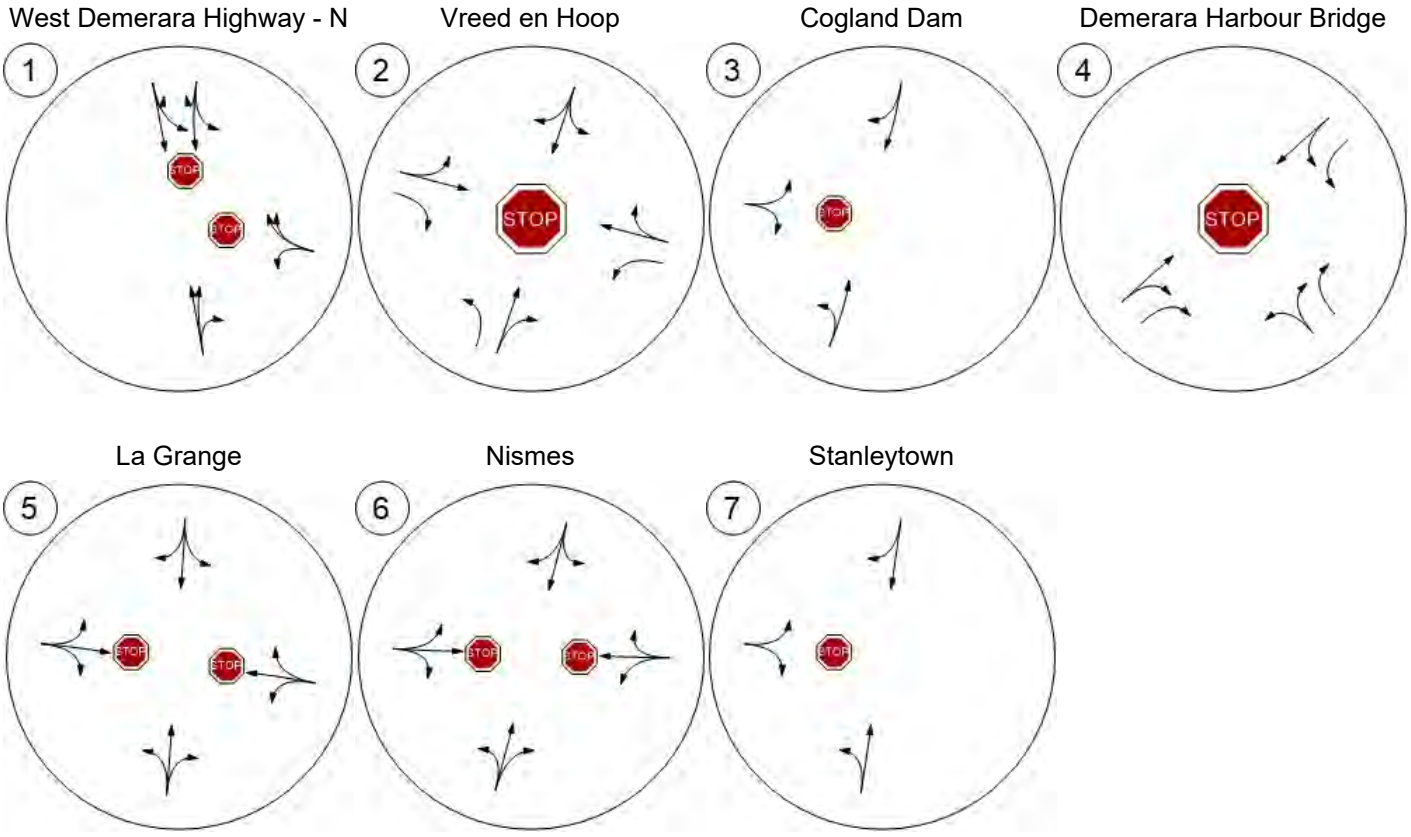
ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
5	La Grange	Final Base	0	63	44	98	685	6	0	3	10	244	3	25	1181
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	**0**	**63**	**44**	**98**	**685**	**6**	**0**	**3**	**10**	**244**	**3**	**25**	**1181**

ID	Intersection Name	Volume Type	Northbound			Southbound			Eastbound			Westbound			Total Volume
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
6	Nismes	Final Base	1	212	2	3	402	4	0	2	1	3	2	6	638
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0	0	0	0	0	0	0
		Future Total	**1**	**212**	**2**	**3**	**402**	**4**	**0**	**2**	**1**	**3**	**2**	**6**	**638**

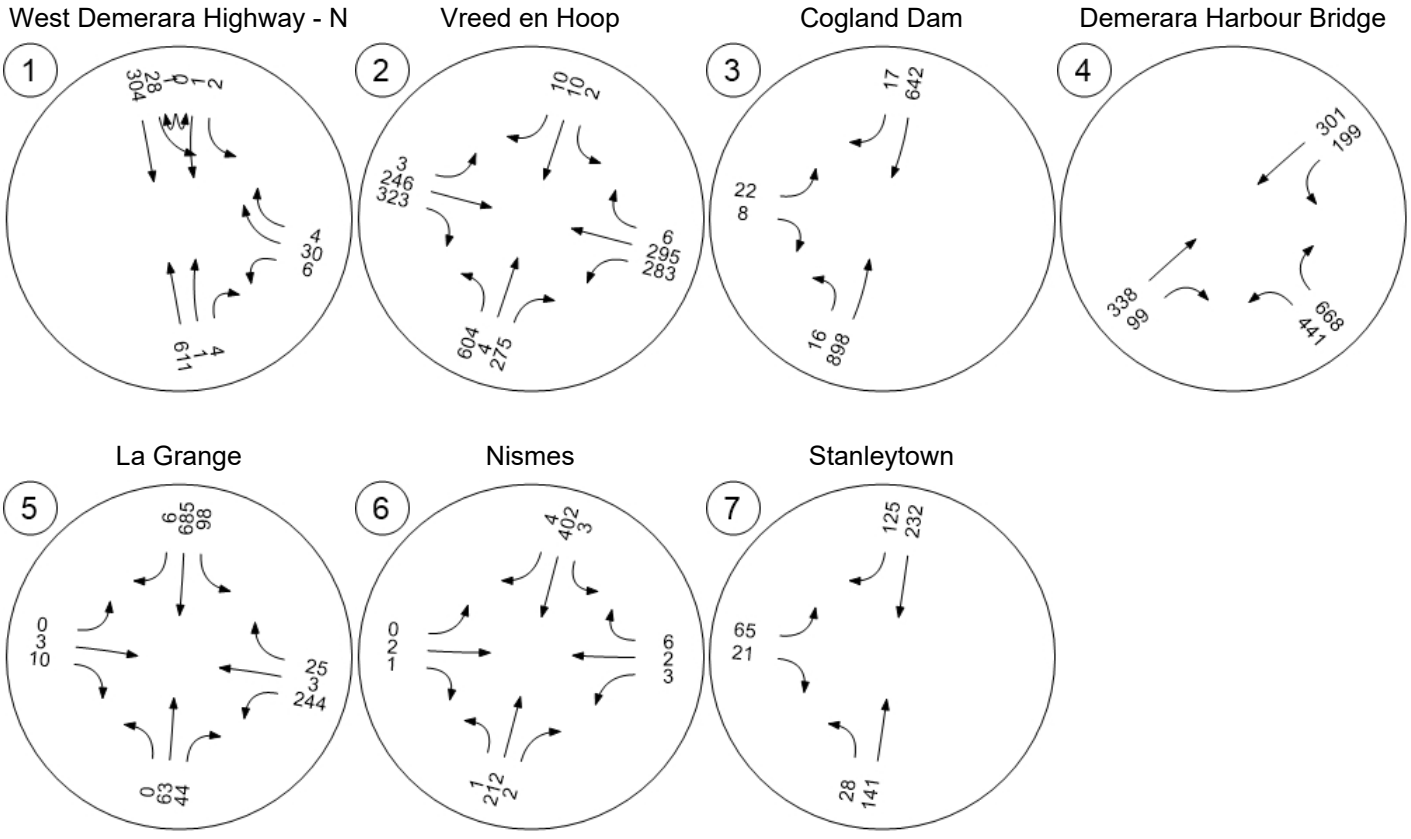
ID	Intersection Name	Volume Type	Northbound		Southbound		Eastbound		Total Volume
			Left	Thru	Thru	Right	Left	Right	
7	Stanleytown	Final Base	28	141	232	125	65	21	612
		Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	-
		In Process	0	0	0	0	0	0	0
		Net New Trips	0	0	0	0	0	0	0
		Other	0	0	0	0	0	0	0
		Future Total	**28**	**141**	**232**	**125**	**65**	**21**	**612**

Report Figure 1: Study Intersections

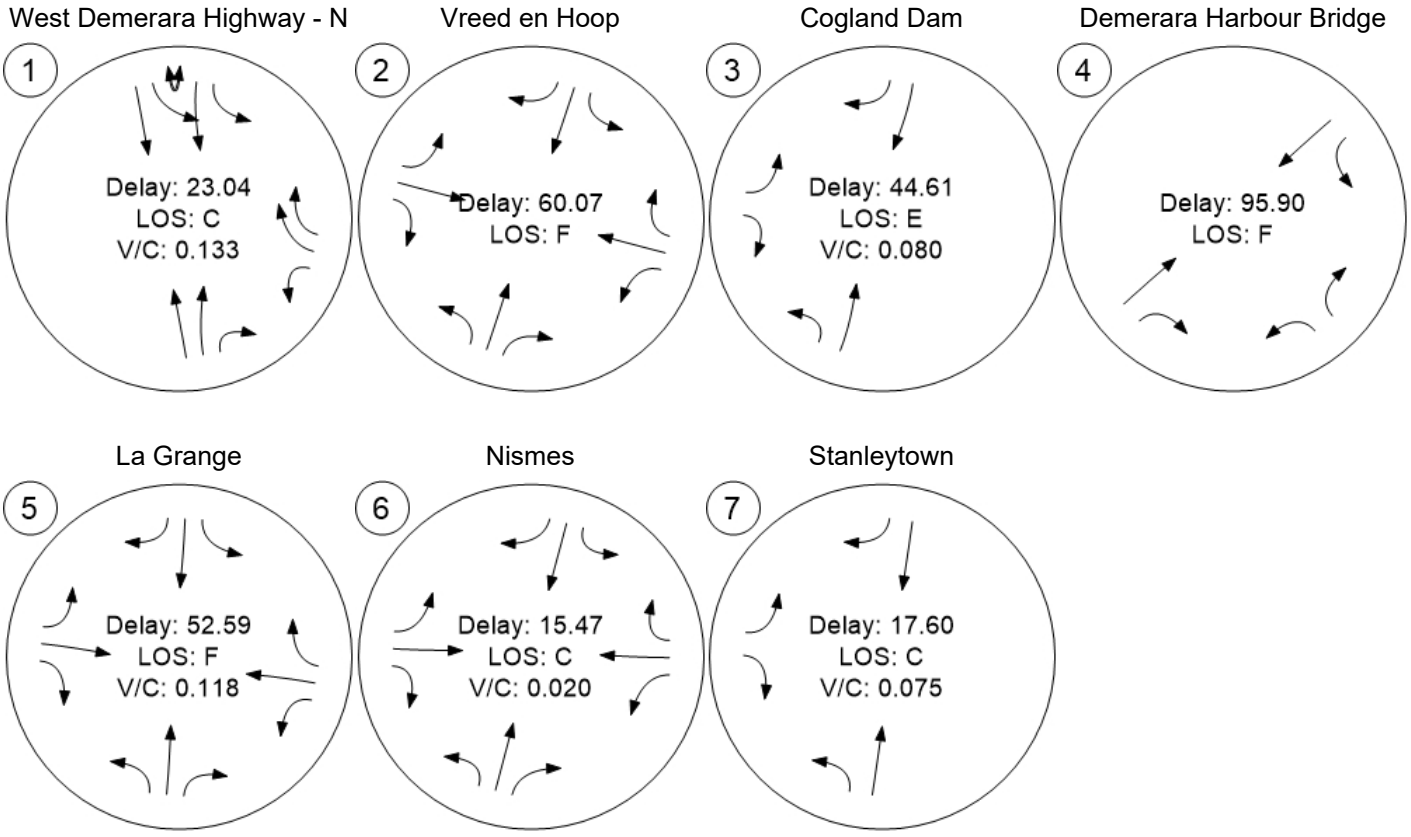
Report Figure 2: Lane Configuration and Traffic Control



Report Figure 3a: Traffic Volume - Base Volume



Report Figure 4: Traffic Conditions



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APPENDIX R

Cultural Heritage Photolog

Resubmitted without changes

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Cultural Heritage Photolog
Georgetown, Guyana

Photograph: 1	Dwelling in Crane Village with additions, view to the northeast.

Photograph: 2	Dwelling in Crane Village with rear addition, view to the northeast.

ERM	**Cultural Heritage Photolog** **Georgetown, Guyana**

Photograph: 3	Dwelling in Crane Village with lower enclosure, view to the north.

Photograph: 4	Dwelling in Crane Village with front gallery, view to the northeast

ERM	**Cultural Heritage Photolog** **Georgetown, Guyana**

Photograph: 5	One-room building with additions at Nismes—Canal 1 (6°45'51.12"N/ 58°14'19.66"W)

Photograph: 6	Bungalow at Nismes—Canal 1 (6°45'51.11"N/ 58°14'20.41"W)

ERM	**Cultural Heritage Photolog** **Georgetown, Guyana**

Photograph: 7	One-room building at Nismes—Canal 1 (6°45'51.01"N/ 58°14'20.06"W)

Photograph: 8	One-room building at Nismes—Canal 1 (6°45'51.38"N/ 58°14'21.14"W)

ERM	**Cultural Heritage Photolog** **Georgetown, Guyana**

Photograph: 9	One-room building at Nismes—Canal 1 (6°45'51.43"N/ 58°14'22.23"W)

Photograph: 10	Bridge structure at Nismes—Canal 1 (6°45'53.34"N/ 58°14'30.59"W)

ERM	**Cultural Heritage Photolog** **Georgetown, Guyana**

Photograph: 11	Mid-size dwelling with additions at Nismes—Canal 2 (6°43'48.95"N/ 58°14'47.79"W)

Photograph: 12	Mid-size dwelling with additions at Nismes—Canal 2 (6°43'48.95"N/ 58°14'47.21"W)

APPENDIX S

ExxonMobil Demerara River Oil Spill Modeling

Resubmitted without changes

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EXXONMOBIL GUYANA DEMERARA RIVER OIL SPILL MODELING ANALYSIS 22-P-216722

Oil Spill Risk Assessment

Oil Spill Risk Assessment
ExxonMobil Demerara River
22-P-216772
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EXECUTIVE SUMMARY

ERM contracted RPS Ocean Science to assess the trajectory and fate of hypothetical discharges of oil occurring at two sites in the Demerara River, Guyana. Instantaneous surface spill scenarios of 500 bbl of Marine Diesel, representative of vessel collision spills, were simulated using the SIMAP model system to quantify the fate of the spilled oil in the environment for these representative spill events. Spills were simulated during representative high and low river flow conditions. The two spill locations used for oil spill modeling included the Demerara River Bridge location and a upstream Marine Offloading Facility (MOF). All SIMAP trajectory and fate model simulations were run for a 5-day simulation period.

Wind data used in the SIMAP oil spill model simulations were collected from a nearby airport meteorologic station (Eugene F. Correia International Airport). In general, winds along the coast tend to be northeast or north-northeast with a mean annual wind speed of about 6 m/s at 10 m. Based on the airport met-station data, winds are 4.76 m/s, on average, and primarily from the north-northeast and east-northeast directions.

RPS applied a Delft3D Flexible Mesh Flow model to the area of interest and developed current fields as forcing to the SIMAP modeling. To capture seasonal variability when modeling the transport of surface oil spills, two distinct environmental conditions were defined for two four-week periods so that each contained a spring and neap tide. The wet season was defined by high river flows while the dry season reflected low river discharges. The wet season included the maximum annual discharge of 1,186.1 m^3/s, and the dry season included a minimum discharge of 11.5 m^3/s. Based on the analysis of these Delft3D FM Flow model results, the maximum current speeds during a tidal cycle near the spill sites range from approximately 0.3 (neap tide) to 0.9 (spring tide) m/s on average.

The SIMAP model was applied in deterministic mode to simulate individual spills representative of high and low river flow conditions using associated wind and current forcings for the identified time periods. Output from the deterministic spill events are provided as maps of the spill trajectories and maps of floating surface oil concentrations and total hydrocarbons concentrations on the shoreline. Oil mass balance graphs showing the time history of oil volume in the environment are also provided.

For all modeled scenarios, the released oil is predicted to travel from the spill sites towards the western shorelines. For the Demerara River Bridge location, some oil is predicted to travel out of the river during high flow conditions due to proximity of the spill site to the mouth. During low flow conditions, oil is predicted to travel to the western shorelines but does not to travel downstream. At the MOF location, oil is discharged at the shore and is predicted to reach the western shorelines in both the high and low river flow scenarios in less than 1 hour.

In general, the released marine diesel evaporates quickly, with ~70% of the oil evaporated within the first day for all modeled scenarios. Approximately 19 to 31% of the total volume released is predicted to strand on shorelines at the end of the 5-day simulation along an approximate 3 km stretch. Note that there is no surface oil predicted to be floating on the water surface at the end of the simulation period in any of the modeled scenarios as much of it evaporated or stranded on shorelines. Larger predicted swept surface areas are associated with the Demerara River Bridge location compared to the MOF location due to the proximity of the MOF site to the coastline while the Demerara Bridge spill location is in the center of the channel.

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1 INTRODUCTION

RPS Ocean Science was contracted by ERM to assess the trajectory and fate of releases using RPS' SIMAP model in the Demerara River, Guyana. This modeling is a continuation of previous modeling for offshore Guyana in the Payara Prospect (Rowe et al., 2018a) and in the Liza prospect, completed in Phase 1 (Galagan, 2017) and Phase 2 (Rowe et al., 2018b). This report presents the results of oil spill modeling, from two locations, in the Demerara River (representative of vessel discharges of Marine Diesel).

Individual hypothetical spill events were modeled using representative high and low river flow conditions in the Demerara River. The oil spill scenarios were simulated using the SIMAP oil spill modeling system in its deterministic mode. The purpose of this modeling was to evaluate the details of each spill type under set conditions representative of a worst-case situation. SIMAP simulations were performed using wind conditions corresponding to two distinct river flow regimes (i.e., high flow and low flow) to capture the range of potential environmental conditions.

This report presents a summary of the modeling methodology, a description of the spill scenarios, and the oil types simulated. The model scenarios and model are provided in Section 2. The environmental and geographic input data utilized for modeling are provided in Section 3. Section 4 provides a description of the model approach and Section 5 provides the model results for the hypothetical releases. Section 5 provides the model results for the oil spill modeling. A brief summary of the modeling results is included in Section 6.

2 MODEL SCENARIOS & INPUTS

2.1 Model Scenarios

Two sites in the Demerara River in Georgetown, Guyana were used for the oil spill scenarios: 1) a representative location at the Demerara River Bridge, and 2) at an upstream Marine Offloading Facility (MOF) located on the western bank of the river (Table 2-1; Figure 2-1). The Demerara Bridge site is located roughly 6 km upstream and the MOF about 27 km upstream (Figure 2-1).

Table 2-1. Location of the spill sites in the Demerara River, Guyana.

Spill Location	Latitude (N)	Longitude (W)
Demerara River Bridge Location	6.770177	-58.187324
MOF Location	6.633816	-58.2141

The modeled spill scenarios include instantaneous spills of Marine Diesel modeled for 5 days (Table 2-2). The model simulations used representative environmental conditions corresponding to high river flow and low river flow conditions (Table 2-3).

Table 2-2. Oil spill scenarios modeled in the Demerara River, Guyana

Scenario ID	Spill Site	Spill Event	Flow Regime	Oil Type	Spill Duration	Spill Volume	Model Duration
1	Demerara River Bridge Location	On-water spill due to a vessel collision High Volume	High	Marine Diesel	Instantaneous	500 bbl	5 days
2			Low				
3	Demerara River MOF	On-water spill due to a vessel collision High Volume	High			500 bbl	
4			Low				

Table 2-3. Environmental conditions of the representative High and Low River Flow scenarios.

River Discharge Condition	Tidal Condition	Period for oil spill simulation
High Flow	Spring Tide	6/10/2018 - 6/15/2018
Low Flow	Neap Tide	3/5/2018 - 3/10/2018

Figure 2-1. Location of the spill sites in the Demerara River used in the modeling.

2.2 Oil Properties

The transport and weathering of spilled oil are dependent on chemical and physical oil properties such as boiling point distribution, tendency to form stable or meso-stable water-in-oil emulsions, and oil viscosity. Table 2-4 summarizes the characteristics of the hydrocarbon product, Marine Diesel, used for this study. The client provided RPS with detailed information regarding the oil properties of the products and RPS assumed a proxy/generic oil to define any additional properties necessary to run the oil spill model. These properties were based on characterizations from the Environmental Technology Centre of Environment Canada. If further information about the actual diesel becomes available, the characterization of the oil provided by RPS and used in this modeling study should be reviewed to ensure that the representative oils are suitable.

Table 2-4. Summary of the oil properties used in the modeling.

Oil Type	Density (g/cm^3)	Viscosity (cP) @ 15°C	API Gravity	Pour Point (°C)	Maximum Water Content (%)
Marine Diesel	0.8316 @ 15°C	2.76	26.5	-50.0	0

Viscosity and interfacial surface tension affect the degree of spreading of the oil, which in turn influences the rates of evaporation, dissolution, dispersion, and photo-oxidation. The maximum water content is a laboratory measurement of the tendency of the oil to form emulsions. Oils that form water-in-oil emulsions tend to be more persistent in the marine environment, as they are less likely to be dissolved and/or evaporated; this increases their potential for reaching the shoreline. Light products (e.g., diesel, condensate) have no tendency in forming an emulsion; thus, they are less persistent on the water surface relative to heavier oils (such as crude).

To classify oil products from a weathering point of view, crude oils and hydrocarbon mixtures can be broken down into distillation cuts based on their boiling points. Total hydrocarbon concentrations (THC) in the oil weathering model include both aromatic (soluble) and aliphatic (insoluble) components. In general, the lighter aromatic compounds, such as Monocyclic and Polycyclic Aromatic Hydrocarbons (MAHs and PAHs, respectively), tend to rapidly evaporate to the atmosphere unless the product gets mixed into the water column. If oil is released below the water surface or gets entrained before it has weathered and lost the lower molecular weight aromatics to the atmosphere, dissolved MAHs and PAHs can reach concentrations where they can affect water column organisms or benthic communities (French McCay and Payne 2001).

3 ENVIRONMENTAL CONDITIONS AND DATA ANALYSIS

To understand the behavior of spills, it is necessary to understand and evaluate the predominant environmental conditions in the area of interest (AOI). The AOI for this study is located near the mouth of the Demerara River in eastern Guyana.

Winds and currents are the key forcing agents that control the transport and weathering of an oil spill. To reproduce the natural variability of the environment, the oil spill modeling requires wind and current datasets that vary both spatially and temporally. Therefore, records of wind and discharge data were obtained from publicly available sources and the river hydrodynamic modeling was developed for this study.

The following sections describe the key environmental conditions that dominate in the region and more specifically at the sites of interest (Figure 2-1), in addition to the environmental model data analyses and development, as forcing factors for the spill modeling.

3.1 General Dynamics and Site Characteristics

The coast of Guyana is approximately 434 km long and consists of mudflats and sandy beaches fronting a swampy coastal plain characterized by cultivated fields and secondary vegetation (Bird, 2010). Human activities have modified the primary ecological functions and species composition, resulting in fragmentation and loss of natural habitats (ASDU, 2015). The primary human development along the Guyana coast has involved the clearance of coastal areas for agriculture and settlements (Pastakia, 1991). With most of the natural defenses such as mangroves wiped out or cleared, the country has relied on an extensive system of sea defenses by means of seawalls and groins for protection. Notably, a sea wall lines the coast at Georgetown on the eastern side of the Demerara River estuary. Remaining natural defenses in the form of mangroves areas are generally thin, however, mangroves have begun to develop on the West Demerara foreshore (ASDU, 2015).

The Demerara River is an important source of potable water, recreation, water transportation, and fisheries for the people of Guyana (Bird, 2010). Along the river, reservoirs, canals, and irrigation ditches supply water to agricultural lands using. Also, species such as the endangered tucuxi, giant river otter, and west Indian manatee, have been spotted along the Demerara River.

The hydrology of the AOI is largely controlled by its location on the low coastal plain and its proximity to the river. A large tidal range, close to 3 m during a spring tide (Bird, 2010), generates relatively large tidal currents throughout the river. The riverine ecosystem, more specifically the riverbanks comprises tidal wetlands that are subject to more frequent inundation due to sea level rise (Edwards et al., 2005). The soils in the area have poor internal drainage as the area can be described as highly developed with industrial activities and, as such, there is a network of drainage facilities (Worts, 1963).

Winds along the coast are generally northeast or north-northeast with a long-term mean annual wind speed of about 6 m/s at 10 m elevation above mean sea level (Figure 3-1; Guyana Hydrometeorological Service, 1973). There are two highly variable rainy seasons, April - August and November - January, with annual average

rainfall at the coast of 2,250 mm (Bird, 2010), with the remaining months defined as the dry season. To capture these two distinct seasons, the modeling scenarios for this study include a wet season (May - June) and a dry season (February - March). During the dry season, the flows of the rivers reach a minimum discharge of. Due to this low river flow, brackish water tends to reach further upstream, recorded by Worts (1963) to extend approximately 45.1 km upstream.

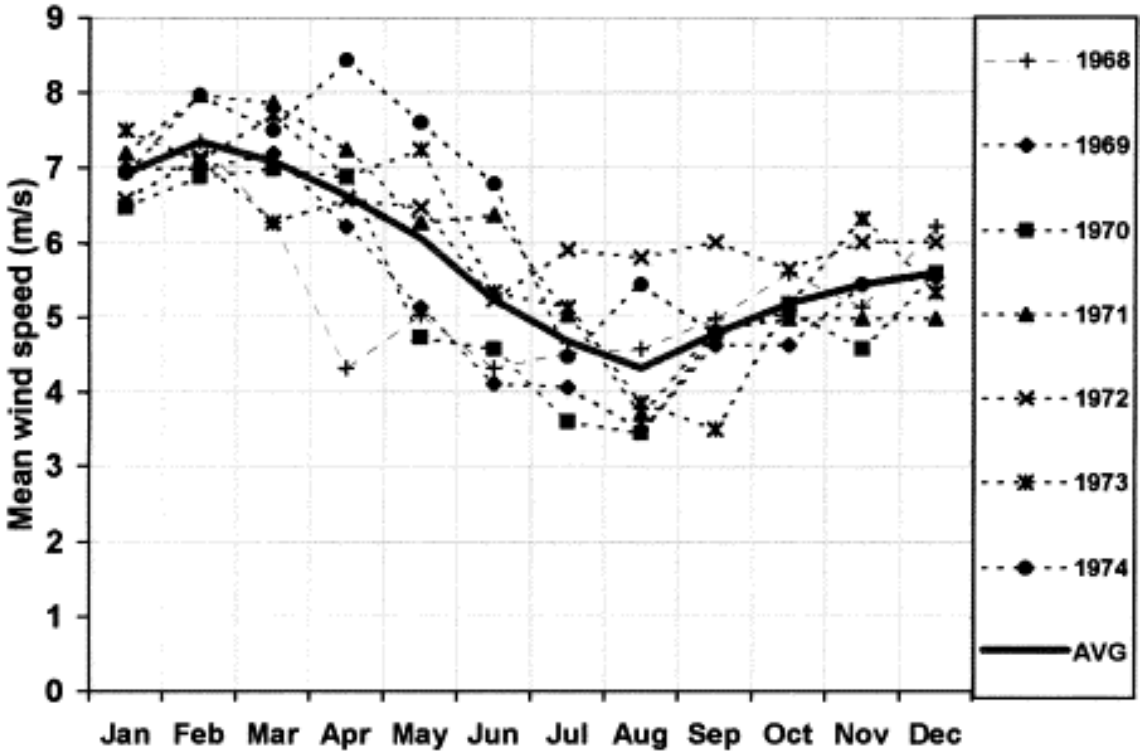


Figure 3-1. Average mean wind speeds between 1968 and 1974 at a station in Georgetown, Guyana (Guyana Hydrometeorological Service, 1973).

3.2 Bathymetry and Shoreline

For river hydrodynamic modeling and oil spill modeling of this project, elevation and bathymetry data were compiled from several sources for the development of the different model grids. ExxonMobil Upstream Production Company provided RPS with geophysical datasets, including multibeam bathymetric surveys of the lower 25 km of the Demerara River. These bathymetric surveys from 2010 included a single track along the center of the river, in addition to cross channel surveys spaced approximately every 2 km.

This AOI included an additional 25 km of river, south of these bathymetric surveys, in which there were no available survey data. To supplement the provided dataset, the Multi-Error-Removed Improved-Terrain (MERIT) Digital Elevation Model (DEM) developed by Dai Yamazaki of The University of Tokyo (Yamazaki, 2017) was used.

The General Bathymetric Chart of the Oceans (GEBCO) data source was also used to sample bathymetry data offshore of the river mouth (IOC, IHO and BODC, 2003). Table 3-1 provides a summary of the bathymetric datasets that were used, with the approximate extents shown in Figure 3-2.

Table 3-1. Specifics of bathymetry datasets used for modeling

Name of Dataset	Owner/Provider	Resolution
TerraSond (2010)	Exxon Mobil	0.5 m
MERIT DEM (2017)	University of Tokyo	3 arc-second
GEBCO (2021)	British Oceanographic Data Centre	15 arc-second

These bathymetry sources, all referenced to mean sea level (MSL), were combined to create a detailed database for the model domain. The dataset was filtered and smoothed to remove sharp gradients at the merged areas, when moving from one data source to another, to have a featureless transition among different bathymetric datasets. To improve the accuracy of the model bathymetry, four along-channel transects (two on either side of the centerline) were created to “connect” the cross-channel survey lines.

The exterior of the river was enclosed with a land-water boundary, which was developed based on an aerial orthoimage. This boundary was treated as the 0 m MSL contour, and ultimately was used as a grid boundary. The bathymetric data were eventually interpolated to the hydrodynamic model grid (Section 3.4.2), and habitat model grid for the oil spill modeling.

Figure 3-2. Approximate extents of different bathymetric datasets utilized to develop the modeling domain.

3.3 Wind Dataset

For the oil spill modeling and hydrodynamic forcing, the wind observation data were obtained from Eugene F. Correia International Airport. Records are available since 2005, with wind speed and direction at 60-minute intervals at 1 m elevation above MSL (Figure 3-3). Missing data in the record were linearly interpolated. The data were accessed through the National Center for Environmental Information (NCEI) database.

Figure 3-3 illustrates wind speeds and directions from January 01, 2018 to January 01, 2019 covering the modeling time period of this project. The annual wind rose at this location is presented in Figure 3-4. Based on the data, winds are on average 4.76 m/s with a cumulative percent occurrence of 77.3% from north-northeast and east-northeast. The mean wind speed was slightly lower than the historical mean wind speed of 5.8 m/s reported by Guyana Hydrometeorological Service in 1973. The variability may be associated with the difference in the measurement locations, the length of recorded data and their time frame, and their elevation.

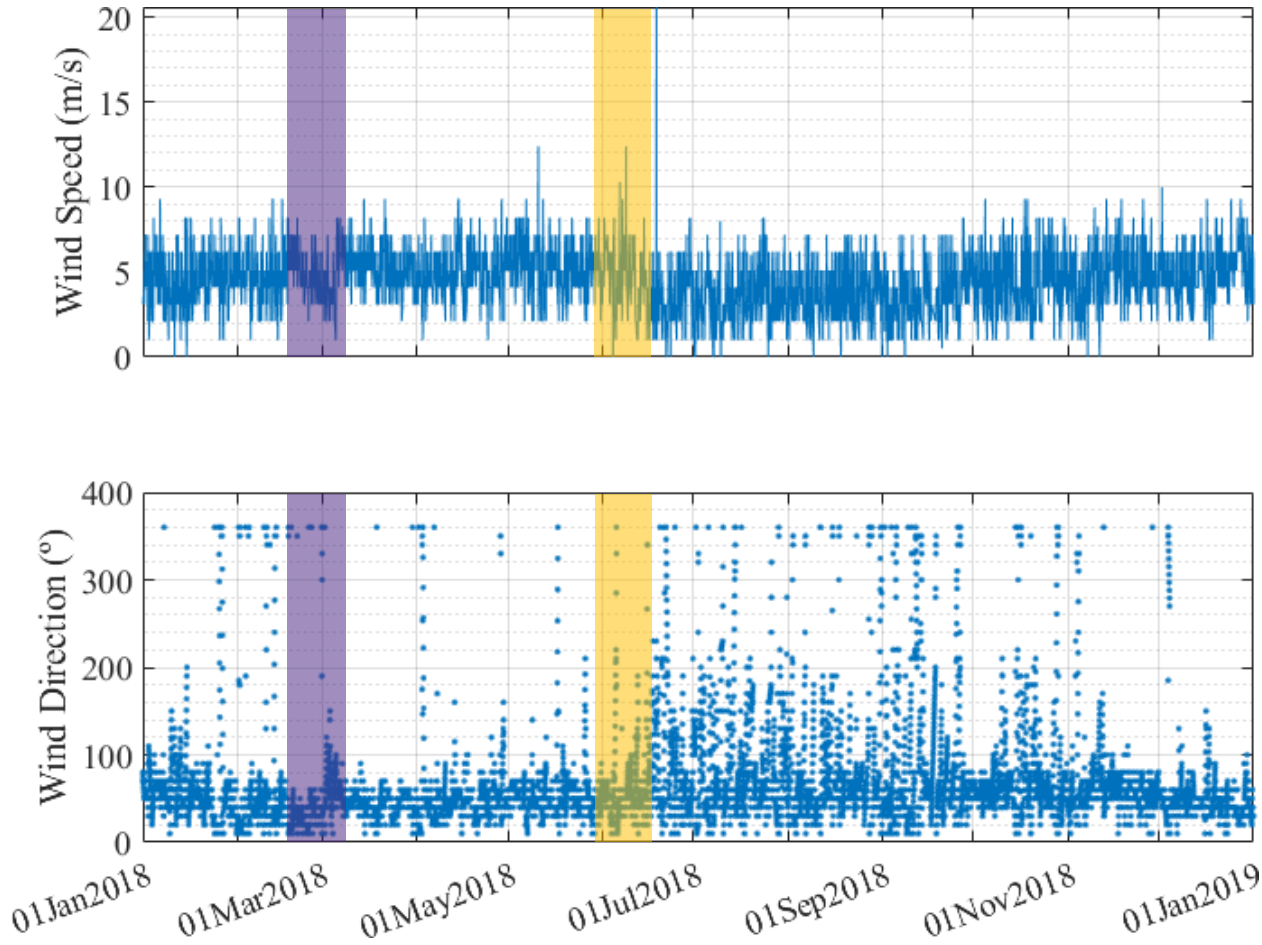


Figure 3-3. Wind speed (m/s) time series of 2018 data recorded at Eugene F. International Airport at Whitham Field, Guyana, for the 1-year period in 2018. Data were recorded 1 m above the MSL and shown for the modeled dry season time period (purple highlight) and modeled wet season time period (yellow highlight).

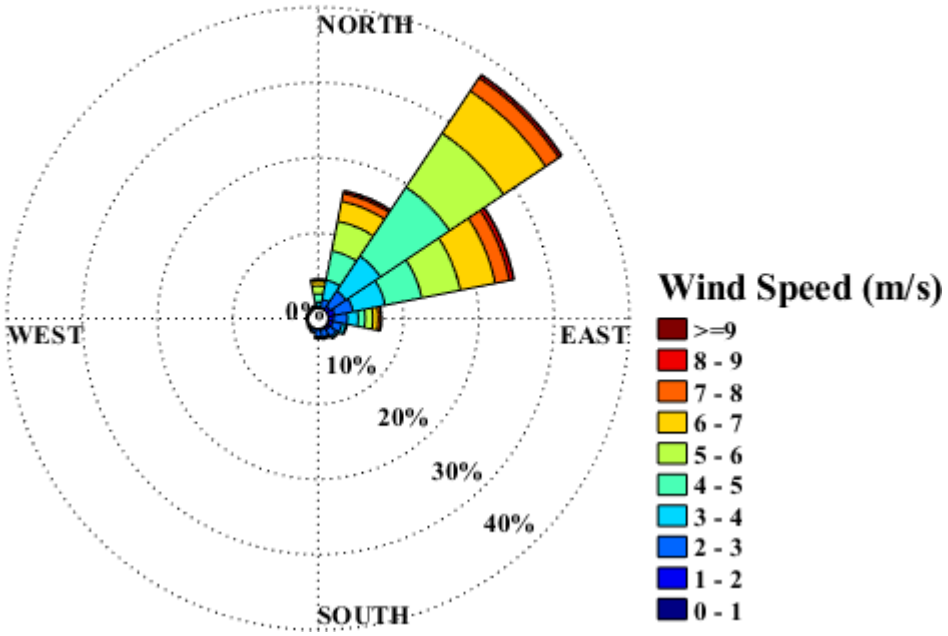


Figure 3-4. Wind rose of data recorded at Eugene F. Correia International Airport in 2018. Direction indicates where wind was blowing from. Colored segments indicate magnitude of wind speeds. Radial length of each segment indicates percent occurrence over the total duration of the data record.

3.4 Hydrodynamic Dataset

To develop hydrodynamic forcing files needed for the oil spill modeling, RPS applied a Delft3D Flexible Mesh (FM) Flow model to the AOI and develop current fields. The following sections describe the Delft3D framework, the environmental data used to develop the present application of the model, and details of the application development, including model setup and discussion of results.

3.4.1 Model Description and Scenarios

The Delft3D FM Flow model was used to develop a depth-averaged hydrodynamic model application for the Demerara River, to capture the circulation patterns and provide hydrodynamic inputs for oil spill modeling. The Flow model is part of the Delft3D FM modeling suite, with a flexible mesh and finite volume code. The model uses a grid mesh that can be constructed using a variety of polygonal elements, with up to six sides. This allows for easy construction of model grids that conform well to complex shorelines and sinuous channels and can include high degrees of mesh resolution in areas only where it is desired.

The model was run using a variable time step that is determined based on metrics of model stability as a function of velocity, water depth and grid cell size (also known as Courant Number). The maximum model time step was set at 30 seconds.

Tide at the open ocean boundary (Section 3.4.3.2), and river flux (Section 3.4.3.2) at the open boundary upstream the river, and wind observation (Section 3.3) on the surface are used as the forcing for this modeling study. The 2018 period was selected for use as the modeling time frame, as it is the most recent year with a full record of available riverine discharge data, and almost complete wind observation record. From the 2018 period, four weeks were selected to represent the wet season (May 22, 2018 to June 19, 2018) and dry season (February 10, 2018 to March 10, 2018). The selected periods each covered a spring tide and a neap tide to capture two distinct environmental conditions to model the transport of surface oil spills (Table 3-2). The high flow period, which occurs during the wet season, included the maximum annual discharge of 1186.1 m^3/s, and the dry season included a minimum discharge of 11.5 m^3/s.

The Delft3D modeling time period was initiated two to three weeks prior to the target oil spill simulation period (4-week total simulation), serving as an initialization period to allow the boundary condition and forcing to propagate throughout the domain and reach an optimal state. To capture two extreme flow conditions during the oil spill modeling, the simulation period during the wet season corresponded with a spring tide and the dry season simulations reflected a neap tide.

Table 3-2. Specifics of the hydrodynamic datasets used for modeling.

Season	Start Date (Time)	End Date (Time)	Mean Discharge (m^3/s)	Peak Discharge (m^3/s)	Minimum Discharge (m^3/s)
Dry	February 24, 2018	March 10, 2018	50.4	91.4	11.5
Wet	June 05, 2018	June 19, 2018	808.1	1186.1	487.4

3.4.2 Model Grid and Bathymetry

To appropriately capture the current circulation patterns in the AOI, a flexible mesh grid was developed to cover the study area. The full extent of the hydrodynamic model grid is represented in Figure 3-5. The model domain includes tidal open boundaries offshore of the inlet, as well as a discharge boundary condition upriver. The domain starts at an approximately 2 m depth offshore (IOC, IHO and BODC, 2003) and extends south into the Demerara River. The model grid closed boundaries were defined by the aerial ortho-imagery derived shoreline (see Section 3.2).

The minimum grid cell edge length is about 25 meters near the spill site, with larger grid cell dimensions of approximately 500 meters located offshore. The broader channel sections of the lower Demerara River include maximum grid cell lengths of 200 meters, with a minimum of 5 cells spanning cross-channel sections. The goal of the grid development process was to ensure that there was sufficient grid resolution throughout the model domain to accurately capture in-situ conditions while optimizing computational modeling time. The computational grid for the entire domain consists of 18,705 cells and 10,019 nodes.

The Delft model gridding tool, QUICKIN, was then used to grid the bathymetry data (Section 3.2), assigning a unique depth value to each cell, either through averaging, for multiple values in a designated cell, or interpolating for the occasional cell where no depth data are available. The resulting grid and associated depths relative to MSL were then manually checked for outliers. The minimum interpolated depth in the model bathymetry is -9.9 m, located near the upriver open boundary. The interpolated bathymetry is shown in Figure 3-6.

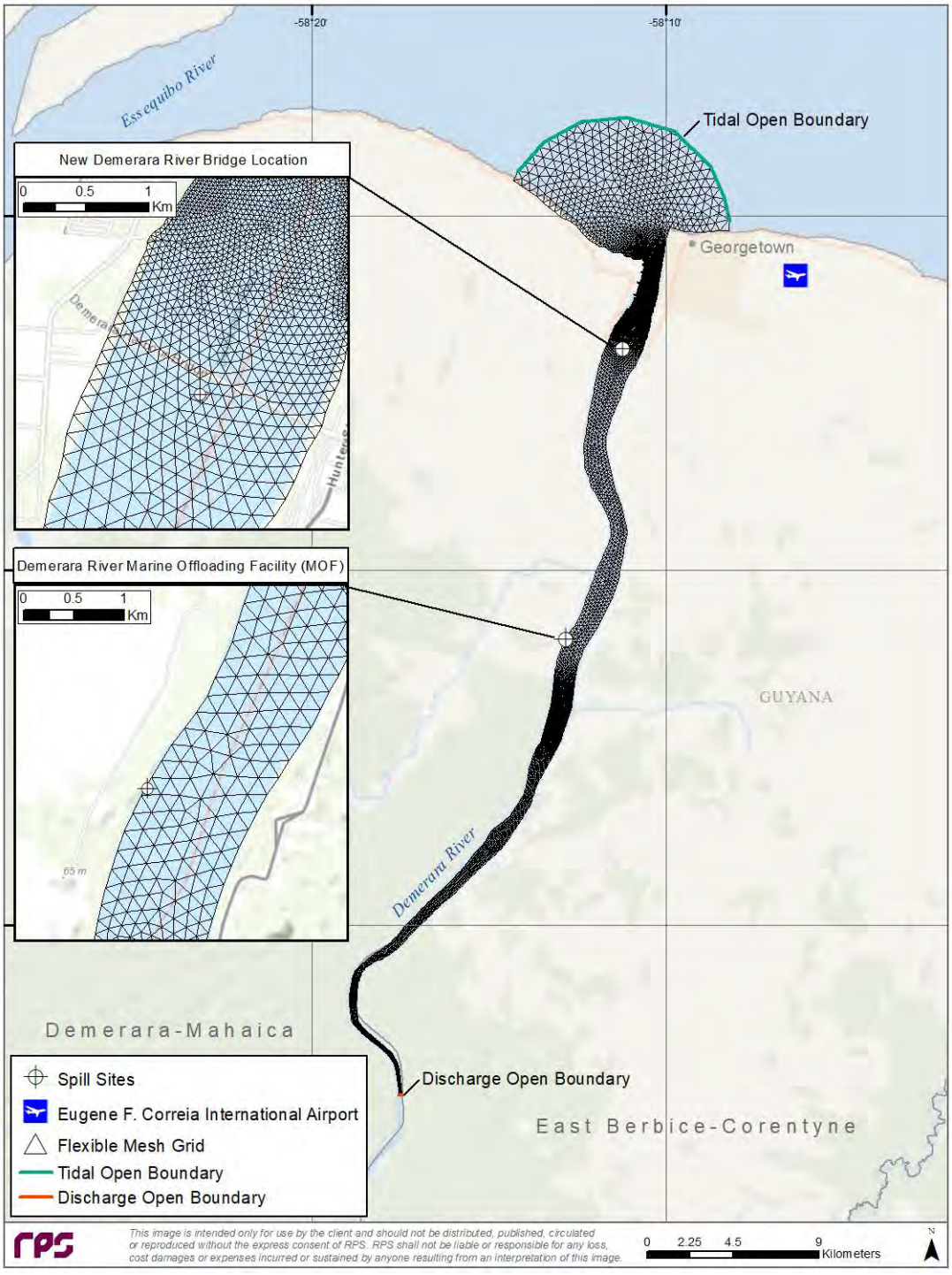


Figure 3-5. Delft3D FM Flow model grid coverage of the Demerara River.

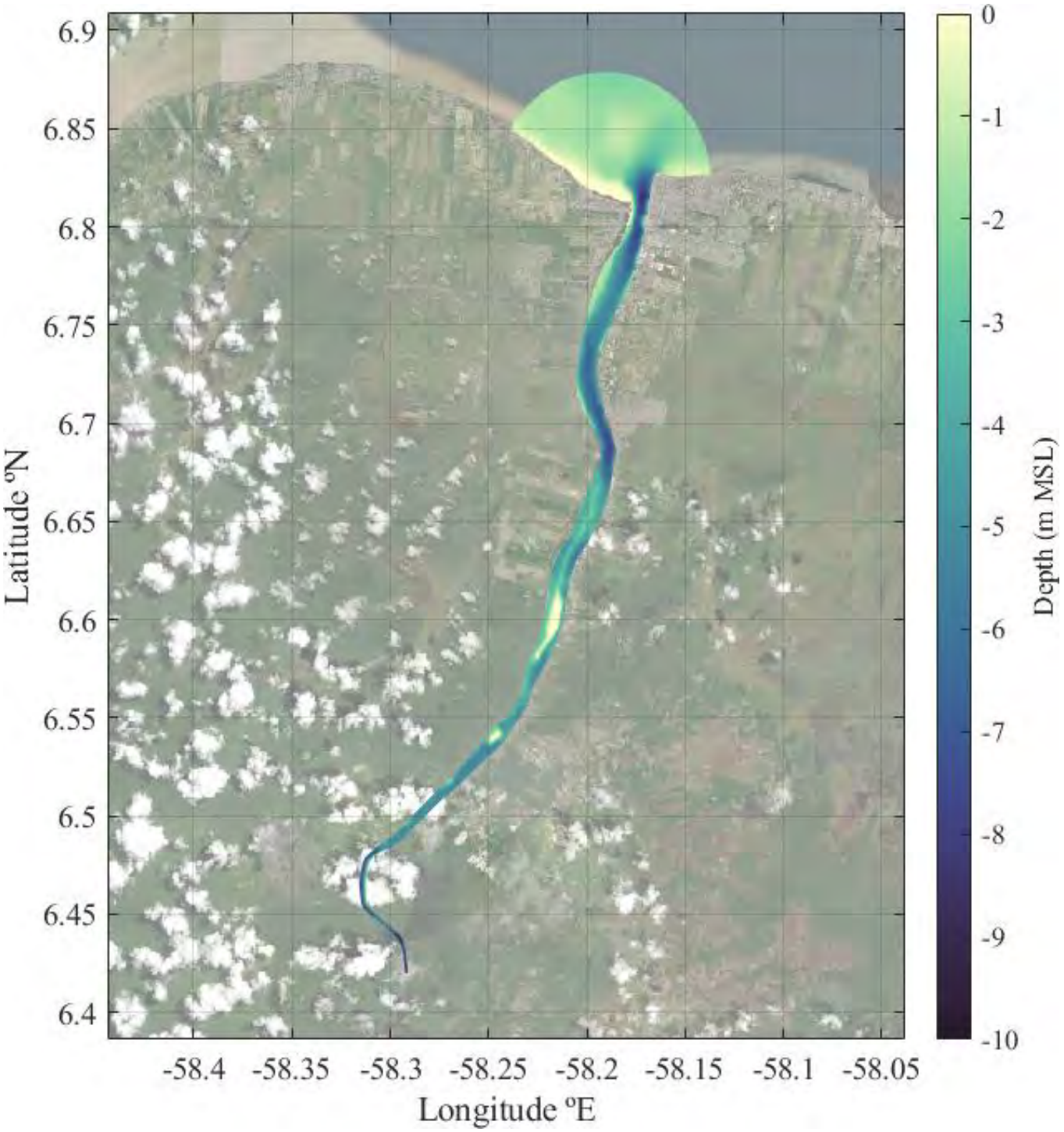


Figure 3-6. Illustration of the bathymetry of the domain interpolated to Delft3D FM Flow grid.

3.4.3 Boundary and Initial Conditions

The Delft3D Flow model requires hydrodynamic data such as water levels and discharges prescribed along open boundaries. For this modeling study, the northern open boundary of the model domain is located on the open Atlantic Ocean while the southern open boundary is located approximately 50 km upriver (Figure 3-2). These open boundaries allow the transfer of external conditions from tide and river flow into the domain.

The data at the boundary includes tidal elevation at the open ocean and discharge at the southern boundary. A meteorological forcing in the form of wind speed and direction timeseries from the Eugene F. Correia Airport observation was applied as a uniform magnitude and direction timeseries throughout the model domain, (Section 3.3, Figure 3-4. Datasets used as boundary conditions and forcing of hydrodynamic model are summarized in Table 3-3.

Table 3-3. Specifics of the datasets used for forcing hydrodynamic model.

	Meteorological Forcing	River flow	Tidal Forcing
Name of Dataset	Eugene F. Correia International Airport	GRADES	TPXO
Coverage	Airport location: 58.11°W 6.80°N	58.75°W – 57.7°W 6.4°N – 6.9°N	Global
Owner/Provider	NCEI	University of Tokyo	Oregon State University
Horizontal Grid Size	NA	0.000833°	0.0333°
Period Available	January 01, 2005 – March 01, 2022	January 01, 1979 – December 31, 2019	Periodic tidal constituents' phase and amplitude, constructed as timeseries for 2018
Timestep	1-hour	Daily	Periodic tidal constituents' phase and amplitude, constructed as 10-minute timeseries

3.4.3.1 Tidal Forcing

Tidal forcing for the hydrodynamic model was obtained from the Oregon State University TOPEX/Poseidon Global Inverse Solution tidal model (TPXO; Egbert and Erofeeva, 2002). TPXO was developed by assimilating altimetry and coastal tide gauge data into shallow water Laplace tidal equations on a 1/30° (~3 km) bathymetric grid, based on the Oregon State University Tidal Inversion Software (OTIS; Egbert et al.,1994; Egbert and Erofeeva, 2002). The depth grid for TPXO was made from GEBCO bathymetry model and from regional bathymetry data (Seifi et al., 2009).

For this study, the latest version of TPXO9-atlas (version 5) was leveraged, which incorporated updated bathymetry and assimilated more altimetry data than in previous versions. Eight primary (M2, S2, N2, K2, K1, O1, P1, Q1), two long period (Mf, Mm) and 3 non-linear (M4, MS4, MN4) harmonic constituents were obtained

from TPXO. Tidal elevations in the TPXO dataset were saved as complex numbers for all the grid points. To create the tidal forcing for the hydrodynamic model, values were extracted for the tidal constituents from a TPXO grid point near the mouth of Demerara River. After the extraction of TPXO values, amplitude and phase were calculated from the real and imaginary parts of the complex numbers; a python software (Github, 2022) package were then used to construct the tidal elevation timeseries from amplitudes and phases of different constituents.

TPXO derived tidal elevation (in meters) timeseries for a 14-day spring-neap cycle (March 1 – March 14, 2022), near the mouth of Demerara River is shown in Figure 3-7. Tide near the AOI is semidiurnal with two high and two low tides each day, which is compatible with existing literature (Gaj, 2014; Bird, 2010). The tidal range during the spring tide is approximately 3 m, which is also consistent with previous studies in Guyana (Bird, 2010; USACE, 1998).

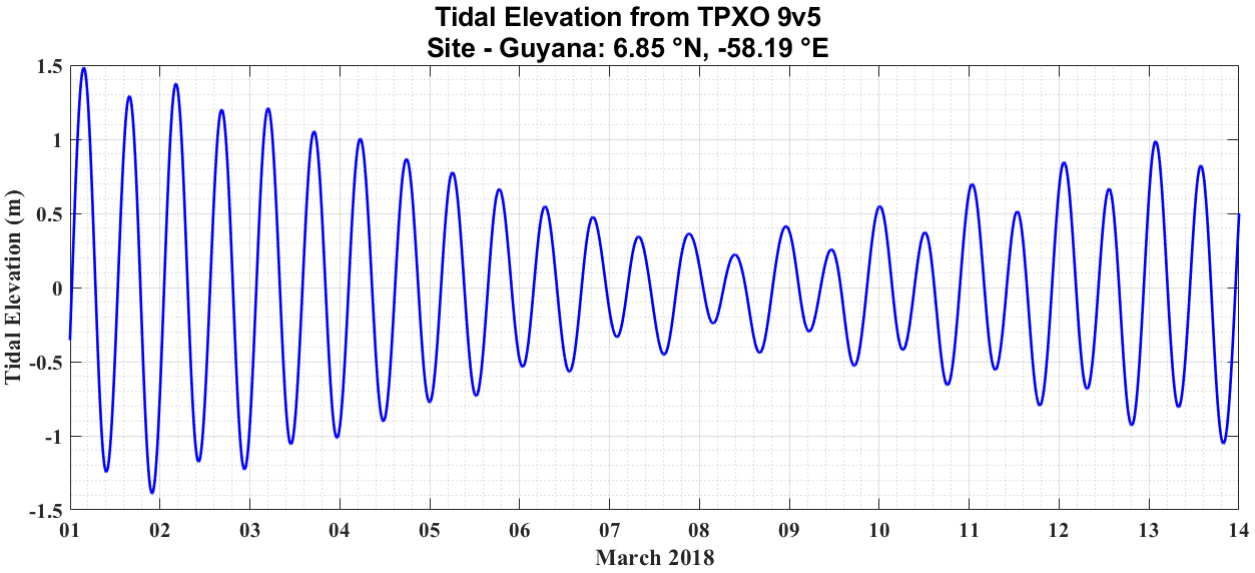


Figure 3-7. Timeseries of tidal elevation (m) near the mouth of Demerara River, Guyana.

3.4.3.2 Riverine Discharge Forcing

The open boundary upriver of the Demerara River was forced with a time series of river discharge. As no river discharge datasets were publicly available for the river at the time of this study, the available hydrologic river runoffs model dataset from Global Reach-scale A priori Discharge Estimates (GRADES) was used. GRADES dataset is developed by researchers at Princeton University and is a model-derived daily discharge database for approximately 2.94 million river reaches. GRADES has been validated against 14,000+ daily gauges globally. The modeling system consists primarily of a land surface model, a river routing model (Routing Application for Parallel computation of Discharge [RAPID]), a calibration procedure, and a bias-correction (post-processing) procedure.

GRADES dataset is based on the hydrography developed from the MERIT Hydro and MERIT Digital Elevation model developed by Dai Yamazaki of The University of Tokyo. MERIT Hydro is a global flow direction map at 3 arc-second resolution that includes flow accumulation, hydrologically adjusted elevations, and river channel width. The Variable Infiltration Capacity (VIC) (Liang et al. 1994) is a macroscale hydrologic model that solves full water and energy balances and is also included in the GRADES modeling. In addition to hydrologic processes, VIC models land-surface interactions and flow routing. Finally, RAPID, another river routing model is used by the GRADES model to compute the flow and volume of water throughout extensive river networks. RAPID modifies corresponding flows from its computations as information concerning water withdrawals or return flows is made available.

A representation of the GRADES modeling chain including the VIC land surface model and RAPID river routing model is included in Figure 3-8. For the Demerara Delft3D FM Flow model, daily 2018 discharge timeseries data from the GRADES dataset (Figure 3-9) were used as inputs into the southern open boundary. Discharge data from each period are summarized in Table 3-2.

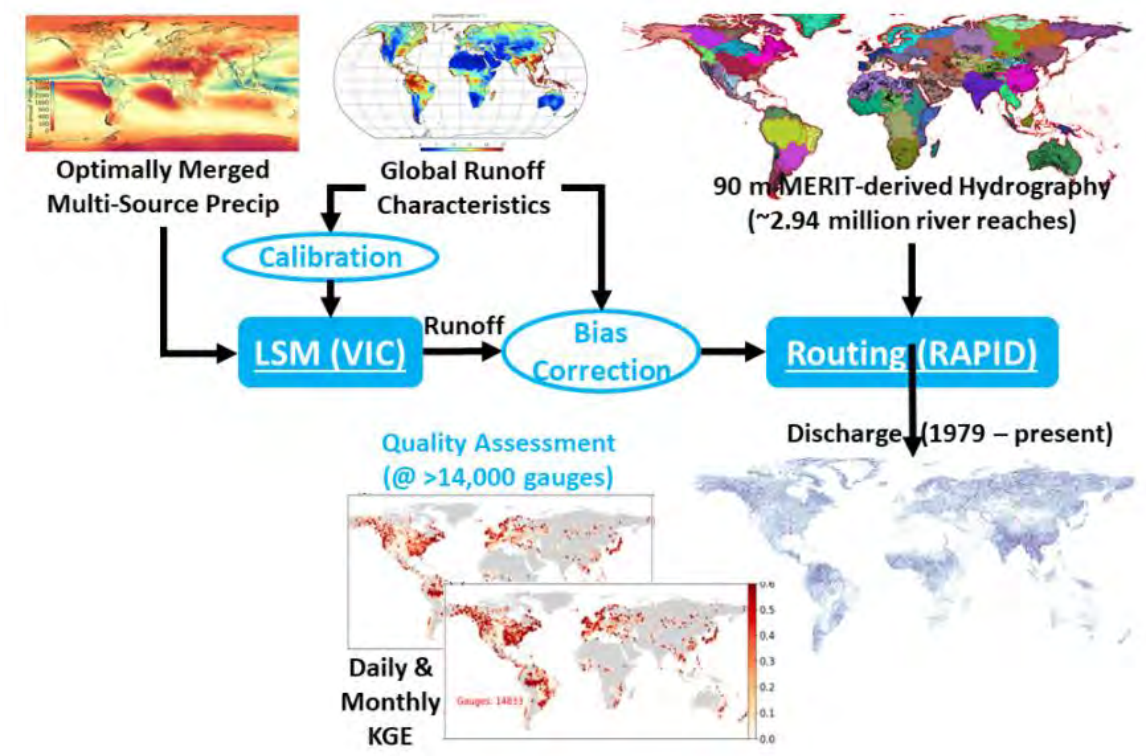


Figure 3-8. Representation of the GRADES modeling chain including the VIC land surface model and RAPID river routing model (Lin et al., 2019; Yang et al., 2019).

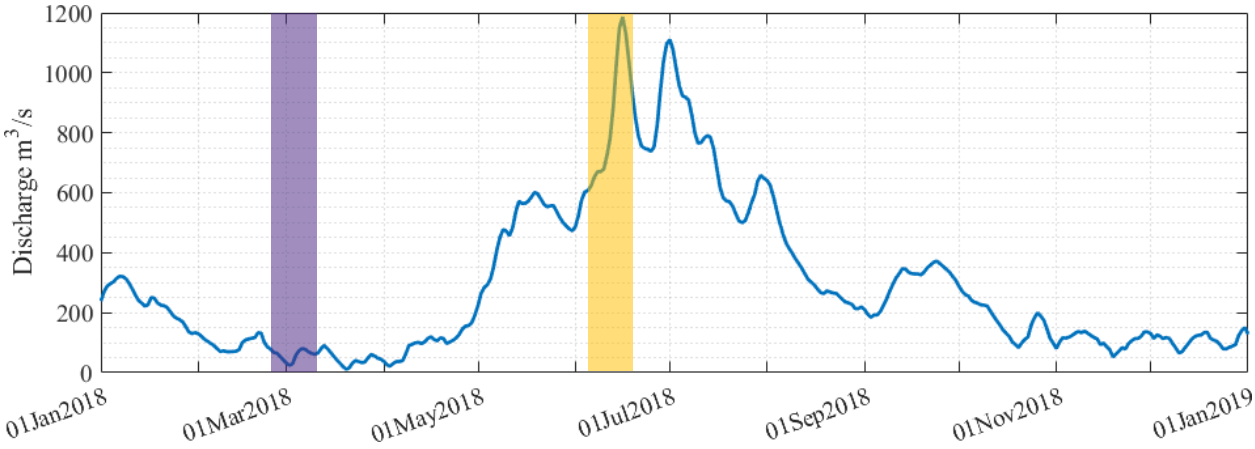


Figure 3-9. Time series output of the GRADES discharge (Lin et al., 2019; Yang et al., 2019) which was applied to the upriver open boundary with modeled dry season and wet season shaded in purple and yellow respectively. Data from these time periods are summarized in Table 3-2.

3.4.4 Delft3D FM Flow Model Results

3.4.4.1 Modeled Flow Validation

The sparse documentation of flow discharges in the Demerara River limited the opportunity to validate model results. The modeled Delft3D FM Flow results were compared with the GRADES for validation purposes at a location near the new Bridge spill site (Figure 3-10). This location was selected for its relevance to the project, and for the sufficient distance downstream from the discharge boundary condition, where the Delft3D FM Flow model was forced with the GRADES discharge data. During the four-week period, the Delft3D FM Flow model had a mean discharge of 702.3 m3/s and the GRADES model had a mean discharge of 692.1 m3/s. The Delft3D FM model output shows good agreement with the GRADES dataset. There are some discrepancies in the two model discharges due to differences in bathymetry and other model parameters (e.g., wind forcing), however the two datasets follow a similar trend and have compatible means over the selected timeframe.

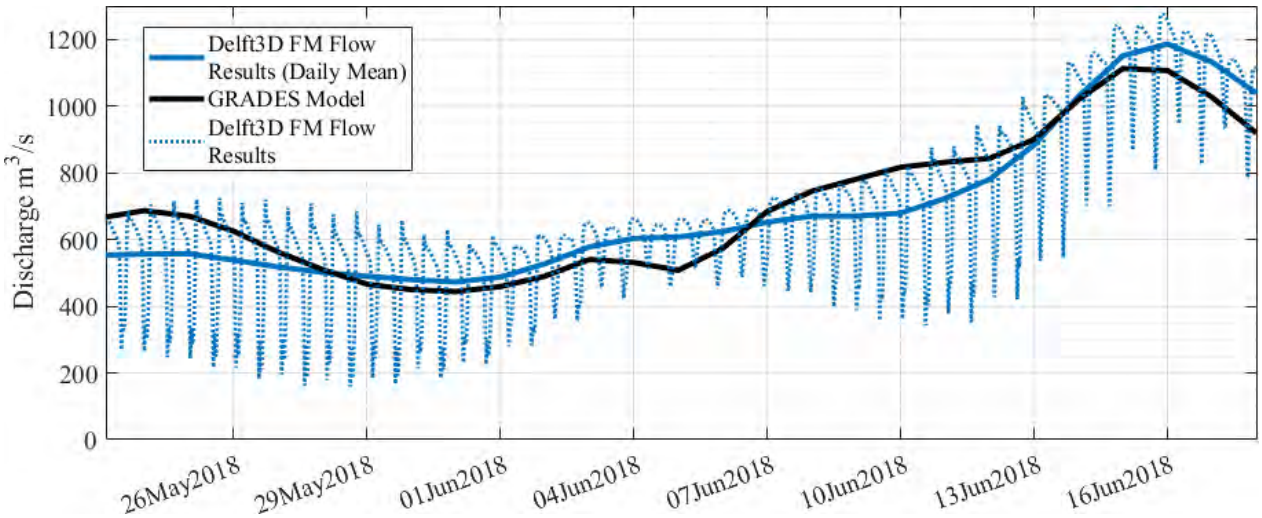


Figure 3-10. Comparison of the GRADES and Delft3D FM Flow results for discharge flux across a cross channel observation line near the new Bridge spill site during wet season modeling period.

3.4.4.2 Modeled Currents

The Delft3D FM Flow model application was used to generate current fields (U, V) in the AOI for use in the oil spill scenarios. The semi-diurnal tides are relatively strong along the Guyana shoreline, resulting in strong ebb and flood currents near the river entrance. The following figures describe the variability of current speed and direction near the potential spill site based on the hydrodynamic datasets:

- Timeseries for the MOF (Figure 3-11) and new Demerara River Bridge (Figure 3-12) spill sites during the dry season modeling period: Sea surface height (SSH) in addition to U and V component of the depth averaged currents near the spill sites;

- Timeseries for the MOF (Figure 3-13) and new Demerara River Bridge (Figure 3-14) spill sites during the wet season modeling period: SSH in addition to U and V component of the depth averaged currents near the spill sites;
- Snapshots of ebb and flood current intensity and direction map (Figure 3-15) for dry season modeling period: Spatial distribution of Delft3D FM Flow depth-averaged current speeds directions for a single flood currents (m/s) on March 05, 2018 at 05:30 AM, and ebb timestep on March 05, 2018 at 10:00 AM (right);
- Snapshots of ebb and flood current intensity and direction maps (Figure 3-16) for the wet season modeling period: Spatial distribution of Delft3D FM Flow depth-averaged current speeds directions for a single ebb timestep on June 12, 2018 at 03:00 PM, and flood currents at June 12, 2018, at 7:30 PM in m/s;

Based on the analysis of these Delft3D FM Flow model results, the maximum current speeds during a tidal cycle near the spill sites range from roughly 0.3 (neap tide) to 0.9 (spring tide) m/s on average.

The gridded timeseries of U and V components of the depth-averaged currents near the spill sites for both modeled periods were used as inputs in the spill modeling.

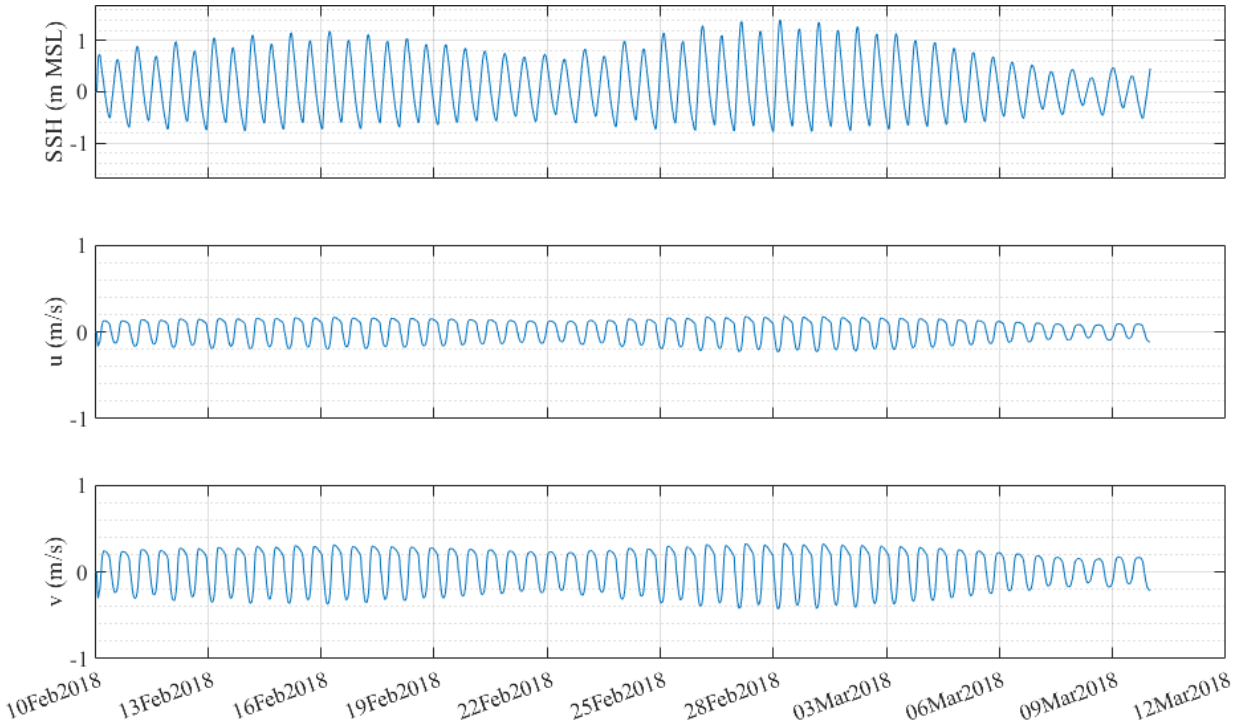


Figure 3-11. Example of timeseries of SSH in addition to U and V component of the depth averaged currents near the Demerara River MOF spill site for the dry season (March 2018) modeling period. Spring and neap portion of the tide were captured in each time series.

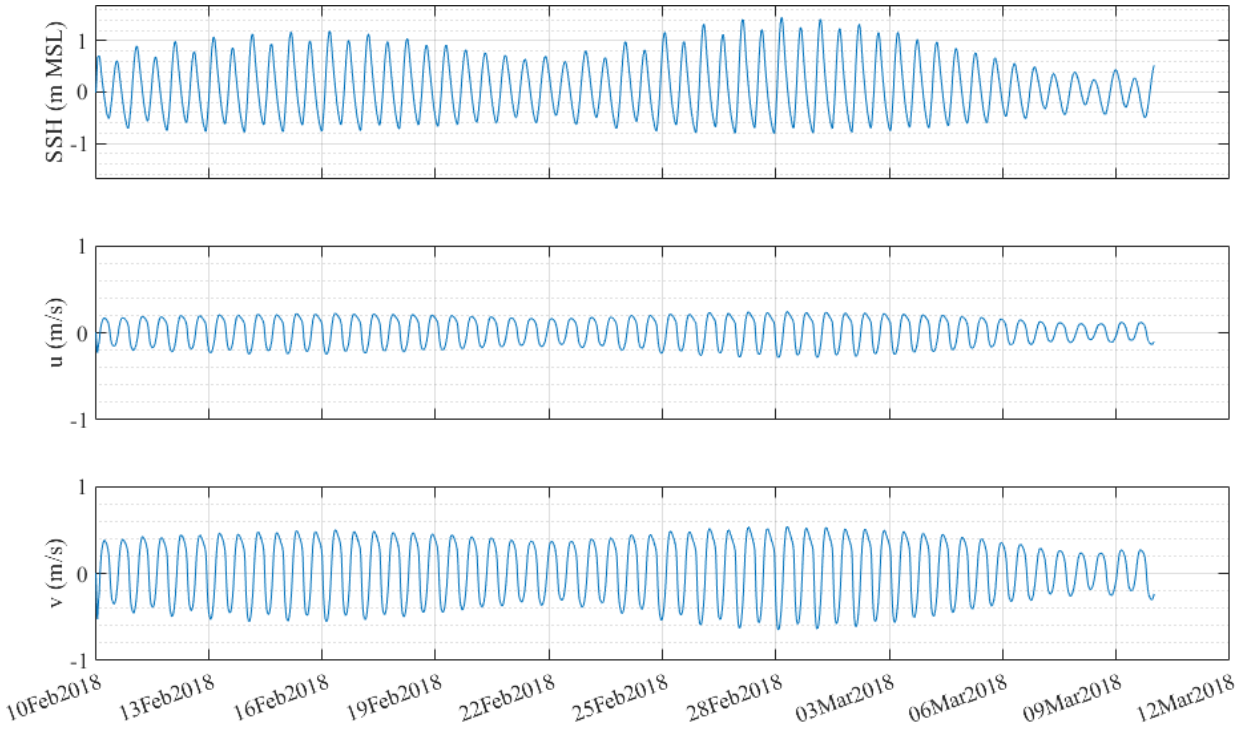


Figure 3-12. Example of timeseries of sea SSH in addition to U and V component of the depth-averaged currents at the new Demerara River Bridge spill site for the dry season (March 2018) modeling period. Spring and neap portion of the tide were captured in each time series.

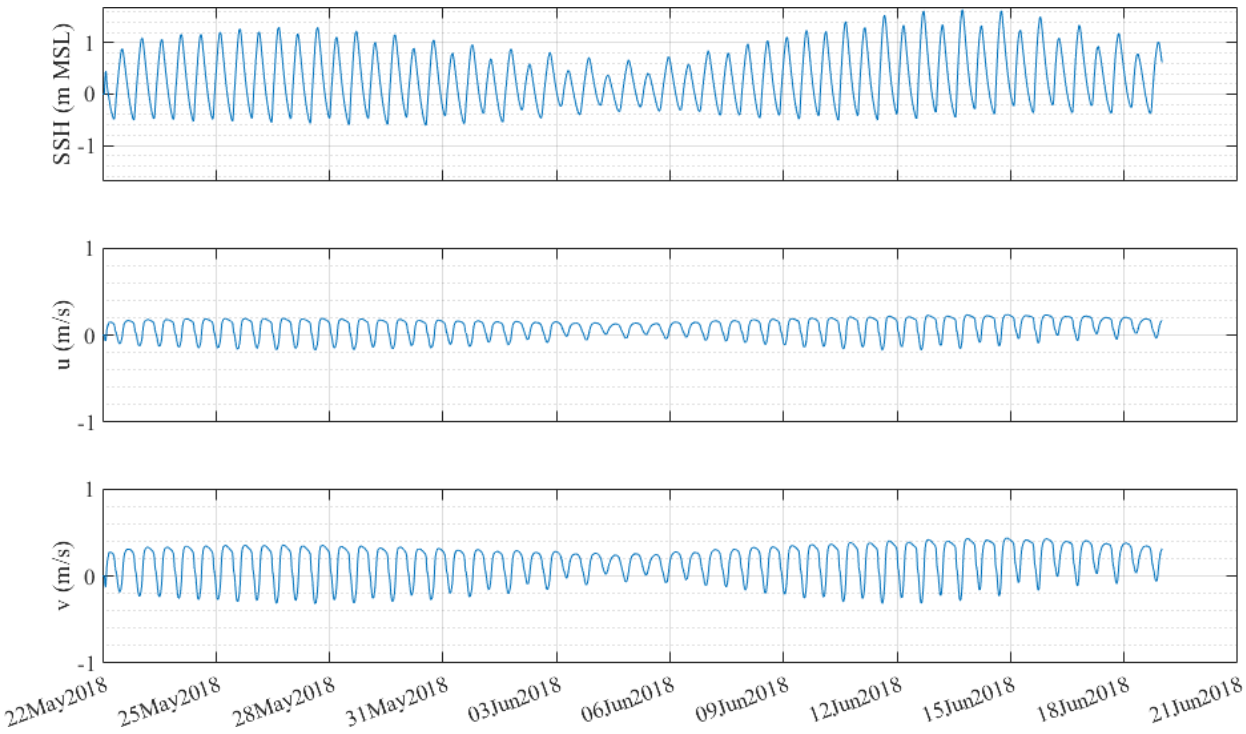


Figure 3-13. Example of timeseries of SSH in addition to U and V component of the depth averaged currents near the Demerara River MOF spill site for the wet season (June 2018) modeling period. Spring and neap portion of the tide were captured in each time series.

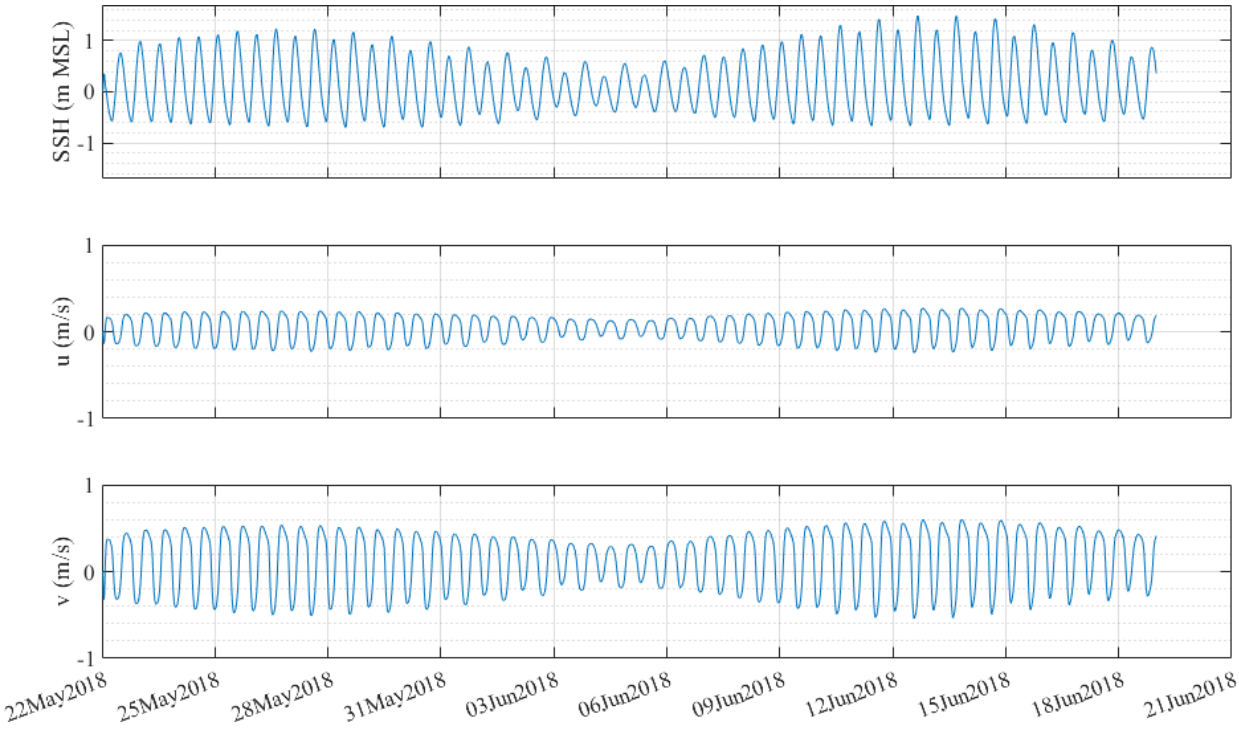


Figure 3-14. Example of timeseries of SSH in addition to U and V component of the depth averaged currents near the new Demerara River Bridge spill site location for the wet season (June 2018) modeling period. Spring and neap portion of the tide were captured in each time series.

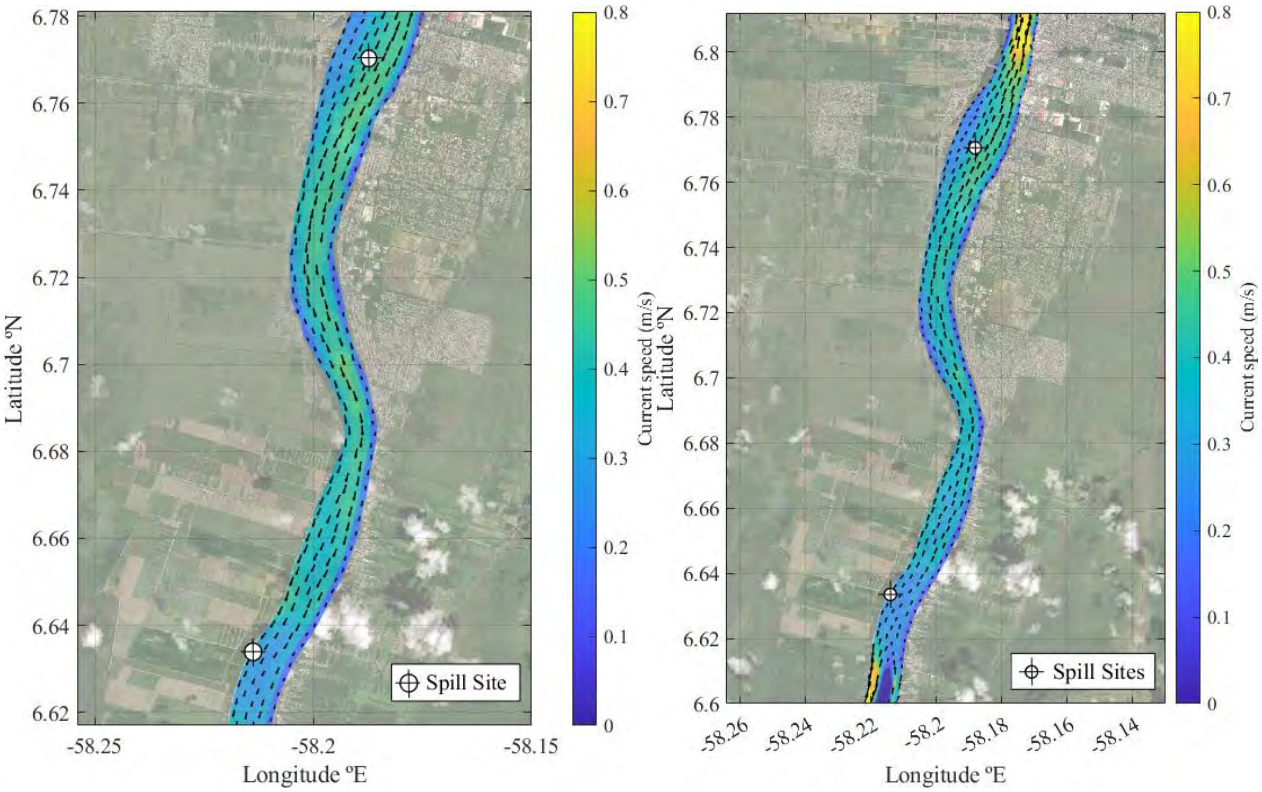


Figure 3-15. Example snapshots of flood currents (m/s) on March 05, 2018 at 05:30 AM (left) and ebb currents (m/s) in dry season on March, 05, 2018 at 10:00 AM (right). Color contours represent velocity magnitude, while vectors indicate both direction and relative magnitude of the depth averaged velocity.

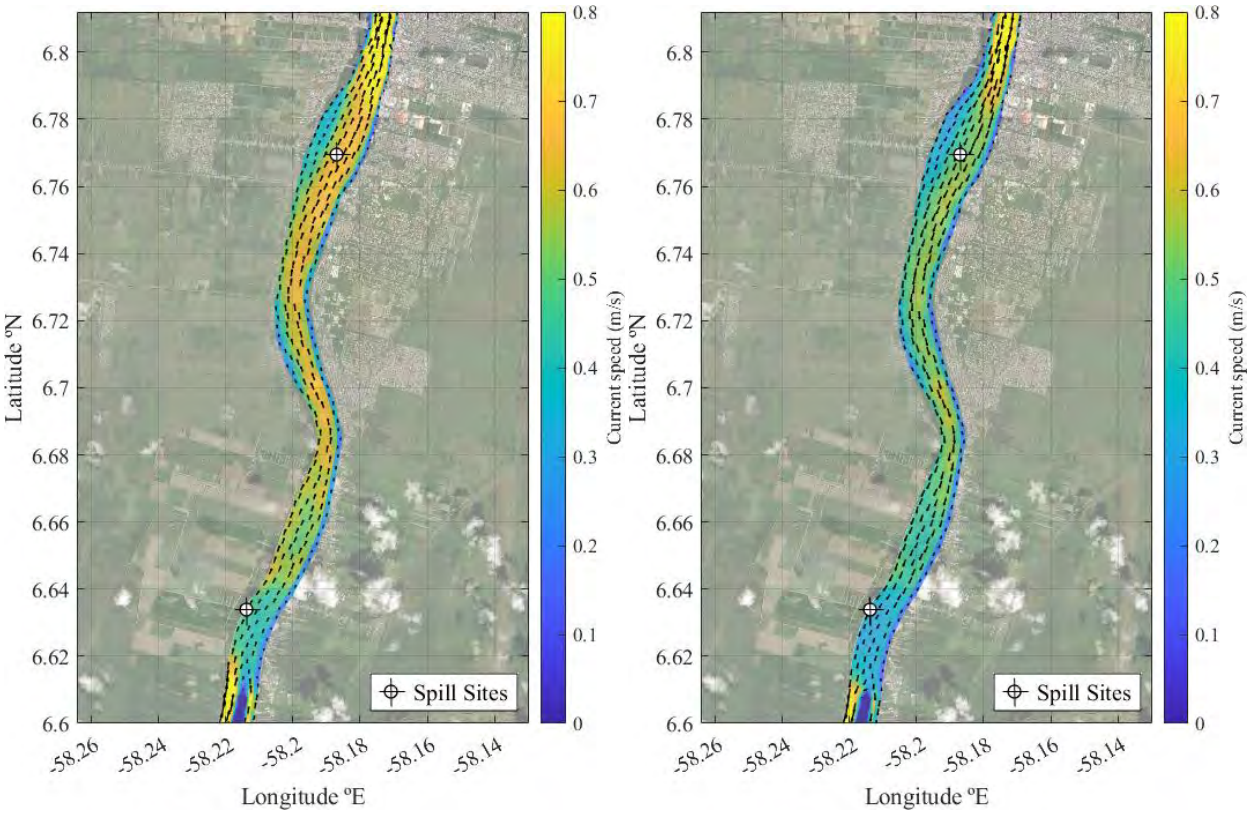


Figure 3-16. Example snapshot of ebb currents (m/s) for wet season on June 12, 2018 at 03:00 PM (left) and flood currents (m/s) on June 12 2018 at 7:30 PM (right). Color contours represent velocity magnitude, while vectors indicate both direction and relative magnitude of the depth averaged velocity.

4 MODEL APPROACH

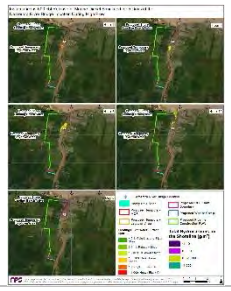
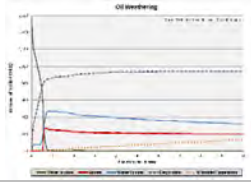
Oil spill trajectory and fate models are used to predict the consequences from spills. As such they are focused on simulating the transport of spilled oil and the interactions of that oil within the different parts of the physical and biological environments. Spill models use a “scenario” to define the location, volume, product, and other parameters of a spill event as inputs to a spill simulation.

The modeling for this study was conducted using RPS’ SIMAP (Spill Impact Model Application Package) oil spill modeling system. The SIMAP three-dimensional physical fates model calculates the distribution (as mass and concentrations) of whole oil and oil components on the water surface, on shorelines, in the water column, and in sediments. Oil fate processes included are oil spreading (gravitational and by shearing), evaporation, transport, randomized dispersion, emulsification, entrainment (natural and facilitated by dispersant), dissolution, volatilization of dissolved hydrocarbons from the surface water, adherence of oil droplets to suspended sediments, adsorption of soluble and sparingly-soluble aromatics to suspended sediments, sedimentation, and degradation. Description of the blowout and physical fates models and descriptions of deterministic simulations can be found in the previous report (Rowe et al., 2018b).

5 OIL SPILL MODEL RESULTS

The model results are presented in maps and mass balance plots by spill location and river flow condition. Oiled shorelines depicted on the particle maps are determined by the presence of any oil amount regardless of a thickness threshold. For each scenario, a figure showing the location of surface and shoreline oil at the end of the simulation and a tiled figure showing multiple timesteps (1, 4, 6, 12 hours, and 5 days) throughout the simulation are provided. Additional tiled maps showing the concentrations of floating surface oil and total hydrocarbons on the shoreline are also provided.

Table 5-1. List of the model output products provided.

Deterministic Simulations	*Trajectory maps – end of simulation*	Maps of the surface oil and shoreline oil contamination at the end of the simulation (5 days).	
	Tiled Trajectory maps	Maps of the surface oil and shoreline oil contamination at selected timesteps throughout the simulation (1, 4, 6, 12 hours, and 5 days).	
	Tiled Floating and Shoreline Concentration maps	Maps of the surface floating and shoreline concentrations at selected timesteps throughout the simulation (1, 4, 6, 12 hours, and 5 days). Note that 1 g/m^2 equivalent to ~1 µm thickness on average over a grid cell.	
	Mass Balance	Plots presenting the location of oil in the environment over time.	

A summary of the mass balance at the end of the 5-day simulations in percent of released mass is provided in Table 5-2. The deterministic results are also summarized in tables listing the sea surface area swept by oil with a thickness greater than 1 µm (1 g/m^2 on average over the grid cell), the length of shoreline oiled with a thickness greater than 1 µm (1 g/m^2 on average over the grid cell), and the time to shore for the selected representative deterministic scenarios (Table 5-3).

Table 5-2. Representative worst-case scenario mass balance at the end of the simulation as percent (%) of the total volume of oil released.

Scenario	Surface	Water Column	Ashore	Evaporated	Degradation	Sediment
Demerara River Bridge Instantaneous 500 bbl Marine Diesel Spill High River Flow	0.0	5.1	19.2	75.2	0.5	<0.1
Demerara River Bridge Instantaneous 500 bbl Marine Diesel Spill Low River Flow	0.0	7.8	20.9	70.1	1.2	<0.1
MOF Instantaneous 500 bbl Marine Diesel Spill High River Flow	0.0	0.1	30.5	69.1	0.3	<0.1
MOF Instantaneous 500 bbl Marine Diesel Spill Low River Flow	0.0	0.2	30.0	69.5	0.3	<0.1

Table 5-3. Oil effects summary for the determinitsic spill events. Surface area is the maximum area swept above a threshold of 1 µm (1 g/m^2 on average) thick. Shoreline length is length of shoreline oiled above a threshold of 1 µm (1 g/m^2 on average) thick.

Scenario	Surface Area (km^2)	Shoreline Length (km)	Minimum Time to Shore (hours)
Demerara River Bridge Instantaneous 500 bbl Marine Diesel Spill High River Flow	51	2.9	1.6
Demerara River Bridge Instantaneous 500 bbl Marine Diesel Spill Low River Flow	72	3.1	5.6
MOF Instantaneous 500 bbl Marine Diesel Spill High River Flow	8	2.9	<1
MOF Instantaneous 500 bbl Marine Diesel Spill Low River Flow	10	3.4	<1

5.1 Demerara River Bridge – High River Flow

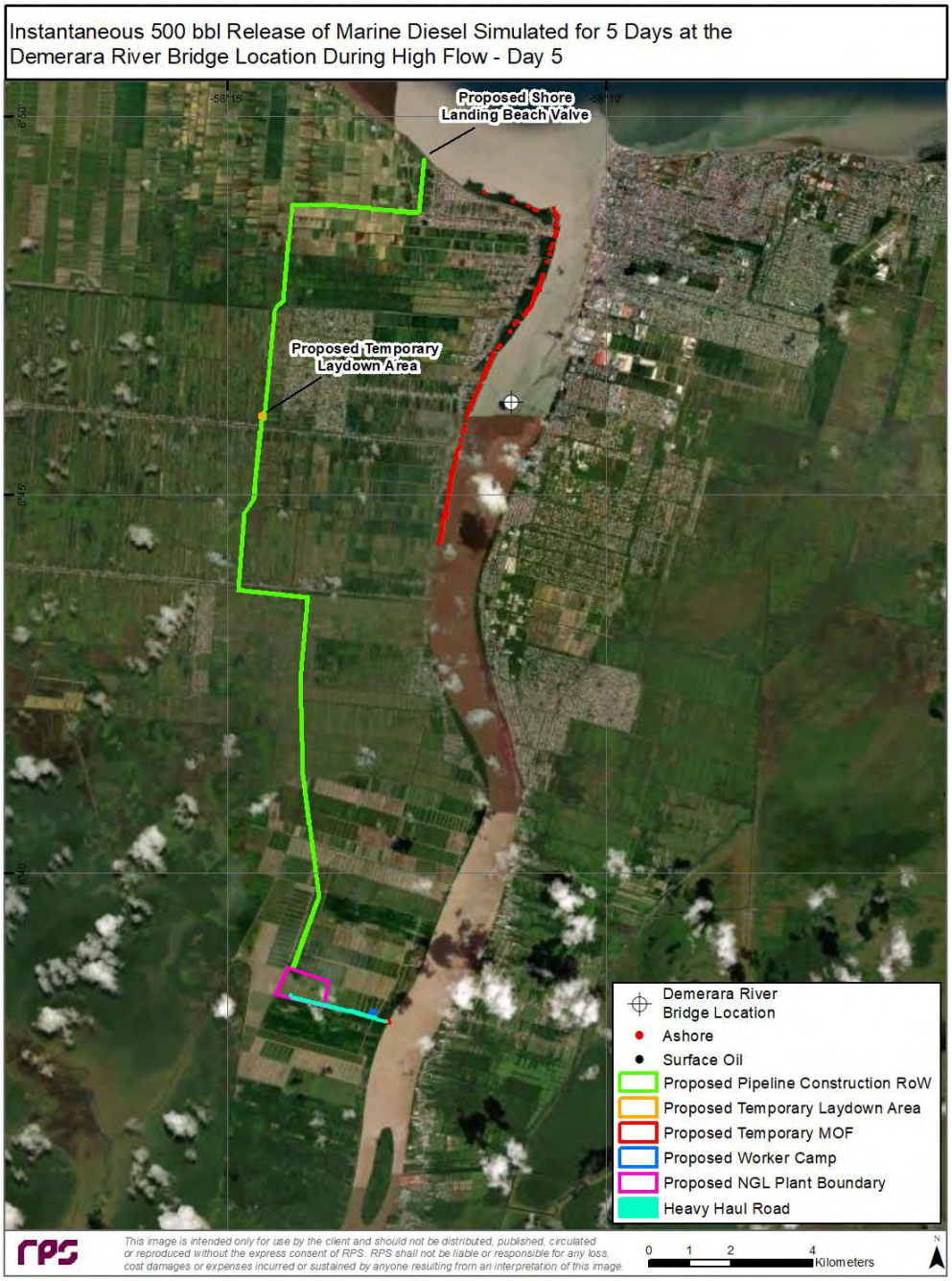


Figure 5-1. Location of surface and shore oil at the end of the 5-day simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River Bridge location during High River Flow.

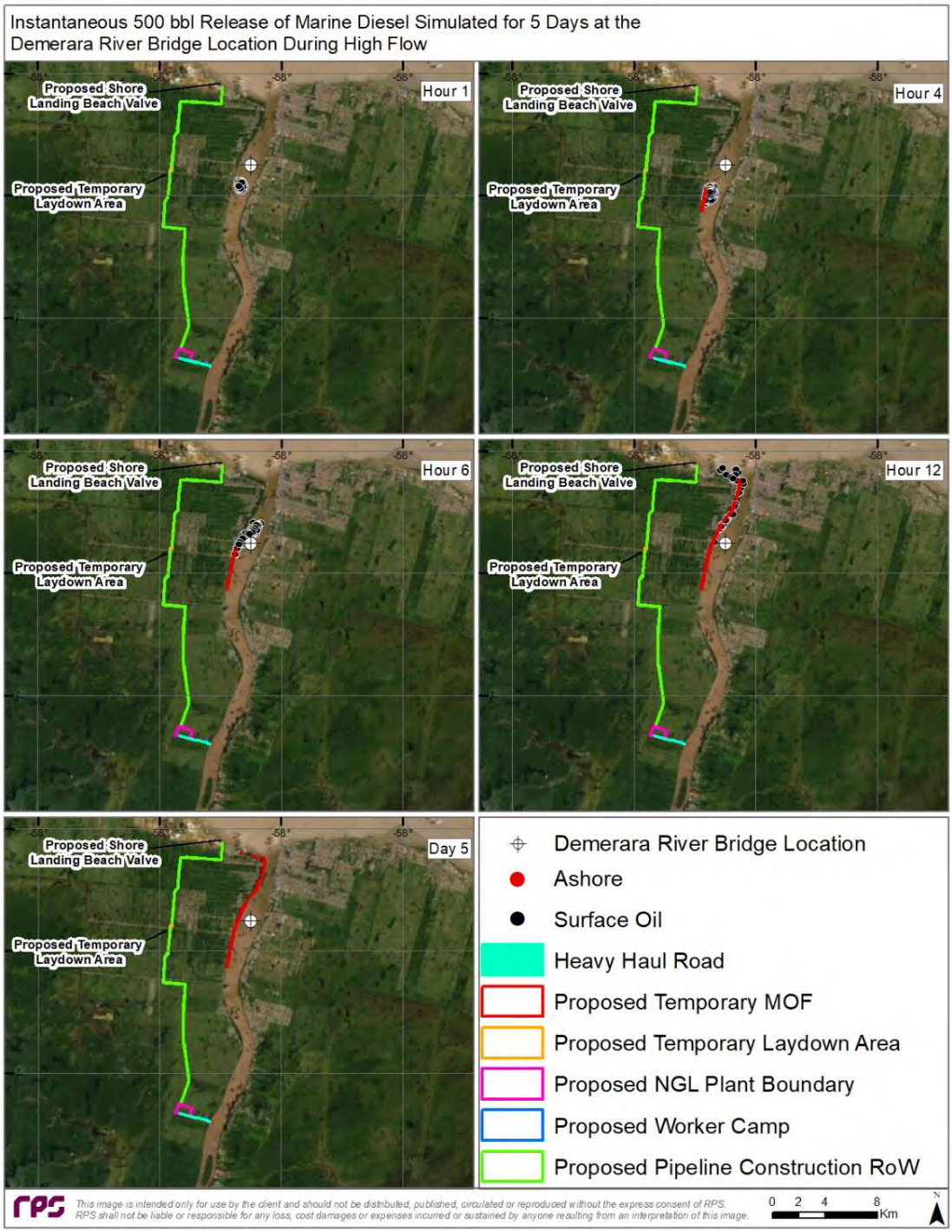


Figure 5-2. Location of surface and shore oil 1 hr, 4 hr, 6 hr, 12 hr, and 5 days into the simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River Bridge location during High River Flow.

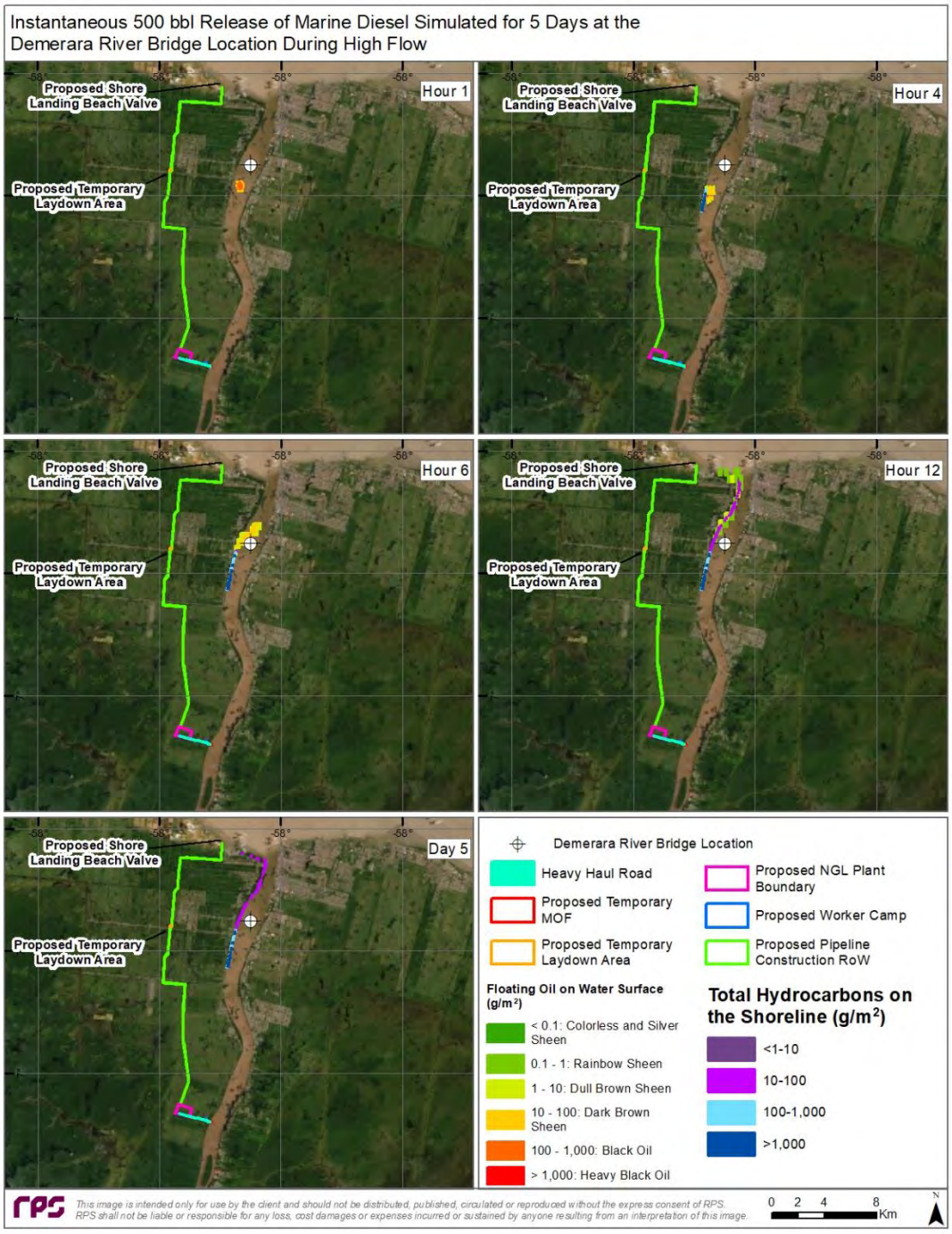


Figure 5-3. Floating surface oil and total hydrocarbon concentrations on the shoreline 1 hr, 4 hr, 6 hr, 12 hr, and 5 days into the simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River Bridge location during High River Flow.

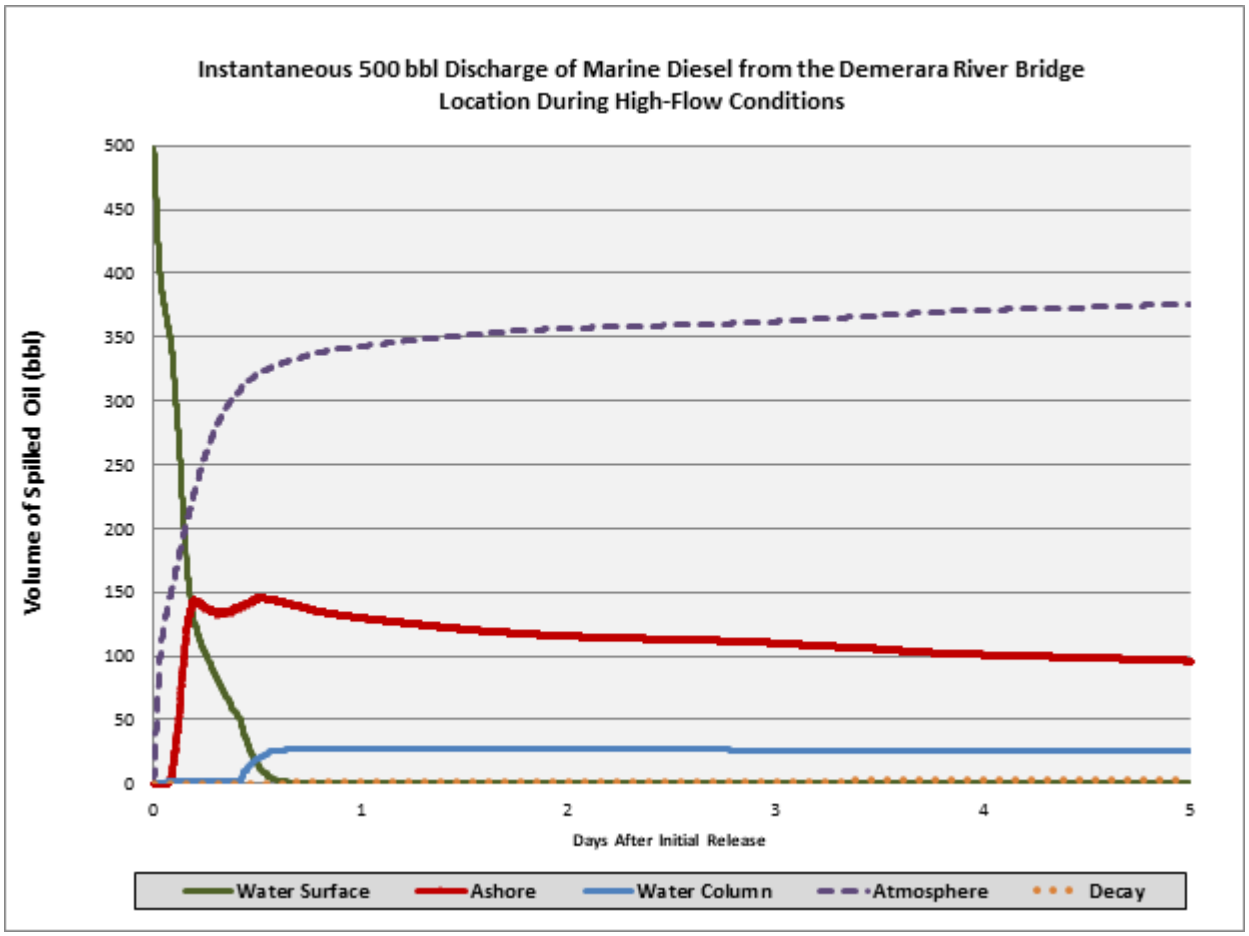


Figure 5-4. Mass balance plot (bottom) for a 5-day simulation of the representative high river flow scenario for a 500 bbl spill of Marine Diesel at the Demerara River Bridge location.

5.2 Demerara River Bridge – Low River Flow

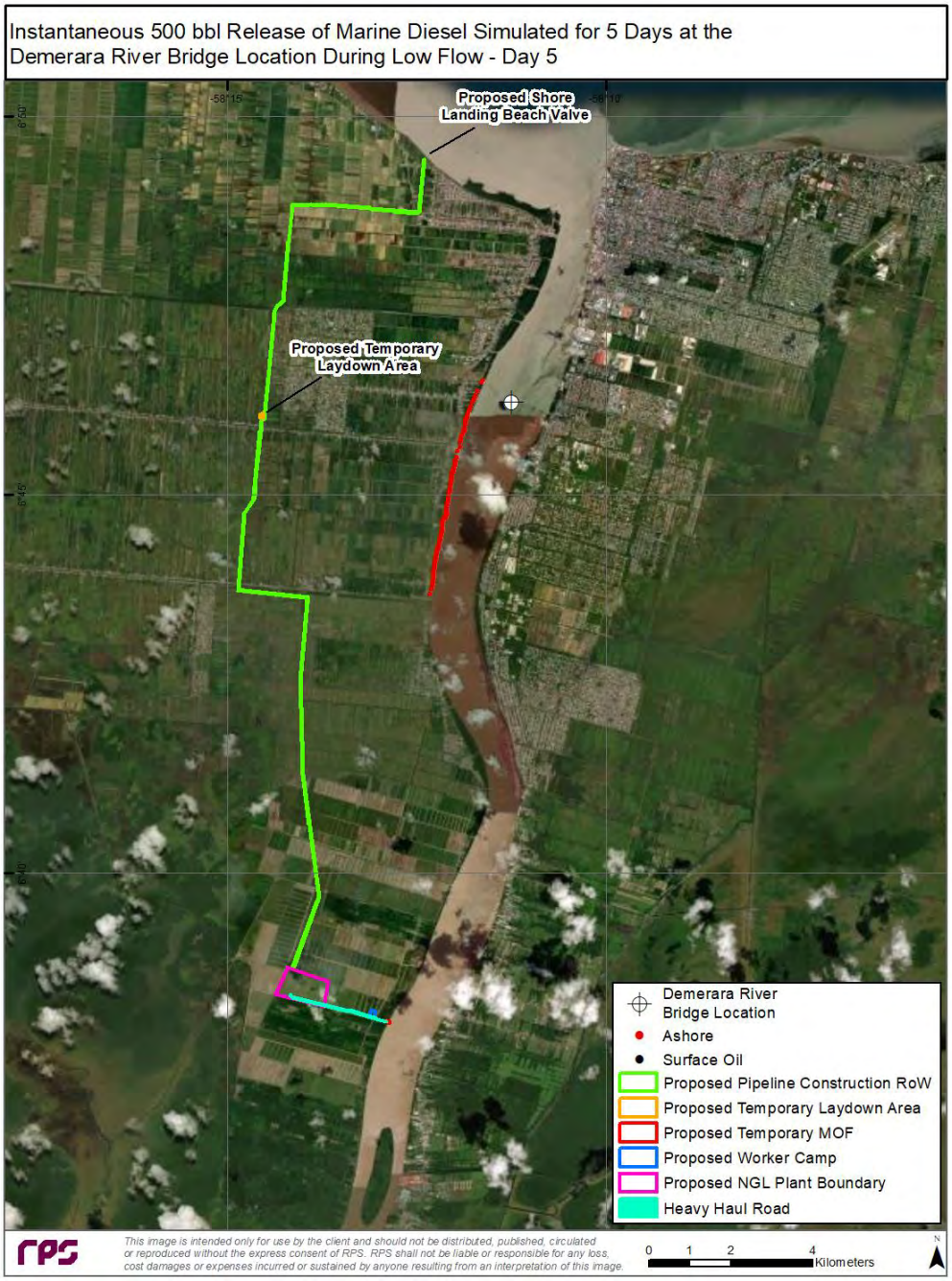


Figure 5-5. Location of surface and shore oil at the end of the 5-day simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River Bridge location during Low River Flow.

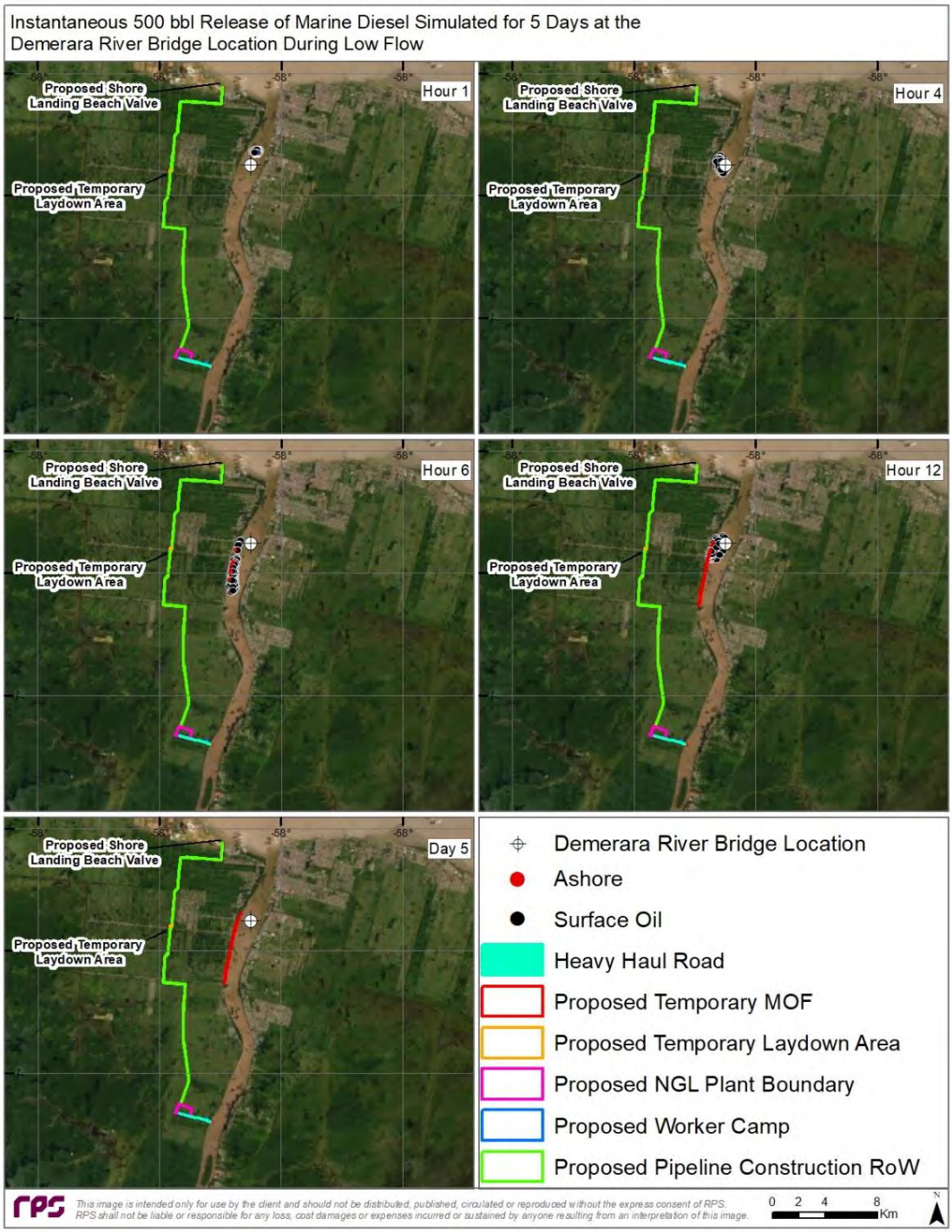


Figure 5-6. Location of surface and shore oil 1 hr, 4 hr, 6 hr, 12 hr, and 5 days into the simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River Bridge location during Low River Flow.

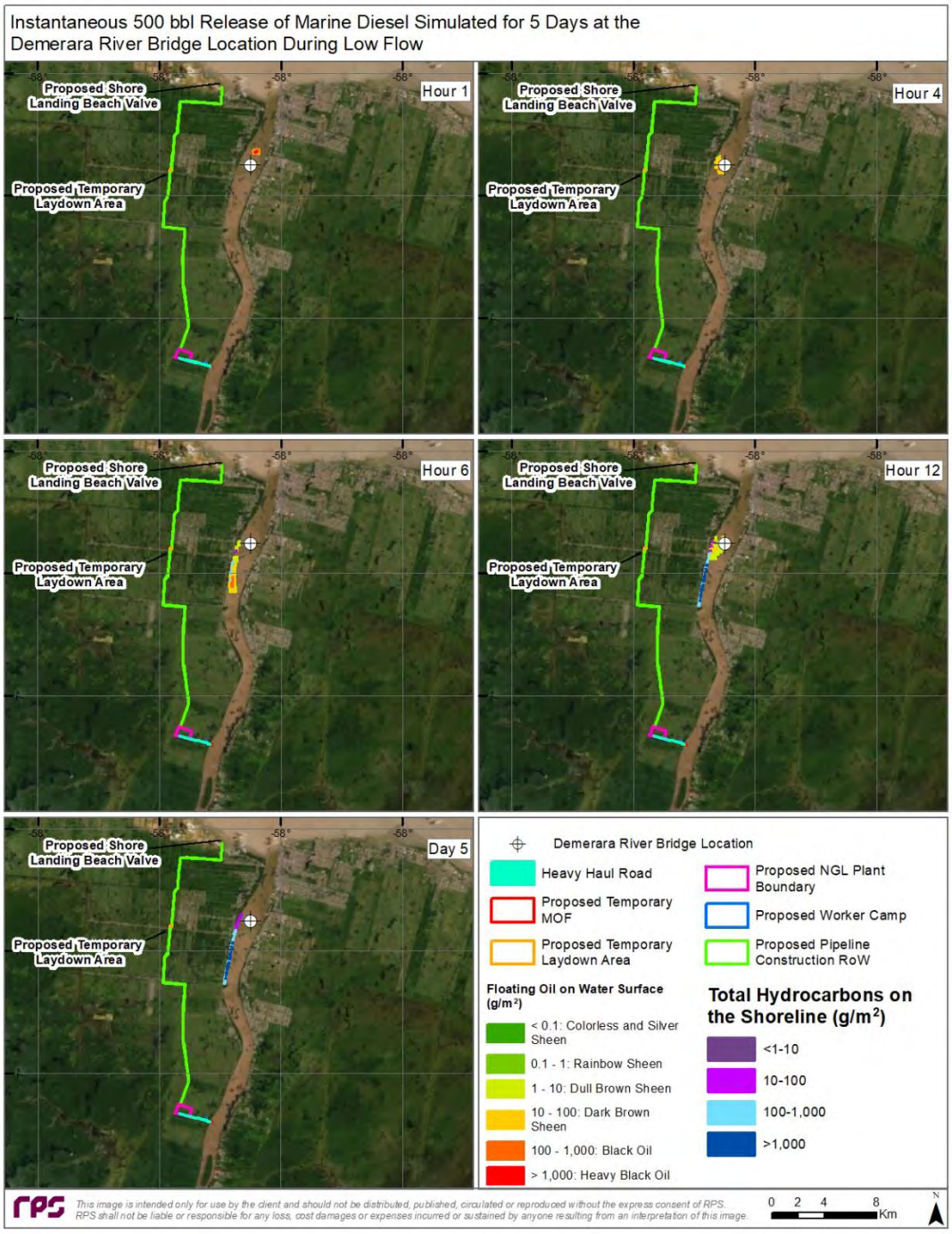


Figure 5-7. Floating surface oil and total hydrocarbon concentrations on the shoreline 1 hr, 4 hr, 6 hr, 12 hr, and 5 days into the simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River Bridge location during Low River Flow.

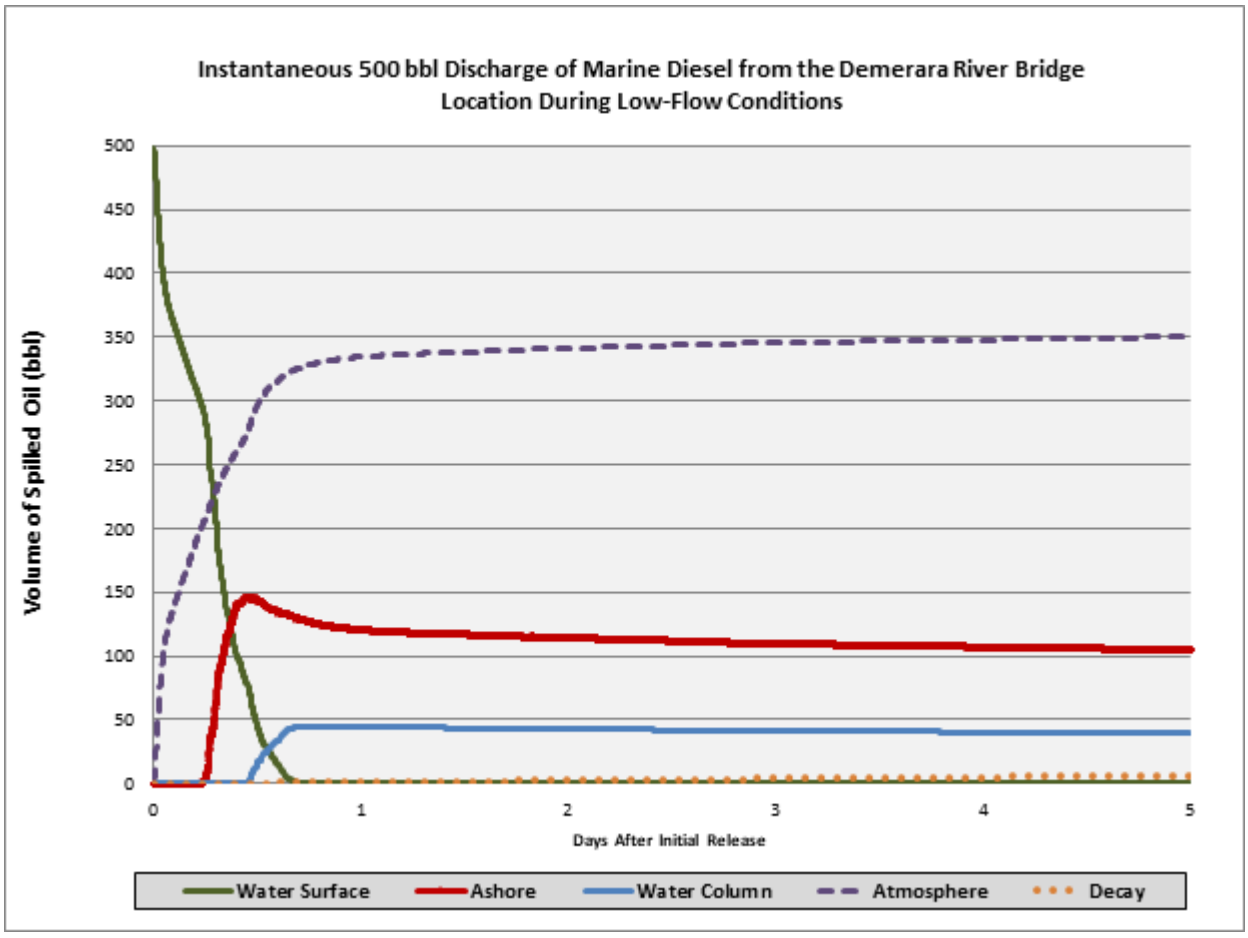


Figure 5-8. Mass balance plot for a 5-day simulation of the representative low river flow scenario for a 500 bbl spill of Marine Diesel at the Demerara River Bridge location.

5.3 Demerara River MOF – High River Flow

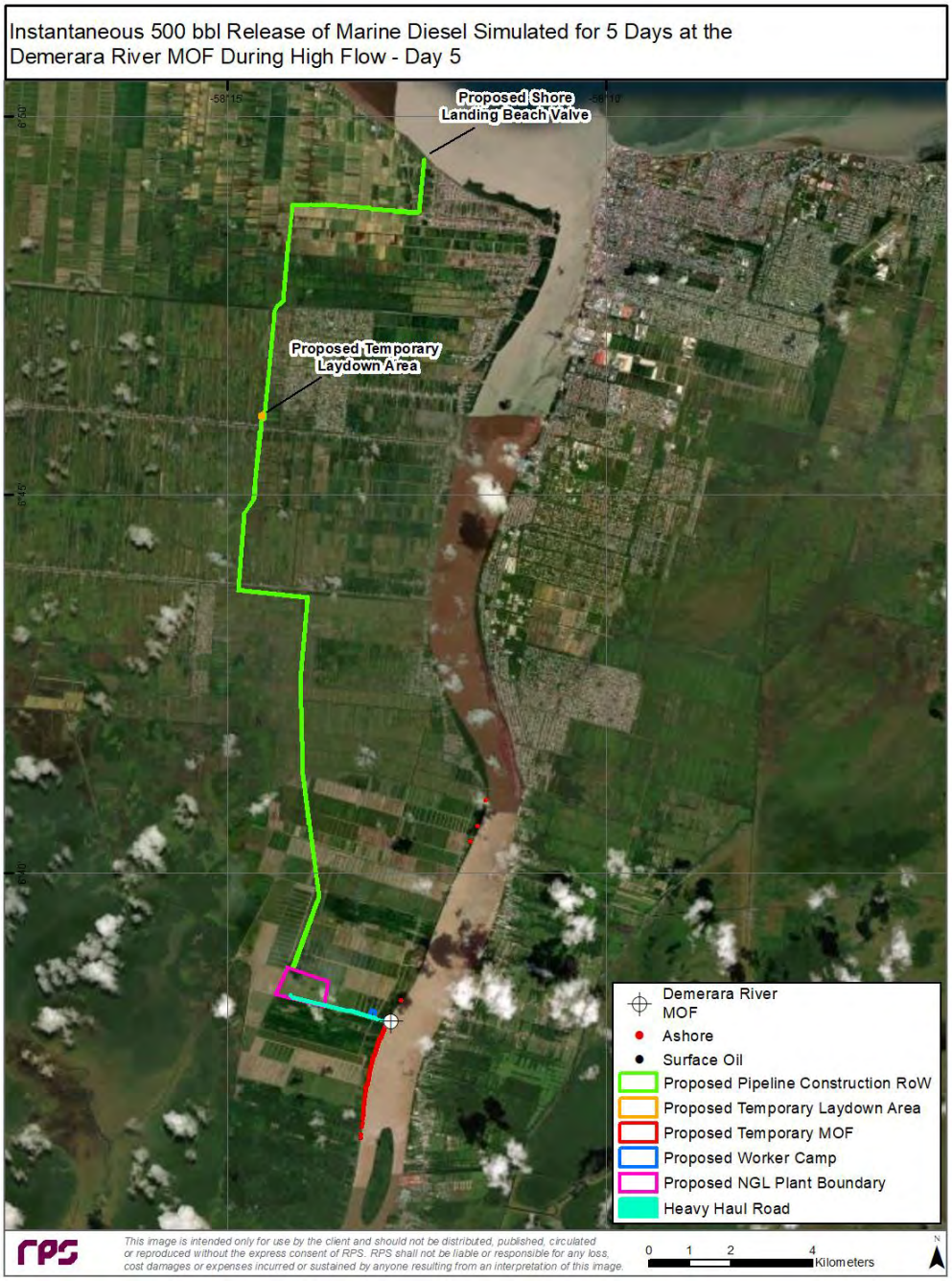


Figure 5-9. Location of surface and shore oil at the end of the 5-day simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River MOF location during High River Flow.

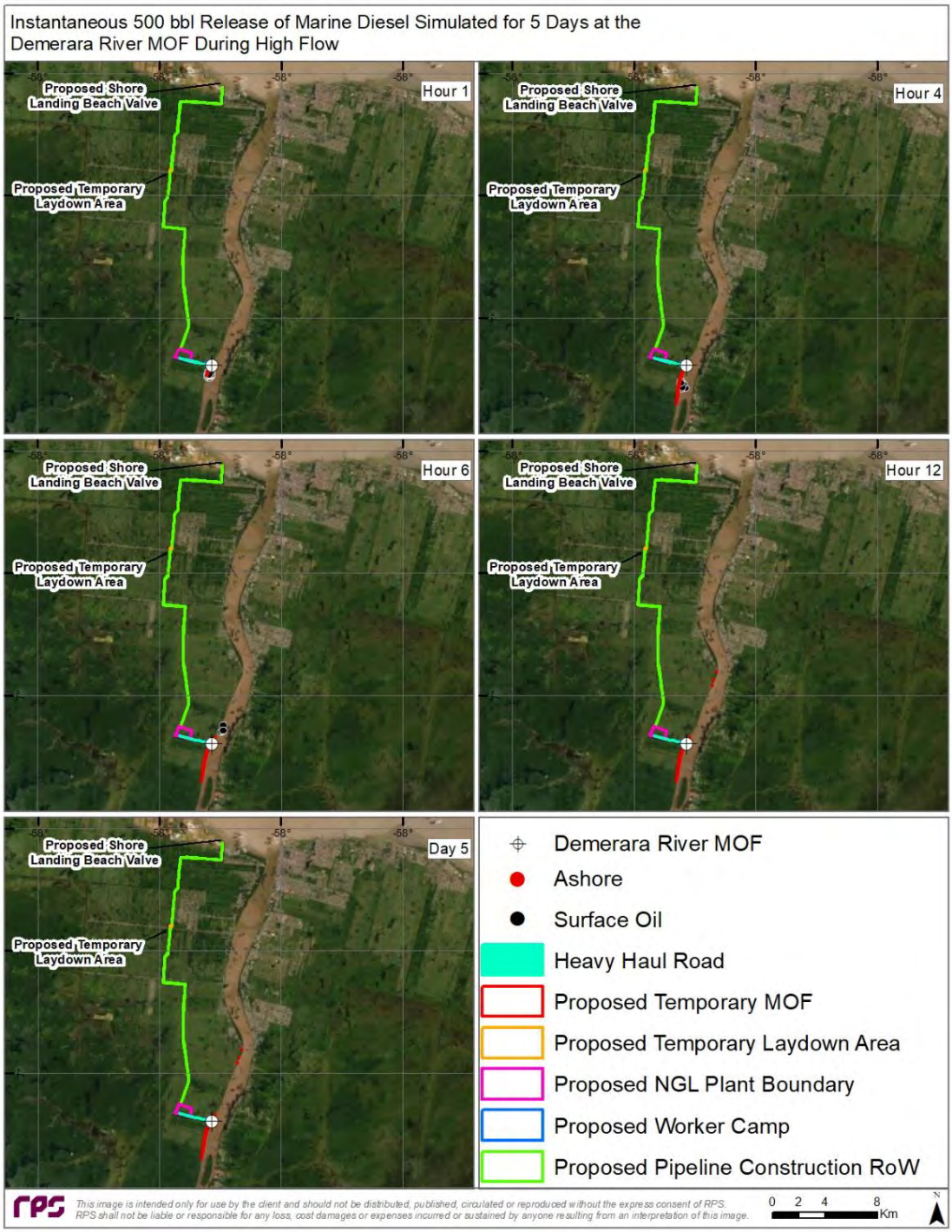


Figure 5-10. Location of surface and shore oil 1 hr, 4 hr, 6 hr, 12 hr, and 5 days into the simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River MOF location during High River Flow.

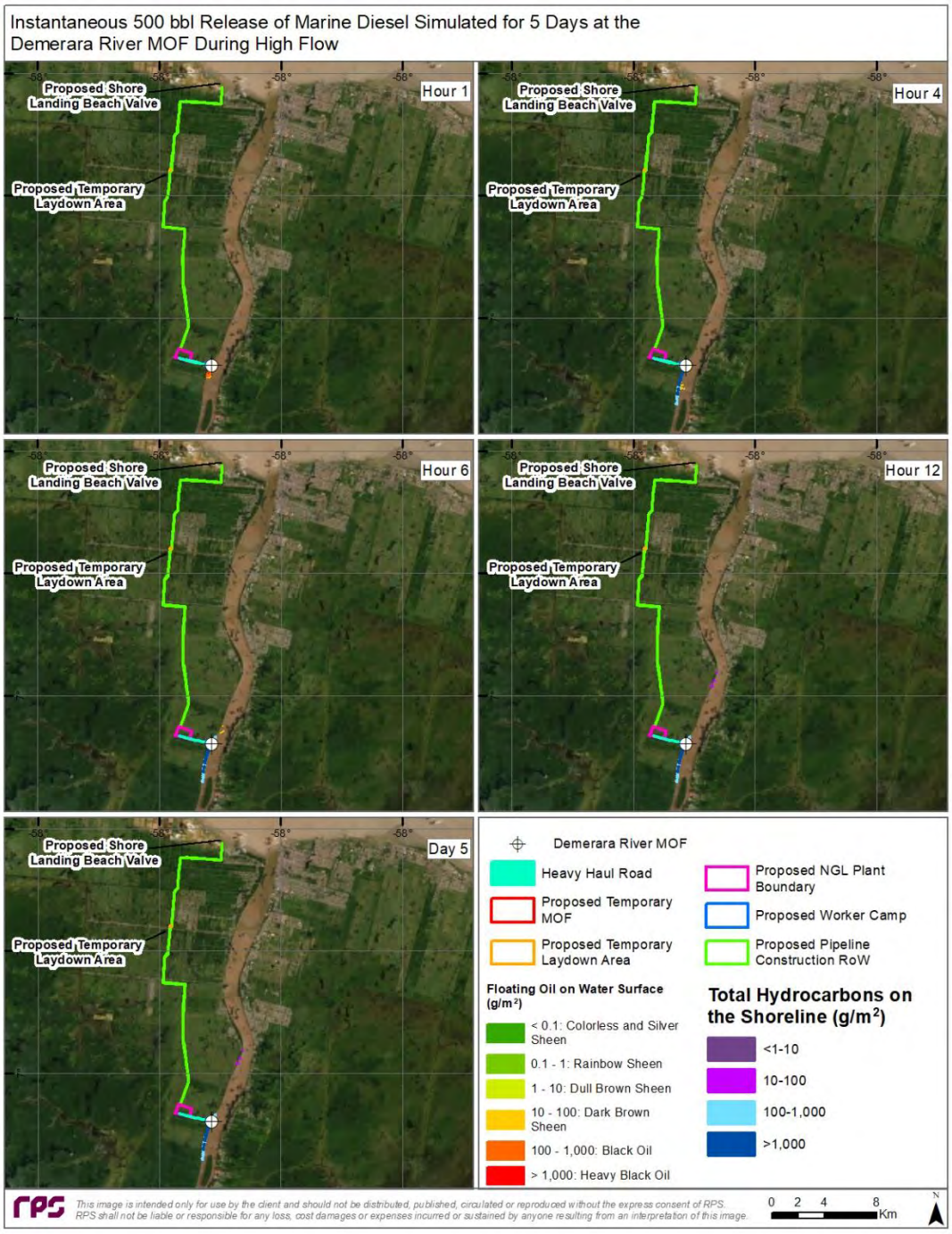


Figure 5-11. Floating surface oil and total hydrocarbon concentrations on the shoreline 1 hr, 4 hr, 6 hr, 12 hr, and 5 days into the simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River MOF location during High River Flow.

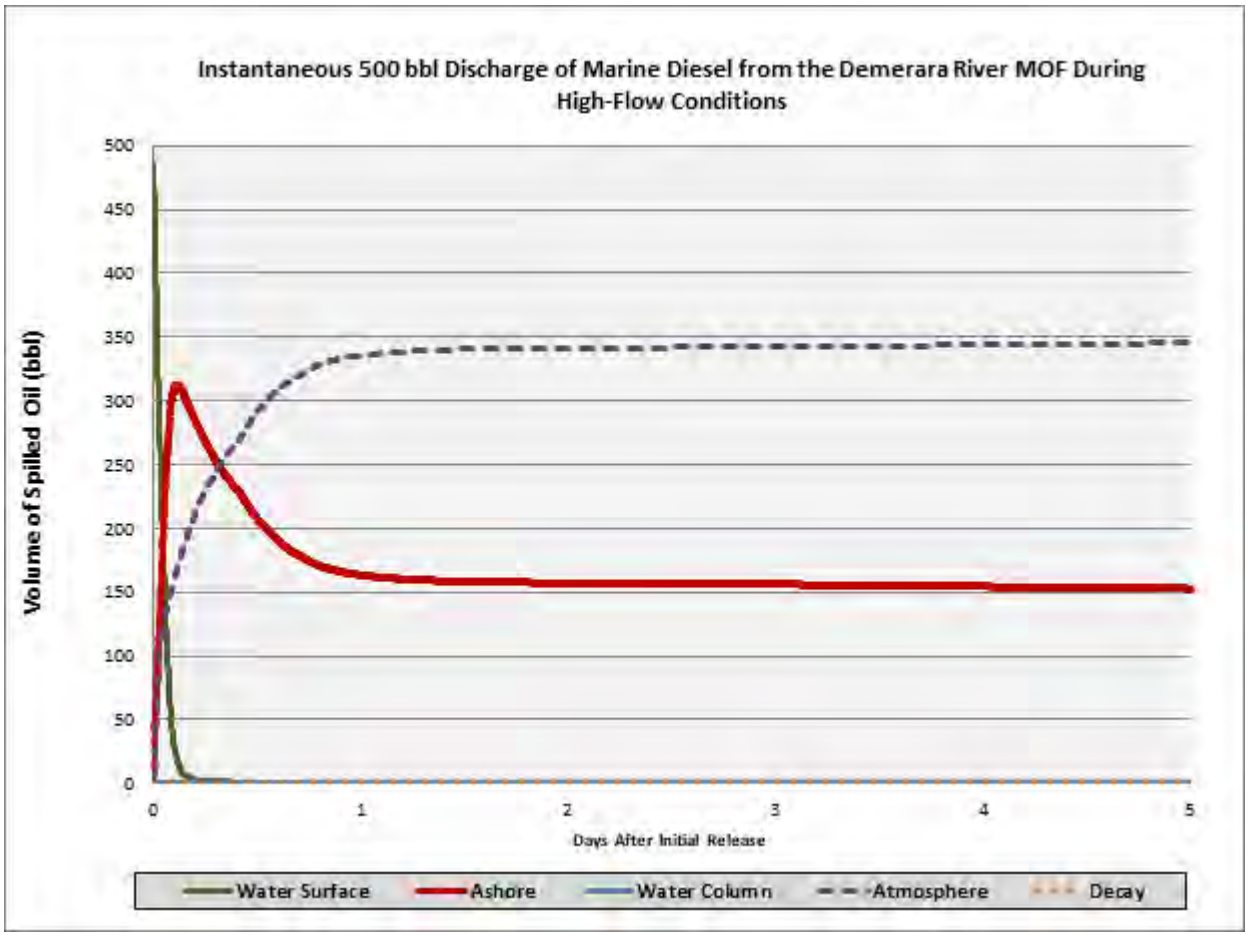


Figure 5-12. Mass balance plot for a 5-day simulation of the representative high river flow scenario for a 500 bbl spill of Marine Diesel at the Demerara River MOF location.

5.4 Demerara River MOF – Low River Flow

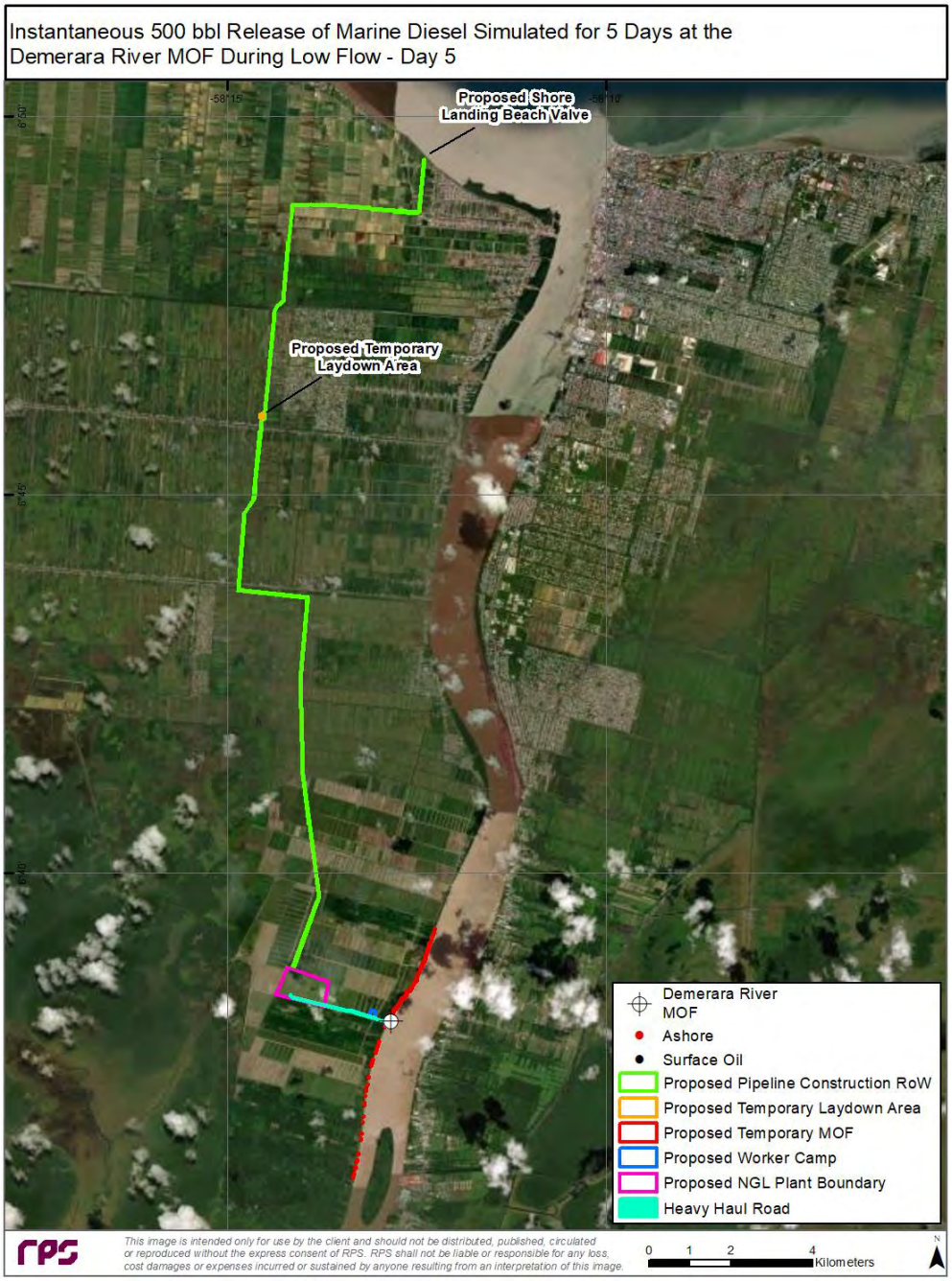


Figure 5-13. Location of surface and shore oil at the end of the 5-day simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River MOF location during Low River Flow.

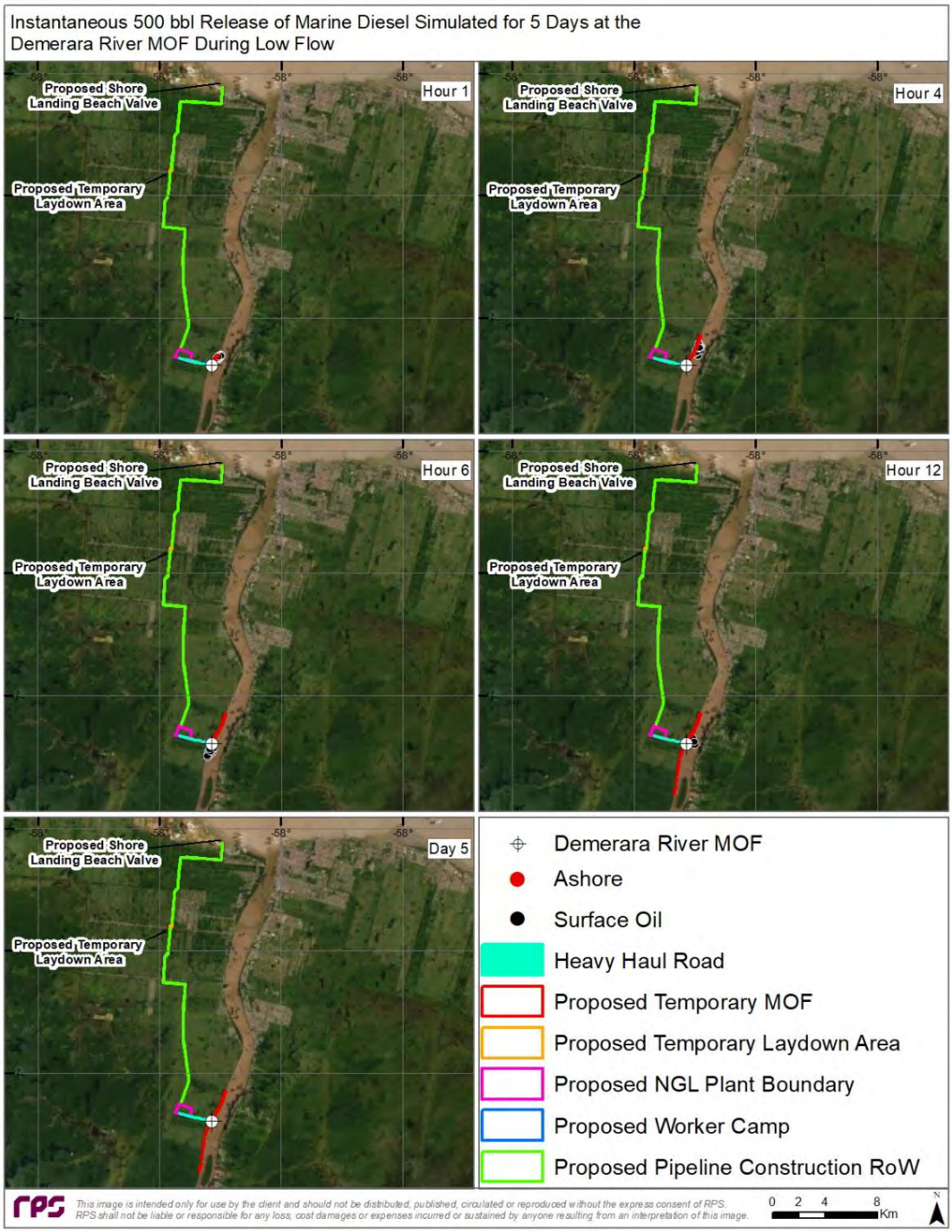


Figure 5-14. Location of surface and shore oil 1 hr, 4 hr, 6 hr, 12 hr, and 5 days into the simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River MOF location during Low River Flow.

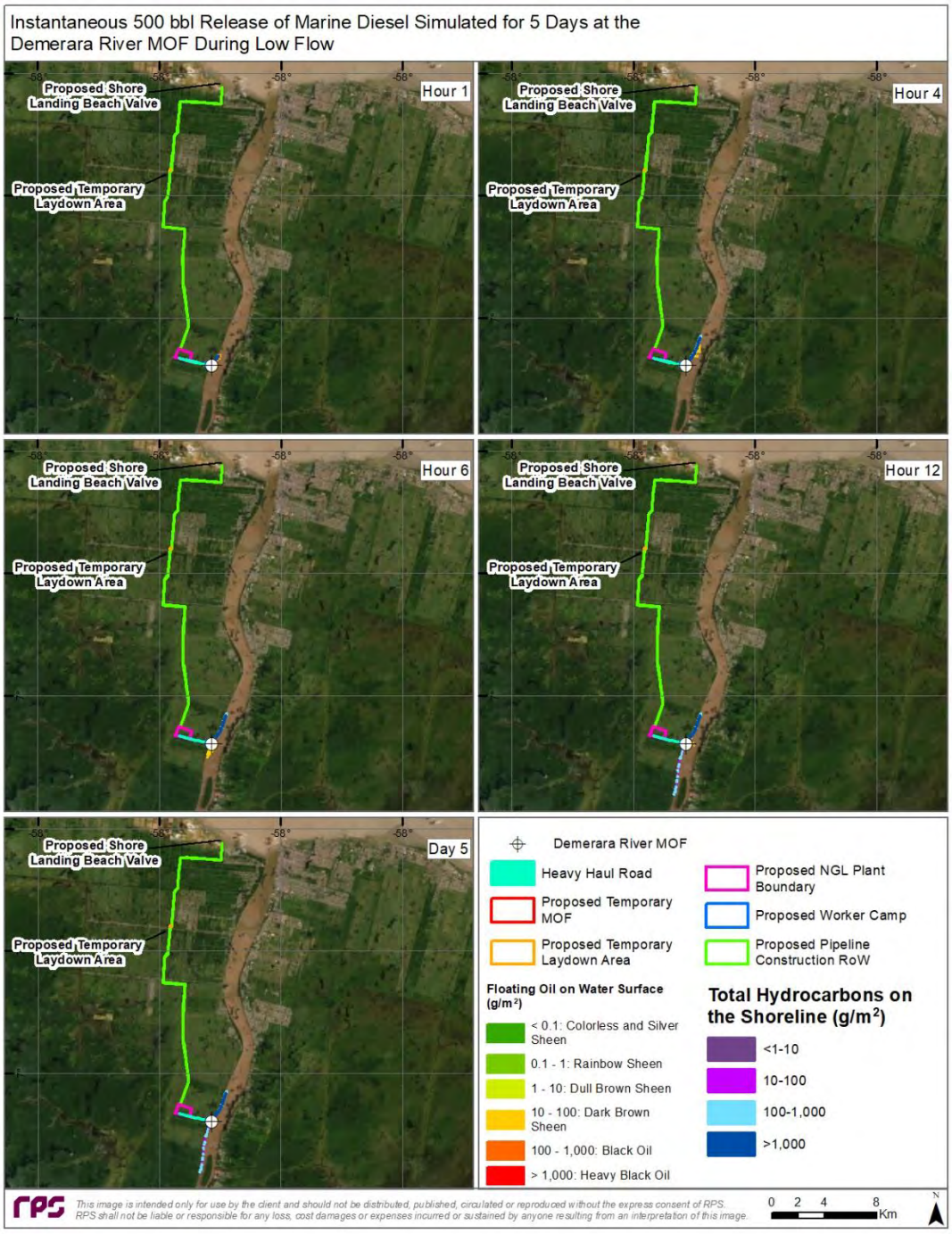


Figure 5-15. Floating surface oil and total hydrocarbon concentrations on the shoreline 1 hr, 4 hr, 6 hr, 12 hr, and 5 days into the simulation for a 500 bbl instantaneous Marine Diesel spill at the Demerara River MOF location during Low River Flow.

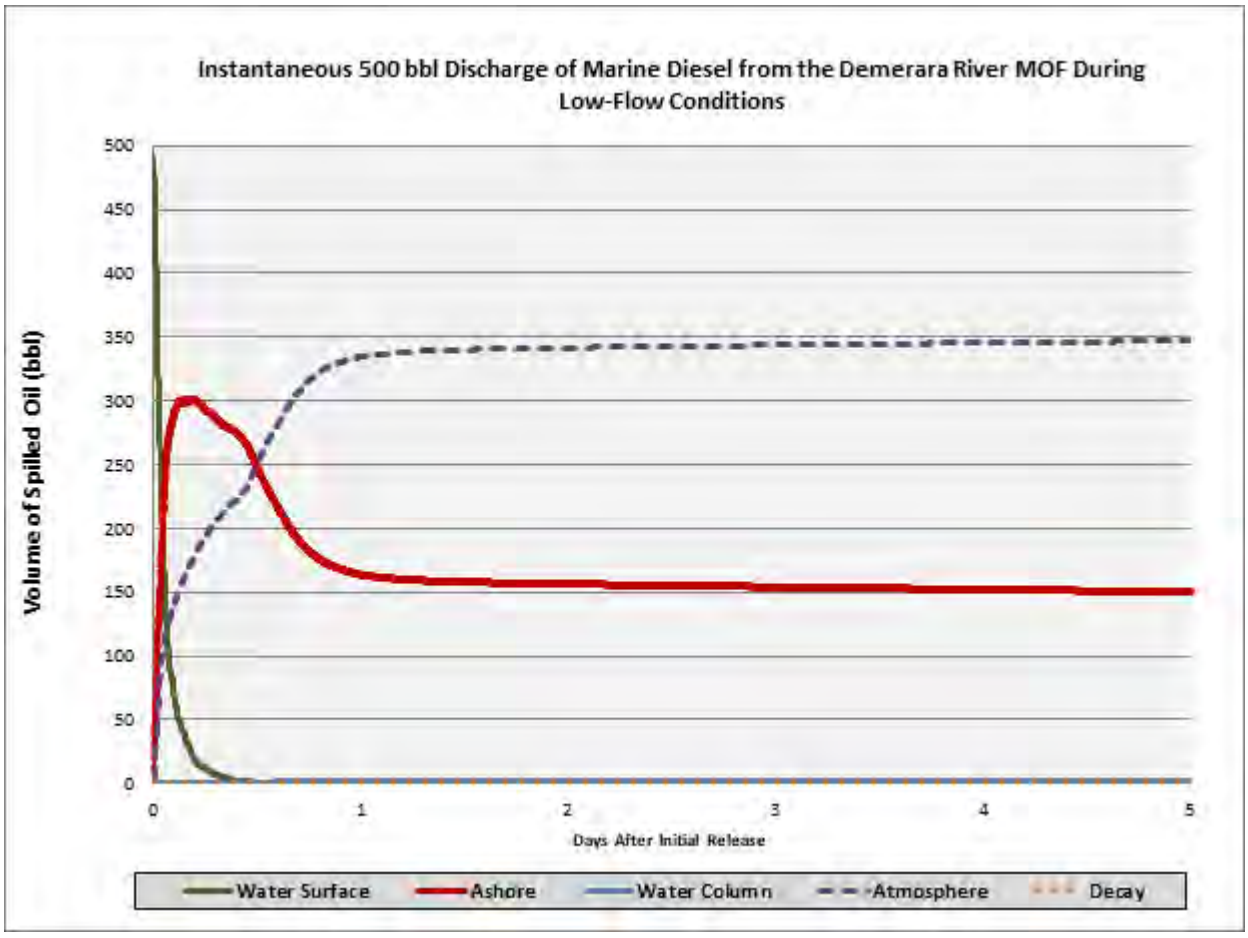


Figure 5-16. Mass balance plot for a 5-day simulation of the representative low river flow scenario for a 500 bbl spill of Marine Diesel at the Demerara River MOF location.

6 SUMMARY AND CONCLUSIONS

For all modeled scenarios, the released oil is predicted to travel from the spill sites towards the western shorelines. For the Demerara River Bridge location, there are some oil particles that are predicted to travel out of the river during high flow conditions due to proximity of the spill site to the mouth. During low flow conditions, oil travels to the western shorelines but does not travel downstream. At the MOF location, oil is discharged close to the shoreline and reaches the western shorelines in both the high and low river flow scenarios in less than 1 hour.

In general, the released diesel evaporates quickly, with ~70% of the oil evaporated within the first day for all modeled scenarios. Approximately 19 to 31% of the total volume released is predicted to strand on shorelines at the end of the 5-day simulation along an approximate 3 km stretch. Note that there is no surface oil predicted to be floating on the water surface at the end of the simulation period in any of the modeled scenarios as much of it evaporated or stranded on shorelines. Larger predicted swept surface areas are associated with the Demerara River Bridge location compared to the MOF location due to the proximity of the MOF site to the coastline while the Demerara Bridge spill location is in the center of the channel.

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APPENDIX T

Stakeholder Comments

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Table 1: Agency Comments

Comment #	Agency	EIA Section / Rev 0 Page Number	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
General Comments						
1.	EPA	—	With regards to the proposed construction and operation of the NGL Plant, based on our review of the EIA, all major potential impacts have been adequately highlighted and mitigation measures presented. However, given the nature of the activity two of the key areas of concern are fires & explosions and potential spills from the Plant. Therefore, EEPGL must ensure the environmental safeguards proposed in the EIA are adequately implemented and monitoring protocols are in place to ensure their effectiveness. Any failure in these Plants Systems will have catastrophic impacts on the environment and human health.	Respond	The comment is acknowledged. The Environmental and Socioeconomic Management and Monitoring Plan (ESMMP) included in Volume III of the Environmental Impact Assessment (EIA) outlines the framework and a number of detailed measures that will be implemented to address potential impacts. Additionally, as part of detailed design and prior to the onset of Operations stage, the Gas to Energy Project (Project) will develop operational procedures designed to facilitate and monitor safe operations.	No
Chapter 5, Project Description						
2.	EPA	Section 5.5.4 Waste Generation. Page 74	Specific waste to be generated from offshore pipeline installation was not mentioned in this section. However, the Comprehensive Waste Management Plan, section 6.1.1 (Waste Generation) outlines potential waste to be generated. Does this list include waste to be generated from offshore pipeline installation as well?	Respond	Section 5.5.4.1 has been updated to state that the types of waste that will be generated from the offshore pipeline installation are consistent with those listed in the *Third Party Offshore Wastes* category of Section 6.1.1, Waste Generation, of the Comprehensive Waste Management Plan (CWMP), and in the *Installation, Marine, and Accommodations* bullets in Section 4.1.1, Waste Generation, of Appendix C.2, Cradle to Grave Waste Analysis Study, of the CWMP; and that prior to wastes from offshore pipeline installation being generated, new waste profile sheets, as warranted, will be generated and added to the CWMP.	Yes
3.	EPA	Section 5.5.4 Waste Generation. Page 75 – 76	With regards to waste generated from the onshore activities such as the onshore pipe installation and NGL Plant, the proposed methods of disposal are acceptable given that the current waste handling and treatment facilities are capable of disposing most of the waste that will be generated. However, one area of concern is treatment of H2S adsorbent beds which may potentially be a new stream for treatment. More information with regards to the specific treatment method to be applied is needed inclusive of whether the waste treatment facilities have the capabilities of treating this waste, if additional infrastructure is required and if any additional impacts may arise.	Respond	Spent hydrogen sulfide (H_2S) absorbent media can likely be classified as a new waste stream as there are no operating facilities using this media currently in Guyana. At present, it is not anticipated that new treatment facilities or disposal methods will be required for the H_2S absorbent media waste stream. Although the exact absorbent medium has not been selected, many of the absorbent media available in market are considered non-hazardous waste and, following removal from use, are recommended to be disposed of in landfill(s). Section 5.5.4 has been updated to include this information. While H_2S removal beds (two lead and lag beds) will be installed in the NGL Plant from day one, H_2S absorbent media is not expected to be required until later in operations (i.e., not before years 5 to 10). The frequency at which the absorbent media will need to be changed out, and therefore disposed, is highly dependent on the actual quantities of H_2S encountered in the gas stream over time. Based on the expected range of H_2S concentrations in the gas stream in later years, one of the two beds will need to have the absorbent media changed as frequently as every 2 months and as infrequently as every 4 years. The more frequent end of this range reflects a high-end of the concentration range and is improbable until the final years of design life. Each bed is expected to hold approximately 70 cubic meters (m^3) of absorbent media.	Yes
Chapter 7, Assessment and Mitigation of Potential Impacts from Planned Activities – Physical Resources						
4.	EPA	Section 7.4, Water Quality	Why weren't discharges from the Power Plant taken into account in the assessment of impacts?	Respond	Discharges for the Power Plant were not addressed in the EIA for two reasons. Firstly, as the Power Plant is not part of the Project, potential impacts from the Power Plant were considered only as part of the cumulative impact assessment (CIA); consistent with best practice, the CIA focuses on those impacts where the Project has a potential significant impact on a given resource and another non-	No

Comment #	Agency	EIA Section / Rev 0 Page Number	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
					Project activity also has a potential impact on the same resource. The Project has very limited Operations stage discharges to surface water, so it would not be expected to result in a significant impact on this resource. Accordingly, impacts on surface water from operational discharges were not addressed as part of the CIA. Secondly, the current concept for the Power Plant also involves very limited Operations stage discharges to surface water. The base case calls for cooling of the Power Plant to be conducted using a closed-loop cooling tower system with make-up water sourced from groundwater, rather than once-through cooling involving a discharge to surface water.	
5.	EPA	Section 7.4, Water Quality	Was any bathometry data collected for the rivers and canals?	Respond	A bathymetry survey was conducted by Terrasound in the third quarter of 2021, but the survey was over a localized area in the immediate vicinity of the area planned for the temporary material offloading facility (MOF)-related dredging. For water quality modeling of the river, bathymetry data were extracted from Navionics SonarChart™ (2022), which provided bathymetry data over the entire length of the study site. With respect to the canals, water quality modeling was not conducted in the canals, as the nature of potential impacts did not warrant such modeling, so no bathymetry data were needed. As part of detailed design for the Onshore Pipeline, a topographic survey will be conducted, which will include measuring depths of canals being crossed, at the identified crossing locations.	No
6.	EPA	Section 7.4, Water Quality	Would the results of the TSS modeling done for the offshore environment be influenced by a change in season i.e., wet or dry season?	Respond	No. The total suspended solid (TSS) modeling considered the incremental increase in TSS in the water column from the trenching activity to show a direct comparison. Modeled increases in TSS were compared to a threshold level of 35 milligrams per liter (mg/L) TSS. Seasonal changes may influence the background TSS in the water column, although seasonal changes in background TSS would be expected to be much smaller with increasing distance offshore. The TSS modeling for the offshore environment did not consider the background TSS.	No
7.	EPA	Section 7.4, Water Quality	What was the methodology used to develop the “acute” threshold?	Respond	The hydrotest water treatment product will be a mixture of different chemicals that have varying toxicity to aquatic organisms. The ecotoxicological data and compositional data for each chemical in each product’s material safety data sheet (MSDS) were used to identify the most toxic chemical in the product. For the most toxic chemical, the ecotoxicological data for fish, invertebrates, and algae in the MSDS were reviewed and the lowest acute endpoint was identified. This lowest acute endpoint was then used to derive an acute threshold for the product by factoring in the percent composition of the chemical in the overall product. For example, if the lowest acute endpoint for the most toxic chemical is 10 mg/L and the chemical is present in the product at 50 percent by volume, the threshold for the product would be 20 mg/L (10 mg/L divided by 0.5). Section 7.4.3.1 has been updated to include additional explanation as presented above.	Yes
8.	EPA	Section 7.5, Sound and Vibrations	What was the methodology used in determining what location to do 48 hours baseline monitoring and 6 hours baseline monitoring?	Respond	Baseline monitoring of 48 hours was completed in locations near where permanent aboveground facilities are being proposed as these will result in potential long-term noise impacts. Shorter (6-hour) baseline monitoring was completed in locations where temporary construction activities will occur, but no potential long-term noise impacts are expected.	No
9.	EPA	Section 7.5, Sound and Vibrations Section 8.4.4, Freshwater	Was noise from the construction of the MoF and dredging of the river considered? Especially underwater noise?	Respond	Airborne noise associated with construction of the temporary MOF was considered in the general construction noise impact assessment. However, as noted in Section 7.5.4.1, because there are no residences located in close proximity to the	No

Comment #	Agency	EIA Section / Rev 0 Page Number	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
		Biodiversity, Impact Prediction and Assessment			temporary MOF, potential impacts associated with the construction of the MOF was not assessed. With respect to underwater noise, the potential impacts of noise on underwater biological receptors are quantitatively assessed in Section 8.4.4.3 of the EIA.	
10.	EPA	Section 7.5, Sound and Vibrations	How did you determine the exact number of residences/households that will be affected?	Respond	The number of potentially affected residences/households was estimated by modeling the expected distance from noise sources to certain noise levels and assessing how many structures appear to be located within that distance. Structures were identified based on recent aerial imagery. Where it was unclear from the aerial imagery if a structure was a residence, the structure was conservatively included in the potentially affected residential structure count.	No
11.	EPA	Section 7.6, Air Quality, Climate & Climate Change	What standards will be employed during Air Quality monitoring, specifically during monitoring for dust emissions (i.e. particulate matter).	Respond	Once detailed construction planning is finalized, EEPGL will develop detailed procedures for dust monitoring during the construction period. However, the preliminary concept EEPGL plans to implement is for multiple coarse particulate matter ("PM_{10}") monitors to be deployed and operated to provide real-time air quality information for managing dust control efforts. Subject to further definition, a preliminary PM_{10} action level of 360 $\mu g/m^3$, 15-minute average, will be used to indicate dust emissions potentially warranting corrective action. The action level will be designed intended to be protective of both construction workers, as well as the local community.	No
12.	EPA	Section 7.6, Air Quality, Climate & Climate Change	Given that no ambient air quality baseline data was collected in Region 3, then how would the effects of the project on air quality be determined? What data will be used to monitor against?	Respond	Ambient air quality monitoring was used to characterize current baseline conditions in the airshed around the NGL Plant. The projected impacts of the proposed Project are quantified using atmospheric dispersion modeling techniques. Standard practice is for the modeled contributions for the Project to be compared to threshold criteria and for the sum of modeled contributions + baseline measurements to be compared to threshold criteria only if the modeled Project contributions exceed a certain percentage of the threshold (10% is used). This is described in Section 7.6.1. The maximum percentage of a threshold for a modeled Project contribution outside the fenceline was 5.5%, so baseline measurements were not added for any pollutants for the purpose of comparison to thresholds. With respect to understanding the existing conditions in the airshed in the vicinity of the Project, a continuous "reference-quality" monitoring station was established on the East Bank of the Demerara River, at a location considered representative of air quality in the vicinity of the NGL Plant. The current lack of ready access and reliable main electrical power closer to the NGL Plant would have necessitated relying on less accurate monitoring methods (e.g., passive samplers or electrochemical sensors that are less reliable). Since there are no significant air emission sources between the selected monitoring site and the NGL Plant, the East Bank of the Demerara River monitoring site is considered representative of existing conditions and provides the best practicably achievable data source at this time.	No
13.	EPA	Section 7.6, Air Quality, Climate & Climate Change	What is meant by "cold and wet" flaring? All terms must be clearly defined.	Respond	As described in Section 5.3.4.3 of the EIA, the Project design includes two flares as part of the flare and blowdown system. This section has been updated to clarify that the wet flare is for streams containing water, and it is intended to serve facilities upstream of the molecular sieve and regeneration processes, and the cold flare is for the remainder of the streams, downstream of the molecular sieve and regeneration processes. Both flares will be used on an intermittent basis to combust excess gas generated during transitional activities.	Yes

Comment #	Agency	EIA Section / Rev 0 Page Number	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
14.	EPA	Section 7.6, Air Quality, Climate & Climate Change	Why wasn't any air quality modelling done for the construction phase of the project?	Respond	Consistent with standard practice, the assessment of potential impacts on air quality from Construction stage impacts was performed by producing a Construction stage emissions inventory and by assessing the significance of potential impacts on dust emissions (the primary source of potential impact during the Construction stage) based on the nature of the construction activities. Typical practice is that dispersion modeling is conducted for long-term operational impacts, and this approach was followed for the Project.	No
15.	EPA	Section 7.6, Air Quality, Climate & Climate Change	How is the rating impact from construction determined given that no modelling was done?	Respond	As described in Section 7.6.3.2, considering the type of construction and decommissioning activities that will be undertaken, construction and demolition criteria published in the *Guidance on the Assessment of Dust from Demolition and Construction* by the United Kingdom Institute of Air Quality Management (IAQM 2014) were adopted to develop criteria for magnitude as outlined Table 7.6-18. The sensitivity ratings for human receptors to the health impacts of dust follows the IAQM criteria for particulate matter with aerodynamic diameter of less than 10 micrometers (PM_{10}). The magnitude and sensitivity ratings were then considered together to assign a potential impact significance rating, following the methodology described in Chapter 3.	No
16.	EPA	Section 7.6, Air Quality, Climate & Climate Change	Justify why the emission inventory doesn't include emissions from the construction phase of the project.	Respond	A Construction stage emission inventory is provided in Table 7.6-16: Summary of Estimated Construction Stage Emissions from Fuel Combustion.	No
17.	EPA	Section 7.6, Air Quality, Climate & Climate Change	The emission inventory must be presented/reported in accordance with good international industry practice such as the API (American Petroleum Institute) *"Compendium of Greenhouse Gas Emissions Methodologies for Natural Gas and Oil Industry"*.	Respond	The criteria pollutant and greenhouse gas (GHG) emissions inventories were developed in accordance with emissions factors in accordance with the USEPA resource AP-42, Compilation of Air Emission Factors and the API Compendium. Section 7.6.3.1 has been updated to reference the API Compendium.	Yes
18.	EPA	Section 7.6, Air Quality, Climate & Climate Change	Justify why outdated data from 2018 was used to conduct air quality modelling. Why wasn't more recent data used?	Respond	The period of 2017 to 2019 is representative of the meteorology of the region and suitable to be used for the air quality modeling. At the time Weather Research and Forecasting (WRF) simulations were done, additional data were available for 2020. However, the 2017 to 2019 data were chosen because observational data from two meteorological stations (Georgetown and New Amsterdam) were available for part of the 2017 to 2019 period. These data were used to help evaluate the WRF model performance. Otherwise, there was very limited local meteorological data available in this region. The WRF model analysis was documented in the final report. If the additional data for 2020 were incorporated, this would not have a significant impact on the results or conclusions of the analysis.	No
19.	EPA	Section 7.6, Air Quality, Climate & Climate Change	How do you distinguish what percent of pollutants come from the LNG Plant, Power Plant or is considered "background"?	Respond	The modeling is conducted for each pollutant separately, and – for cumulative impact modeling - each pollutant modeling run includes all the sources associated with the NGL Plant and the Power Plant. The model allows the user to create source groups for each run. The two source groups created include the contributions from the NGL Plant separately and from the Power Plant separately. The modeling output provides the breakdown between these two groups for all modeled receptors.	No
20.	EPA	Section 7.6.2, Existing Conditions and Baseline Studies 174- 7-179	Why is the combined results for Carifesta not the summation of Carifesta #1 and #2?	Respond	The two Carifesta monitoring campaigns are presented individually to shows results separately for the "dry" and "wet" season campaigns. They are also presented as combined to provide insight into long-term background levels across the Georgetown area. When presenting the maximum of the two campaigns, the value is the greater of the two tabulated values. In contrast, the average of the two campaigns presents the arithmetic average of each hour of valid data from the	Yes

Comment #	Agency	EIA Section / Rev 0 Page Number	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
					combined database. Since the number of valid hours in each campaign differs somewhat depending on the pollutant monitored, the averages are not directly the averages of the two campaign averages. Section 7.6.2.1 has been updated to clarify that the first and second Carifesta monitoring campaigns were representative of dry and wet season conditions, respectively.	
21.	EPA	Section 7.6.2.1. Existing Conditions—Air Quality page 171	Justify why no ambient air quality baseline data was collected in Region 3, when both the Environmental Protection Act and the approved Terms and Scope for the conduct of the EIA requires that baseline data be collected within the Area of Influence (AOI) of the project.	Respond	Please see response to comment 12.	No
22.	EPA	Section 7.6.2.1. Existing Conditions—Air Quality page 174	Is the data used for these recordings the same data used for the Yellowtail Project since there was a spike in Benzene levels at the Carifesta location as reported for the Yellowtail Project?	Respond	The data from the first four monitoring campaigns was used for both the Yellowtail EIA and the Gas to Energy (GTE) EIA, as these data are relevant to both projects with respect to broad categorization of existing conditions in the regional airshed. The elevated benzene levels previously measured were associated with one of these earlier monitoring campaigns. However, the GTE EIA included an additional set of data associated with the Friendship Education Department monitoring site, which was not included in the Yellowtail EIA and was conducted specifically to provide additional data in the airshed local to the proposed NGL Plant site.	No
23.	EPA	Section 7.6.2.1. Existing Conditions—Air Quality page 174	Why weren't additional data sites closer to the NGL plant site selected?	Respond	Please see response to comment 12.	No
24.	EPA	Section 7.6.4. Impact Management and Monitoring Measures page 204	How do you plan to keep stockpiles and portions of the heavy haul road moist?	Respond	In reviewing the historical precipitation data for Georgetown and the surrounding areas, it is anticipated that natural rainfall will likely suffice to maintain moisture on roads and stockpiles and prevent excessive dust. In instances where this is not the case, multiple methods of wetting stockpiles and roads can be used. Most common for roads is the use of a water truck, which releases water from the truck directly onto the road surface. For stockpiles, a pump and hose system or sprinkler system can be implemented.	No
25.	EPA	Section 7.6.3.1. Relevant Project Activities and Potential Impacts	Has there been any consideration for pollutants from mobile sources?	Respond	Estimated Construction stage emissions from mobile construction equipment (e.g., mobile earthmoving equipment) and from marine and riverine construction vessels are included in the Construction stage emissions inventory presented in Section 7.6.3.1.	No
Chapter 8, Assessment and Mitigation of Potential Impacts from Planned Activities – Biological Resources						
26.	EPA	General Comments	The presentation of survey data for Marine and Coastal Biodiversity includes terms such as "Spring", "Winter" and "Fall". Perhaps it is best to use terms which are more suited to the local context.	Respond	The seasonal terms spring, summer, fall, and winter are used when describing seasonality for birds because the abundance, distribution, and species assemblage of birds in coastal and marine environments in Guyana is driven by migratory, breeding, and non-migratory periods that align with North America's spring, summer, fall, and winter seasons. Use of the North America seasons when describing bird populations is common practice in scientific analysis and writing because of the global influence these seasons have on bird populations. An explanation regarding the use of this terminology has been added to Section 8.2.2.1 as a footnote.	Yes
27.	EPA	General Comments	The section on the 12 Marine Bird surveys commissioned by EEPGL only covers the period 2017-2020. Most of the other surveys with the exception of the Marine Benthos survey, are not up to date. Since the T&S was finalised in 2021, should the surveys not have been updated? In order to justify the accuracy of the impact predictions and	Respond	The period of record for the EEPGL-commissioned bird studies includes multiple years from 2017-2020, and a diverse set of seasonal conditions within each study year. The studies found little interannual variation in abundance or species richness, and there have been no indications of environmental changes since 2020 in the Guyana EEZ that would cause changes in the marine bird community.	No

Comment #	Agency	EIA Section / Rev 0 Page Number	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
			assessments presented, the information presented should be more recent. The team should justify why updated surveys were not presented in all cases to allow for “future comparisons”.		For these reasons additional field surveys were not considered necessary to support the conclusions of the EIA.	
28.	EPA	Section 8.2.2.4. Marine Turtles	Kindly provide a map showing turtle movement in relation to location of the FPSO.	Respond	Figures 8.2-15 through 8.2-18 have been revised to show the locations of the Liza Destiny and Liza Unity Floating Production, Storage, and Offloading (FPSO) vessels.	Yes
29.	EPA	Section 8.2.2.5. Marine Fish. Page 43	Please indicate whether the study provided a reason for the decrease in fish species between the first and second study years from 109 to 92.	Respond	The report for the second year of the marine fish study (which was submitted to the Guyana Environmental Protection Agency (EPA) as an appendix to the Yellowtail EIA) identified differences in water temperature and salinity between survey years as likely contributing factors in the lower species richness in the continental shelf samples in the second year of the marine fish survey. As discussed in the report, maximum measured water temperatures in the dry season reached approximately 35 degrees Celsius (ºC) in the second year’s dry season, which is approximately 5 ºC higher than in the first year. Very few marine fish prefer water temperatures above 32 ºC, so these temperatures may have caused some species to seek cooler water. Dissolved oxygen (DO) levels were also low during the wet season in the second year, with concentrations at the seafloor below 2.0 mg/L at 4 of the 13 sampling stations during the wet season in the second year. This is below the optimum range for most marine fishes and may partially explain the apparent scarcity of large fishes during this period. Low DO concentrations were more widespread in the wet season than high temperatures were in the dry season, which suggests that DO concentrations may have had a more significant effect on fish distribution than temperature.	No
30.	EPA	Section 8.2.2.5. Marine Fish. Page 43	The last dataset of information was taken in 2019; more than 2 years ago. Kindly indicate why an additional survey was not conducted, given that operations in the area would have increased significantly from that time.	Respond	A third marine fish survey was not considered necessary because of the nature of predicted Project impacts on fish related to vessel traffic, and the size of the Project Area of Influence (AOI) relative to the amount of marine habitat available in Guyana’s Exclusive Economic Zone (EEZ). As described in Section 8.2.2.3 of the Project EIA (and prior offshore development EIAs), the significance of potential auditory impacts from vessel traffic was rated as Negligible. Considering the incremental and temporary nature of the increase in vessel traffic that would be caused by the GTE Project and how this particular impact had been rated in the past, an additional year of marine fish study was not considered necessary to support the EIA. Furthermore, per the Food and Agriculture Organization of the United Nations, the Guyana EEZ occupies 138,240 square kilometers (km^2), or 13,824,000 hectares. The Project AOI represents 660 hectares, or 0.0048 percent of Guyana’s EEZ. The very small area of marine habitat that would be affected by this Negligible impact further suggests that an additional year of study is not necessary to support the conclusions of the EIA with respect to the impacts of vessel noise on marine fish.	No
31.	EPA	Section 8.2.3.1.	It was observed that impacts during the operation were ‘NONE’. Please provide an analysis on the potential impacts of natural gas leaks underwater (e.g. whether there is potential for damage by anchors etc.).	Respond	The reference to the lack of proposed mitigation measures in Section 8.2.3.1 refers to planned Project activities. Impacts of an underwater natural gas leak (which could only occur as a result of a loss of integrity of the marine pipeline) and appropriate measures to manage such an event are assessed in Chapter 10 of the EIA. A footnote has been added to Section 8.2.3.1 clarifying this. As stated in Section 10.2.9.2 of the EIA, the area of the ocean within which marine biota could be affected by a gas leak from the offshore pipeline would be very small because the gas would naturally rise through the water column to the surface, where the natural gas would dissipate into the atmosphere; however, within the immediate	Yes

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					area of the leak, natural gas could diffuse directly into the bodies of fish and marine benthos. As discussed in Section 5.6.3, Section 10.1.9, and Chapter 15 of the GTE EIA, the Project includes several embedded controls to reduce the likelihood of a loss of integrity of the offshore pipeline, including trenching in shallow water, constructing the pipeline using international good practices, and demarcating the pipeline to prevent anchors, fishing equipment, or other hazards from potentially damaging it. As further discussed in several locations in the EIA, should all of these measures fail and a leak occur, the leak would be quickly detected and isolated using emergency shutdown valves, which would limit inventory loss and therefore the duration of any release event.	
32.	EPA	Section 8.2.3.3. Impact Magnitude Ratings—Marine and Coastal Biodiversity. Marine Habitat. Pages 59-60	It was stated that 6.62 hectares of benthic habitat will be lost and an additional 623 hectares of benthic habitat will be temporarily disturbed during construction of the offshore pipeline, a total of 629.62 hectares of benthic habitat either be lost or temporarily disturbed. Indicate whether or not the benthic habitats are sensitive and what are the sensitive species if any or include the species found there.	Respond	The benthic habitats across most of the continental shelf (where the offshore pipeline will be located) are not particularly sensitive to physical disturbances of the kind that will occur during Project installation. This general resilience to physical perturbation arises from the high degree of homogeneity in the marine sediments across the continental shelf. As described in Appendix F of the EIA, this homogeneity derives from a general lack of industrial activity in all three of the major continental watersheds that contribute sediments to the continental shelf (the Amazon, Orinoco, and Essequibo watersheds), as well as the large-scale marine current systems at work in the region coupled with shallow water depths and wind-driven movement, which together cause substantial mixing of the sediments and a diffused distribution of chemical characteristics across the continental shelf. There are isolated patches of live coral on the continental shelf as documented in past environmental baseline survey (EBS) reports submitted to the EPA. These coral communities would be considered sensitive, but none of these communities are known to occur in the area that would be affected by the GTE Project. Section 8.2.2.6 has been updated to include additional information provided in this response.	Yes
33.	EPA	Marine Biota. Pages 65	Since hydrostatic discharge is a onetime event and its impact will be continuous, justify the impact intensity as rated low. Additionally, justify the impact rating by including the following information: what is the half-life of the RX-5254 and/or SLB HydroHib? How long will marine organisms be exposed to the chemicals to reach No Observed Effect Concentration (NOEC)?	Respond	As defined in Section 3.3.6.1 of the EIA, low intensity impacts are impacts that create a “minor but measurable change from baseline conditions and/or affects a small area within or near the Project Footprint.” As described in Section 8.2.3.3 of the EIA, modeling indicates that dilution of SLB HydroHib or RX-5254 will be sufficient to meet the acute guidance threshold for each product within 100 meters or 500 meters from the discharge location under most scenarios, respectively. For both products, this would represent a measurable change from baseline conditions over an area that is small relative to the Project Footprint, which for the offshore pipeline is 6.62 hectares. The MSDSs for RX-5254 and SLB HydroHib do not provide numerical values for half-life. For SLB Hydrohib, no numerical data were provided for persistence or degradability; text was provided stating that the product SLB Hydrohib did not contain any substances that were persistent. For RX-5254, numerical values for biodegradation of the product components ranged from greater than 60 percent to 100 percent and were rated as readily biodegradable. Based on the information of persistence as provided in the MSDSs for both RX-5254 and SLB Hydrohib, the impact rating of Low is supported. The hydrotest discharges are either 6, 18 or 24 hours in duration, depending on the testing/discharge option implemented. These are short-term discharges, and no marine organism is expected to be exposed to chemical concentrations for a	No

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					duration long enough to cause chronic (i.e., long-term) issues. The modeled concentrations are predicted from a steady-state transport model, and the exposure scenario assumes this concentration is constant at all times and that a receptor is exposed to this concentration for an extended period of time to experience potential acute/chronic impacts. These assumptions are highly conservative in nature and are not likely given the highly dynamic nature of the offshore ocean marine environment.	
34.	EPA	Section 8.4, Freshwater Biodiversity. Page 140	**Figure 8.4-1** Site locations for Freshwater Habitat, Macroinvertebrate and Fish surveys. Provide reasons why samples for Fish and macroinvertebrates were not taken within the immediate footprint of the LNG plant and the MOF and or within 4km of the site.	Respond	Survey sites for freshwater habitat, macroinvertebrate, and fish surveys were selected based on the location of aquatic habitats that could support macroinvertebrate and fish populations within and near the Project Footprint and receiving waterbodies. The NGL Plant footprint does not contain aquatic habitat, so no samples were collected there. Samples were collected in the immediately vicinity of the temporary MOF and in the waterbodies (canals) crossed by the onshore pipeline corridor. All aquatic habitats that could be impacted by the Project, either directly or indirectly, were sampled during the survey. Section 8.4.2.1 has been updated to include additional information provided in this response.	Yes
Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities – Socioeconomic Resources						
35.	EPA	Section 9.1.1.1. Study Areas. Page 1	*Primary Study Area1: This study area includes communities and households located within 500 meters* What influenced this study area and why were primary stakeholders not considered in demarcating the study area? As indicated in the question above why were the Primary stakeholders not identified in accordance with the consultation plan.	Respond	Please note that the text referenced in the comment is not complete. The full definition of the Primary Study Area is as follows: ***Primary Study Area:*** *This study area includes communities and households located within 500 meters of the onshore pipeline corridor, within 1 kilometer of the natural gas liquids processing plant (NGL Plant) boundary and/or temporary material offloading facility (MOF); within the area extending from the Demerara River immediately north of Free and Easy village, south and west to the NGL Plant and temporary MOF, plus the area encompassing settlements in the Belle West housing scheme.* *The communities that were engaged and/or studied in the Primary Study Area include Crane, Nouvelle Flanders, Westminster, Lust-en-Rust, Canal 1, Bordeaux, Canal 2, Alliance, Resource, L'oratoire; Genieve, Free and Easy, Catherina Sophia, Maria's Lodge, Jacob's Lust, Voorburg, Goldberg, and La Harmonie.* The Primary Study Area was defined based on the extent of anticipated impacts of the Project and is not only defined as 500 meters from the onshore pipeline. Anticipated impacts considered in determining the Primary Study Area included noise, dust, and changes to access to properties/agricultural lands (with 500 meters of the onshore pipeline), access to services (the Belle West housing scheme, which relies on access via Canal 2 road), and within 1 kilometer of the NGL Plant. Primary stakeholders (being those directly affected through the above impacts) were considered in this demarcation.	No
36.	EPA	Section 9.1.1.2. Data Collection. Page 5	*During the months of November and December 2021, the 2021 socioeconomic survey teams interviewed 440 discrete individuals, 150 local businesses, and 30 members from the aforementioned NDCs.* What determined how many households were surveyed and why was the survey selected as the only method of engagement with the households and businesses? What was responsible for the constraint with less than 50% favorable response for the consultation?	Respond	The identification of areas included in the socioeconomic survey was based on the scoping of anticipated impacts and an understanding of publicly available information. The household survey focused on those households in proximity to the Project, including people living near the temporary MOF and heavy haul road, NGL Plant (including Free and Easy village as the nearest community), and within 500 meters of the proposed onshore pipeline, as these residents are most likely to experience impacts during construction (e.g., noise, dust, traffic) and/or have concerns/anxiety related to public safety or land use impacts during operations.	No

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					The household/commercial survey was not the only method of engagement that supported the EIA. Additional engagement included meetings and focus groups with the Neighbourhood Democratic Councils (NDCs) representing the key parts of the primary and secondary study area, including Canals Polder NDC (representing households near Canal 1 and Canal 2 crossings, Belle West, etc.), Toevlugt/Patentia (representing Patentia, Sisters Village and area), Malgre Tout/Meer Zorgen (representing Westminister / Lust-en-Rust / Parfaite Harmonie / Onderneeming housing scheme), and Best Klien Pouderoyen NDC (representing Vreed-en-Hoop and the shore crossing area). The NDCs were engaged as the representatives of these communities and residents therein. Additionally, the Consultants engaged with Toshaos (Santa Aratak and Pakuri / St Cuthberts) and relevant government agencies (ministries of Health, Agriculture, Statistics, and others). Past engagements with coastal NDCs in Region 3 also informed the baseline and impact assessment, including engagements conducted in late 2021 in regard to the Yellowtail Development Project EIA, and ongoing engagement with fisherfolk through the Participatory Fishing Study. Public engagement was also facilitated through the GTE Project scoping meetings, and the concerns and issues raised by members of the public, local communities and government agencies during the scope stage directly informed the EIA. Engagement during the EIA development stage was conducted to support the understanding of baseline conditions, potential impacts, and development of effective and meaningful mitigation measures. Engagement at this stage does not typically involve public forums or consultation about the location/route of the proposed Project facilities, as this would not be useful to the assessment of the impacts within the scope of the EIA. The household and business surveys were conducted based on the survey plan and associated response goals, as described for Response 37. For smaller communities, a response rate of 100% was targeted, while for larger communities a lower percentage of responses was sufficient to provide an adequate sample size. The above information is discussed in Chapter 6 of the EIA.	
37.	EPA	Section 9.1.1.2. Data Collection. Page 5	What was the quota for household and business surveys relative to the population size?	Respond	The study methodology was broken up into five primary survey areas depending on the location of the individuals/community to be interviewed in relation to the Project components. The completion rate goals associated with the estimated number of households or properties has been determined based on International Finance Corporation (IFC) guidance and previous ERM field experience and are intended as guidance only to have as robust a data set as possible for the baseline. For the household and business/commercial survey, the survey completion goals were: • 100 percent completion rate for households in the southern portion of the Wales development area, including Free and Easy village and households in the vicinity of the temporary MOF (estimated less than 75 households total) • 25 percent for households and businesses in vicinity of Patentia and Stanleytown • 25 percent for households and 100 percent businesses on East Bank of the Demerara River (across from temporary MOF) • 25 percent for households and businesses within 500 meters of pipeline corridor crossing Canal 2, Canal 1 Westminister / Lust-en-Rust, and Crane	Yes

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					• 50 to 100 survey respondents for commercial businesses in Vreed-en-Hoop and in centers along the West Bank of Demerara Public Road (La Grange, Coglan Dam) Section 9.1.1.2 has been updated to include additional information provided in this response.	
38.	EPA	Section 9.1.2. Existing Conditions and Baseline Studies (Social). Page 10	An estimated 300,000 people emigrate from Guyana annually, one of the highest emigration rates in the world (sect 9-10). 1. How does this compare to the immigration of foreign nationals to Guyana? 2. Was any data collected to ascertain whether this is comparable?	Respond	Publicly available information indicates that Guyana's net migration rate between 2015 and 2020 was -6.3 (Source: IOM), indicating that emigration significantly outweighs immigration. This is relevant to the EIA as emigration both influences the availability of skilled labor and tertiary-educated professionals (and efforts to retain these persons in Guyana), and for Guyanese households who rely on remittances from abroad. Comparatively, immigration is much lower and less relevant to the impacts assessed in this EIA.	No
39.	EPA	Section 9.1.3. Existing Conditions and Baseline Studies (Economic)	What were the changes in the employment patterns identified by the EIA?	Respond	Section 9.1.3 of the EIA provides the baseline of economic conditions, including general employment data within the Project AOI against which future Project-related changes (if any) can be monitored. Potential changes (i.e., impacts) are discussed in Section 9.1.4. "Increased employment" is identified as a potential impact of both the construction and operation stages, as follows: *The Project will have limited direct local employment during the Construction stage, as most employment opportunities will arise through EEPGL's construction contractors for the onshore pipeline and NGL Plant construction. As a result, only modest increases in total direct employment by EEPGL, including an increase of EEPGL's office staff (for all EEPGL activities), are expected. EEPGL intends to continue hiring Guyanese nationals in alignment with its Local Content Plan, which outlines EEPGL's strategy and multi-tiered approach to building Guyanese workforce and supplier capabilities in conjunction with strategic investments in the local community.* *As discussed in Chapter 5, Project Description, during the Construction stage there will be an estimated peak of approximately 500 construction worker positions, of which between 25 and 50 percent are expected to be Guyanese. It is expected that a majority of the Guyanese workforce will comprise individuals already residing in either Region 3 or Region 4. During the Operations and Decommissioning stages, there will be approximately 40 and 50 full-time equivalent (FTE) workers, respectively, who will likely reside predominantly either in Region 3 or 4. Employment will contribute to the improvement of livelihoods and economic wellbeing of workers and their families.* Mitigation and monitoring measures are described in Section 9.1.5. For example, measures as identified in Section 9.1.5 include monitoring the percentage of the Project workforce made up of Guyanese nationals on a quarterly basis and working with select local institutions and agencies to support workforce	No

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					development programs, may provide data to understand any changes in employment patterns over time as a result of the Project.	
40.	EPA	Section 9.1.3. Existing Conditions and Baseline Studies (Economic)	What is the ability of the available labor pool to meet project-related employment needs?	Respond	The EIA assesses the potential impact on existing livelihoods and employment opportunities in general, but the scope does not include a Workforce Skills Analysis or labor pool study, EEPGL and its contractors and suppliers together with the Centre for Local Business Development and the Government of Guyana do conduct ongoing and project or sector specific market assessments related to capacity for suppliers and workforce.	No
41.	EPA	Section 9.1.3. Existing Conditions and Baseline Studies (Economic)	Were there any economic multipliers used in the analysis?	Respond	Although the multiplier impacts of Project-related economic benefits are acknowledged in Section 9.1.4.3, [Impact Magnitude Ratings—Socioeconomic Conditions] Economic Development, the EIA does not employ economic multipliers for a quantitative economic analysis. The intent of the EIA is to identify and mitigate/manage potential adverse impacts of the Project. As such, the anticipated direct, indirect, and induced economic benefits are acknowledged but are not subject to further quantitative calculations or modelling. This is consistent with typical EIAs in Guyana and other jurisdictions.	No
42.	EPA	Section 9.1.3. Existing Conditions and Baseline Studies (Economic)	What is the potential change in the overall economic activity in the Region?	Respond	The EIA does not provide a quantitative economic analysis. However, Section 9.1.4 assesses the potential impact of “Increased Local Business Activity” including opportunities for local businesses and related indirect employment.	No
43.	EPA	Section 9.1.3. Existing Conditions and Baseline Studies (Economic)	What was the nexus between employment increases and population immigration?	Respond	Section 9.1.4.1, Relevant Project Activities and Potential Impacts, of the EIA discusses that the Project is not expected to cause a significant population influx to the area and, as such, is not expected to cause noteworthy population shifts or impacts. However, EEPGL will proactively communicate the Project’s limited direct staffing requirements as a measure to reduce the magnitude of potential population influx to Georgetown from job seekers and will do the same for the number and types of jobs expected to be contracted during the Construction stage.	No
44.	EPA	Section 9.1.3. Existing Conditions and Baseline Studies (Economic)	Where were the deficiencies in available housing identified?	Respond	Section 9.3.2.1, [Existing Conditions and Baseline Studies] Housing, of the EIA provides baseline data specific to housing. As noted, a thorough analysis of the housing market in Guyana in general is challenging in view of the limited availability of data. Section 9.3.3, Impact Prediction and Assessment, assesses specifically the potential impacts within the Project AOI for any increased demand on housing leading to reduced availability and/or increased cost.	No
45.	EPA	Section 9.1.3.4. Fisheries and Aquaculture. Page 29	The EIA was not explicit in the fish catch results for 2021 whether there was an increase or decrease. The data recorded was up to 2020.	Respond	The EIA baseline data rely on the available information on the fishing industry, including fish catch results. Specific data related to whether or not there was an increase or decrease between 2020 and 2021 were not available, although this does not affect the assessment of the potential impact of Project activities on the fishing industry. Section 9.1.3.4 has been updated to include additional information provided in this response.	Yes
46.	EPA	Section 9.1.3.4. Fisheries and Aquaculture. Page 30	*Within the fishery sector, the prawn industry has been voluntarily scaled back in response to limited catches resulting from overfishing in previous years, with approximately 15 Guyanese-registered boats in operation in 2016.* This data is five years old, were there no updated datasets in this regard?	Respond	The EIA baseline characterization relies on the available information on the fishing industry, including fish catch results. More updated data on the prawn industry was not available, although this does not affect the assessment of the potential impact of Project activities on the fishing industry. Section 9.1.3.4 has been updated to include additional information provided in this response.	Yes

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47.	EPA	Section 9.1.3.7 Labor Force Profile. Page 37	Where do oil and gas support services fall in this assessment?	Respond	The following third paragraph has been added to the end of Section 9.1.3.7, [Labor Force Profile] Labor Force Statistics. *"According to the Guyana Labour Force Survey data (BSG 2021), there was a 1.2 percent increase in employment from first quarter 2020 (3.4 percent) to first quarter 2021 (4.6 percent) for the economic sector of Mining and Quarrying (in which oil and gas and support services are captured), This amounted to a 40,323 GYD increase in labor related income (gross remuneration in cash and in kind) for the sector."* There were no available data on labor force profiles specific to oil and gas support services, as the sector itself is carried into Mining and Quarrying.	Yes
48.	EPA	Section 9.1.3.7 Labor Force Profile. Page 37	How many are providing direct services to the offshore operations and how many are providing indirect services? Would these see an increase with the operation of an NGL?	Respond	There are currently over 1,000 unique Guyanese vendors that provide both direct and indirect services to EEPGL. The GTE Project is expected to require the use of some current and new contractors.	No
49.	EPA	Section 9.2. Community Health and Wellbeing.	Was there any analysis of the potential long-term contaminant bio-accumulation within the food chain?	Respond	A formal bioaccumulation study was not performed as part of the EIA, but the potential for bioaccumulation was considered in the impact assessment. There are two main categories of chemicals that could become available to biological receptors as a result of the Project: hydrostatic test water treatment chemicals and naturally occurring constituents in the marine sediments that will be disturbed by installation of the offshore pipeline. As stated in Section 8.3.3.2, neither of the two candidate hydrostatic test water treatment chemicals that may be used are designated as bioaccumulative. Section 8.2.3.3 has been updated to also clarify this and to explain that some of the non-Project-related metals that are present in the marine sediments along the offshore pipeline route are known to be bioaccumulative; however, based on the known tendency of marine sediments to move and become buried and uncovered over time off the Guyana coast, the constituents are not expected to become concentrated at a high enough level above background concentrations for long enough to cause a significant risk of bioaccumulation.	Yes
50.	EPA	Section 9.3.2.1. Housing. Page 101-103	What about housing costs for rental and purchasing of lands increasing because of the increased demand and higher offers from the oil and gas sector?	Respond	As noted in Section 9.3.3, Impact Prediction and Assessment, the Project workforce is not expected to affect demand for new housing structures to be built, so no direct impacts on purchasing of land are anticipated as a result of the Project. Section 9.3.3 discusses the Project's potential demand for housing rentals, which - due to lack of quantitative baseline data on the rental market - includes a conservative assessment on the potential impact on housing rental availability and price.	No
51.	EPA	Section 9.4.2.2. Onshore Vehicular Traffic	What is the effect of heavy-duty vehicle traffic needed for this type of project on affected pavement, bridges, roads, etc.? What are the mitigation measures to avoid, reduce or offset adverse impacts to structural integrity?	Respond	Road(s) and bridges expected to potentially be inadequate for use in construction are already being improved as part of early works activities; this improvement scope is not included in the scope of this EIA. While this work benefits the Project, it is improvement to public infrastructure. The maintenance of public infrastructure is not within the scope of the EIA.	No
52.	EPA	Section 9.4.3.1. Relevant Project Activities and Potential Impacts	What considerations were given to the delay caused by the construction of the new Demerara River Bridge which should be occurring simultaneously?	Respond	The Demerara Harbour Bridge replacement was one of ten other projects that was included in the cumulative impact assessment, as described in Chapter 11 of the EIA. Additionally, the planned infrastructure and schedule for the GTE Project was developed as if the new Demerara Harbour Bridge was not in place. As such, any delay to the construction of the new bridge is not anticipated to impact the schedule for the GTE Project.	No

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53.	EPA	Section 9.4.3.3. Impact Magnitude Ratings – Transportation	During the first year of NGL Plant construction, an average of 7 to 8 barge round-trips weekly between a shorebase on the east side of the Demerara River, north of the Demerara Harbour Bridge, to the temporary MOF. Would this be aligned with the existing bridge schedule or would the bridge require additional opening and closing times until the new bridge is constructed or is it a potential project impact that needs to be mitigated?	Respond	The Project plans to conduct all vessel movement in alignment with planned bridge opening and closing times. Routine communication will be maintained with the Demerara Harbour Bridge Corporation to understand these planned opening and closing times. From time to time, the Project may request an extension of the duration of bridge closures or have additional bridge closures to facilitate vessel movement. However, the Project would make every attempt to minimize this occurrence, and any change to the bridge opening and closing schedule would ultimately be the decision of the Demerara Harbour Bridge Corporation. Commitments reflecting the information provided in this response have been added to EIA Section 5.6.2, Section 9.4.4, and Section 15.1, and Section 3.2.2 of the Environmental and Socioeconomic Management and Monitoring Plan (Volume III).	Yes
54.	EPA	Section 9.5.2.4. Historic Structures Existing Conditions and Results	The onshore pipeline corridor will potentially be in the line-of-sight of several structures at the intersection of the corridor with Canal 1. An historic bridge located 81 meters east of the corridor and a cluster of historic structures, in fair condition approximately 341 to 420 meters east of the corridor, were identified within the Indirect APE (Table 9.5-3). To what extent would construction, operation, and maintenance activities disrupt the aesthetic or sensory attributes of the area?	Respond	Although these historic structures are located within sight of the onshore pipeline right-of-way, any disruption to the historic setting or aesthetic through changes in viewshed and noise disturbance would be temporary in nature. In addition, modern development in the area has been substantial—thus altering the historic setting, and the temporary impacts of this work will not significantly change the historic setting. Once installation has been completed, the presence of the (buried) pipeline will not permanently affect the viewshed or historic setting in a meaningful way, nor will routine maintenance or decommissioning.	No
55.	EPA	Section 9.6.3.3. Impact Magnitude Ratings—Land Use and Ownership	While this impact is identified as minor and short-term in EIA, how can it affect the cultural dynamic of the area as it relates to possible loss of income and switch to other forms of employment in the long term? Additionally, what would be the possible spin-off to the economy and the issue of food security?	Respond	It is not clear what impact is referred to in the comment. None of the impacts in Section 9.6.3.3 are described as being “minor and short-term”. In fact, all impacts described in Section 9.6 are characterized as long-term or medium-term in duration. However, in regard to livelihoods and food security, the majority of potential impacts on agricultural livelihoods (including change in access to croplands and potential impacts of dust on crops/harvests) will be limited to the Construction stage of the Project. Potential impacts are also expected to be largely constrained to lands adjacent to the proposed onshore pipeline route, and widespread changes to agriculture or agricultural livelihoods—or related issues such as food security—are not anticipated to result from the Project. Thus, the Project’s potential impact on land use is not expected to alter the extent of agriculture and related employment or livelihoods; however, there may be other elements (external to the Project) that could influence this sector, including but not limited to climate change, the COVID-19 pandemic, global supply chain changes, economic development and diversification across Guyana, and development of an industrial hub within the Wales Estate.	No
56.	EPA	Section 9.6.3.3. Impact Magnitude Ratings—Land Use and Ownership	Were there any conflicting zoning requirements and land uses relative to site preparation and construction?	Respond	No conflicting zoning requirements have been identified for the areas that will be impacted as part of Project development. As discussed in Section 9.6.3.3, Impact Magnitude Ratings—Land Use and Ownership, site preparation and construction activities will impact a variety of land uses, primarily agricultural and residential use. Mitigation and management measures include dust management and revegetation of the pipeline corridor after the pipeline is installed. Most impacts will be of a temporary nature during the construction stage, although some existing agricultural lands may no longer be used to grow crops (i.e., within the permanent, 12-m-wide onshore pipeline right-of-way).	No

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57.	EPA	Section 9.6.3.3. Impact Magnitude Ratings—Land Use and Ownership	What were the anticipated changes in nearby land use which can result in conflicts from the construction or operation of the facility and the best mitigation measures to address same?	Respond	As described in Section 9.6.3.3, Impact Magnitude Ratings—Land Use and Ownership, the anticipated changes to land use related to Project construction and operation are: • Physical displacement/relocation of a limited number of households (i.e., three households near the temporary MOF, and one potential household near the shore crossing), which will be mitigated through the development of a Resettlement and Livelihood Restoration Strategy aligned with the requirements of IFC Performance Standard 5 (EEPGL to support the Government of Guyana to develop and implement this strategy). • Change in land ownership or status of existing tenure, which will be minimized, as the proposed onshore pipeline route follows existing canals to minimize impacts on private property and/or agricultural tenure. • Reduced access to agricultural lands as a result of the larger construction footprint (including temporary construction areas), and the permanent right-of-way (RoW) that will be established during the Operations stage. Mitigation includes reclamation and revegetation of temporary construction areas. In addition, EEPGL will support the Government of Guyana to develop and implement a Resettlement and Livelihood Restoration Strategy aligned with the requirements of IFC Performance Standard 5. • A temporary change in quality of agricultural harvests as a result of dust generated by construction activities. Proven dust suppression measures will be applied to minimize dust, and dust levels will be monitored so that mitigation can be adapted or added if needed. Additional mitigation and management measures, including embedded controls, are described in Section 9.6.4, Impact Management and Monitoring Measures.	No
Chapter 10, Unplanned Events						
58.	EPA	—	Justify why a “risk rating” and not a “significance rating” was used?	Respond	Impacts from unplanned events are rated in terms of risk because unplanned events have a less-than-certain chance of occurring, unlike planned Project activities; therefore, the likelihood of an unplanned event (and the impacts that would accompany such an event) occurring are factored into the assessment in addition to the potential consequence of the impact. This is consistent with typical risk assessment methodology. It is noted, however, that the methodology used to rate the consequence is equivalent to the methodology used to rate significance for potential impacts from planned activities.	No
59.	EPA	—	Was collision with a bunkering vessel taken into consideration, since that would be the worst case scenario?	Respond	Oil spill modeling was conducted for two marine fuel spill scenarios (50 barrels and 250 barrels), selected to represent a reasonable range of the size of a potential fuel release that could occur from a marine vessel supporting the Project. The oil spill scenarios were not specific to a particular type of vessel. Section 10.1.1.5 has been updated to include additional context for the fuel spill scenarios modeled.	Yes
60.	EPA	—	The risk of an offshore pipeline leak was minor. How is that possible when the closer the pipeline gets to shore the more receptors there are, hence increasing the risk?	Respond	A potential loss of integrity for the offshore pipeline was assessed without specific assumption as to the location where such a release could occur. For the bulk of the offshore pipeline length, the consequences of such a release would be equivalent. However, it is acknowledged that a release close to shore could potentially result in impacts to human receptors that are near the shore landing location. With respect to this portion of the pipeline, Section 10.1.2 explains that the potential consequences of such a release would be—in a worst-case situation—equivalent to a loss of integrity of the onshore pipeline, and that the assessment of this scenario is addressed through the assessment of that potential unplanned event.	No

Comment #	Agency	EIA Section / Rev 0 Page Number	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
61.	EPA	—	How is the risk from a chain explosion at the LNG Plant assessed?	Respond	Risk from an unplanned event such as a loss of integrity leading to an explosion was assessed in Section 10.4.1.2, Loss of Integrity of NGL Plant Facilities, and Section 10.1.4.3, Modeling of Hydrocarbon Releases Factors Effecting Consequences of Hydrocarbon Releases. The potential for a loss of integrity leading to an explosion and corresponding consequences for the NGL Plant and the surrounding area were assessed using the Process Hazard Analysis Software (PHAST) (i.e., modeling software), which outputs data that describe the potential impacts and associated distances for those impacts. The potential for one fire/explosion to impact other pieces of equipment and cause secondary fires/explosions was incorporated into the PHAST modeling.	No
62.	EPA	—	Why wasn't the use of a buffer zone recommended as an imbedded control/mitigation measure?	Respond	The perimeter fence for the NGL Plant is located to account for the required safety and security offsets from the facility. Additionally, the NGL Plant is being constructed in a demarcated industrial zone and it is anticipated that any potential, future facility(ies) would establish requisite buffer zones for the facility(ies); however, those potential future facility(ies) are not within the scope of this EIA. The entire Onshore Pipeline is designed to ASME B31.8, an industry standard for gas pipelines installed in residential / high occupancy areas. There is not a law or code that dictates a buffer zone for this Onshore Pipeline further from what is established by using ASME B31.8. Section 10.1.4.1 and Section 10.1.4.2 have been updated to include additional information provided in this response.	Yes
Chapter 11, Cumulative Impacts						
63.	EPA	—	It was determined that the impact from the project on air quality was low, given that the air shed is already diminished plus the majority of air contaminants will be emitted from the Power Plant and not the LNG plant or the pipeline. However, once the Power Plant is operational, the current GPL (Guyana Power & Light) substations at Garden of Eden, Kingston and Sophia will be decommissioned, eliminating the emissions from these power generation plants. How does this affect the analysis done in the EIA?	Respond	The reduction in emissions that would result from eventual decommissioning of existing Guyana Power & Light power plants was not factored into the cumulative assessment of impacts on air quality or climate primarily because the nature and timing of such actions is not known by the Consultants. As described in Table 11.5.3, the only future activities that could affect cumulative impacts on air quality and climate that were included in the cumulative impact assessment would increase emissions. As a result, the EIA conservatively concludes that the potential cumulative effect on air quality and climate would be adverse; however, the EIA also acknowledges in EIS Section 4.1, Chapter 1, and Section 14.3 that construction of the Project would enable heavy fuel oil/diesel-fired generation capacity to be retired.	No
64.	EPA	Section 11.3.2: Identification of Other Projects. Page 6	Construction of the new Demerara Harbour Bridge is taken into account for the cumulative impacts since it will overlap with the construction of the NGL plant and the MOF. Would the retraction schedule of the current Demerara Harbour Bridge be affected to facilitate passage of ships to access the MOF facility?	Respond	Please see response to comment 53.	No
65.	EPA	Section 11.3.2: Identification of Other Projects. Page 6	What impact would this activity (longer retraction times and or more frequent retractions) have on commuters traversing this bridge?	Respond	Please see response to comment 53.	No
66.	EPA	Section 11.3.2: Identification of Other Projects. Page 6	Has the decommissioning of the Demerara Harbour Bridge been modeled for cumulative impacts? If not, why wasn't this taken into consideration?	Respond	As described in Section 11.3.2 of the EIA, construction of the new Demerara Harbour Bridge was one of ten other projects that was included in the cumulative impact assessment; however, decommissioning of the existing bridge was not considered in the cumulative impact assessment as a specific activity because the method and timeline for decommissioning the existing bridge have not been made	No

Comment #	Agency	EIA Section / Rev 0 Page Number	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
					public and both of these factors would materially influence the type and significance of cumulative impacts related to the decommissioning activity.	
Chapter 15, Commitment Register						
67.	EPA	—	Details on specific actions are required. Indicate timelines for planned monitoring schedules and specify the time for conditions such as “monitored regularly”. Elaborate on any special training that may be required by operators to carry out tasks identified.	Respond	The Environmental and Socioeconomic Management and Monitoring Plan has been updated to clarify that more detailed implementation plans will be developed prior to construction—once detailed design and construction planning has been completed—and will contain the level of detail requested in the comment.	Yes

Table 2: Disclosure Meetings Comments

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
68.	1	Flavio’s Hall 16 May 2022	Who will own the NGL Plant and Power Plant? EEPGL or the government?	Respond	EEPGL will own and operate the NGL Plant. The Power Plant is not part of the Project addressed by the EIA; the Government of Guyana has announced plans to construct a Power Plant that would be fueled with gas from the GTE Project, but the proposed Power Plant would be a separate project and would be owned by the Government of Guyana.	No
69.	1	Flavio’s Hall 16 May 2022	Information presented without the original research to back it up is not useful. What research was carried out? This is important for the process.	Respond	EEPGL commissioned several studies to support the EIA for the GTE Project. For the onshore portion of the Project, EEPGL commissioned studies on engineering/constructability, soils, groundwater and surface water quality, geotechnical conditions, biodiversity, socioeconomics, traffic, and land use. In addition, specialists acquired and reviewed high-resolution satellite imagery to supplement the field survey efforts and support desktop analysis of inaccessible portions of the onshore pipeline route. For the offshore/aquatic portion of the Project, EEPGL commissioned studies on sediments, water quality, and benthic biodiversity in the nearshore marine and riverine zones. The data from these studies are included in several technical appendices included in Volume II of the EIA. In addition to the above studies that were commissioned primarily to support the GTE Project EIA, in recent years EEPGL has commissioned several other studies including various environmental baseline surveys, marine and coastal bird studies, marine and riverine mammal studies, marine fish studies, participatory fishing studies, and air quality studies, all of which provided recent data from the Project AOI. These studies were referenced in the GTE EIA as appropriate, and the data produced from these studies have been provided to the EPA in prior regulatory submissions (all of which are referenced in the EIA, where the data are used).	No
70.	1	Flavio’s Hall 16 May 2022	Please share the documents ahead of meetings in order to have productive consultations.	Respond	The Consultants made efforts to share the pertinent information prior to the disclosure meetings. The EIA was shared with the regional democratic council (RDCs) in Regions 1 through 6, and Non-Technical Summaries of the EIA were distributed to the NDCs in Regions 2 through 6 and Village Councils in Region 1 prior to the disclosure meetings in each of these regions.	No
71.	1	Flavio’s Hall 16 May 2022	There is no NDC council in place. Who did you coordinate with for the stakeholder engagement?	Respond	Engagement with residents of Region 1, including arrangements for the EIA disclosure meetings, has been coordinated through the respective Toshao.	No
72.	1	Flavio’s Hall 16 May 2022	It is mentioned that Santa Aratak will be impacted. Are they being invited to Umana Yana?	Respond	The location of the disclosure meetings was agreed with the EPA, and meeting times and locations were publicly advertised in local media. Accordingly, Santa Aratak was not specifically invited to the Region 4 disclosure meetings; however, the Consultants employed a number of methods to advertise the disclosure meetings in Region 4 and other regions, including the issuance of a public notice of availability announcing the EIA and the disclosure meetings that was published in local print media and on social media. It is not standard practice to invite every community to disclosure meetings directly. In August 2022, the EPA hosted a meeting (with EEPGL and the Consultants) in Santa Aratak to present the Project and EIA, and to listen and respond to questions from this community. In addition, during the	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
					development of the EIA, the Consultants engaged with the Toshaos of Santa Aratak and Pakuri (St Cuthbert's) to provide information about the Project and gather information about these Amerindian communities.	
73.	1	Flavio's Hall 16 May 2022	Can there be more time for interactions and workshops?	Respond	The disclosure period and period for comment on an EIA in Guyana is determined by law, specifically Part IV, paragraph 10 of the Environmental Protection Act (EP Act).	No
74.	1	Flavio's Hall 16 May 2022	We need more onshore development.	Respond	The likelihood that other onshore development projects will occur in Guyana is beyond the scope of the GTE Project EIA; however, the EIA does acknowledge the possibility that several other onshore development projects may occur, as well as the contributions of those projects together with the GTE Project to potential cumulative impacts on several environmental and socioeconomic resources.	No
75.	1	Flavio's Hall 16 May 2022	Is there a connection between this project and Region 1? Can a pipeline bring the gas or electricity to this region?	Respond	As described in Section 3.2 of the EIA, the area with the potential to be impacted by a project is referred to as its Area of Influence (AOI). The Direct AOI, which is the area within which the Project is expected to have potential direct impacts, is limited to the area surrounding the pipeline, NGL Plant, and temporary MOF within and offshore of Region 3. The Indirect AOI, within which the Project could have potential indirect impacts, including impacts from an unplanned event, is limited to the vicinity of the offshore pipeline and Regions 2, 3, and 4. As such, the Project is not expected to significantly affect Region 1. The Project does not include a pipeline to bring gas to Region 1.	No
76.	1	Flavio's Hall 16 May 2022	What is EEPGL doing for indigenous communities in Region 1?	Out of Scope	Benefits accruing to Region 1 from activities unrelated to the GTE Project are beyond the scope of the EIA.	No
77.	1	Flavio's Hall 16 May 2022	Make sure that the pipeline during construction or operations will not sink. Will installation of the pipeline cause the seafloor to sink?	Respond	Section 7.3.2 describes the six separate studies that contributed information to the EIA regarding seabed conditions within the Project AOI. None of these studies indicated a propensity for the pipeline to cause seafloor subsidence or other geotechnical hazards, and this is not typically an impact of concern for a subsea pipeline. Language to this effect has been added to Section 7.3.3.1. Although the pipeline is not expected to cause the seafloor to sink, the pipeline is expected to alternately be covered or exposed at different locations and at different periods throughout its operational life due to the natural sediment dynamics of the continental shelf.	Yes
78.	1	Flavio's Hall 16 May 2022	Where is my sports proposal that was submitted last year?	Out of Scope	The Consultants acknowledge the question related to the status of a community grant request. However, the question is beyond the scope of the EIA.	NA
79.	1	Flavio's Hall 16 May 2022	What happens after the Project's 25 year lifetime is over?	Respond	At the end of the Project's operational lifetime, the Project will be decommissioned. As described in the Preliminary Decommissioning Plan, which was submitted as part of Volume III of the EIA, decommissioning consists of six primary decommissioning activities: planning, subsea facilities decommissioning, pipeline decommissioning, NGL Plant decommissioning, MOF decommissioning, and waste management. As described in this plan, EEPGL will develop a more detailed decommissioning plan, in consultation with appropriate Guyanese regulators, as the Project nears the end of its operational life.	No
80.	1	Flavio's Hall 16 May 2022	What is in place to make sure there are no leaks?	Respond	The Project will include several design and operational measures to prevent leaks. Design features include burying the onshore pipeline to prevent vandalism, burying the nearshore segment of the marine pipeline to prevent damage, and cathodic protection to reduce corrosion (rust) of the pipeline through the use of an induced current or a sacrificial anode (such as zinc) that corrodes at a faster rate than the steel pipe wall. Operational measures include pre-installation inspection of all pipe joints to verify weld integrity, post-installation cleaning of the pipe and hydrostatic testing to verify the integrity of the pipeline, and periodic inspections of both the onshore and offshore pipeline segments.	No
81.	1	Flavio's Hall 16 May 2022	What effects will the Project have on fishing?	Respond	As described in Section 9.1.4, Impact Prediction and Assessment, the Project is expected to create short-term restrictions on fishing activity along the offshore pipeline route due to marine exclusion zones that will be in place around the offshore pipeline installation vessels during construction. These restrictions will not	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
					affect any specific location for more than a few days, as the exclusion zones will follow the installation vessels as they move along the pipeline route. Some nearshore portion of the offshore pipeline exclusion zone is expected to remain in place throughout the Operations stage, and this exclusion zone will effectively represent a permanent limitation on anchorage, trawling, and the placement of fish nets and pens, which could have impacts on local fishing livelihoods in the immediate vicinity of the pipeline route, depending on the size and location of the exclusion zone. This issue was discussed with the Maritime Administration Department (MARAD) during the preparation of the EIA, and impacts on ecosystem services (including provisioning services provided by marine fisheries) from this and other aspects of the GTE Project were discussed with local NDCs, as indicated in Section 6.3.3 of the EIA.	
82.	1	Flavio's Hall 16 May 2022	Will Region 1 be directly impacted?	Respond	The Project is not expected to have any direct impacts on Region 1.	No
83.	1	Flavio's Hall 16 May 2022	What material is the pipeline made of?	Respond	The pipeline will be constructed of steel, which will be treated with a protective coating that will inhibit corrosion by preventing moisture from coming into direct contact with the pipeline wall.	No
84.	1	Flavio's Hall 16 May 2022	Has the amount of flaring been reduced?	Respond	It is assumed that the comment refers to flaring on the Liza Destiny FPSO. This is outside of the scope of the GTE Project EIA. However, it is noted that the GTE Project will not include routine flaring. Combustion of flare pilot and purge gas at the NGL Plant will be required to maintain the flares in a safe operational state, but otherwise the only flaring at the NGL Plant would be as a result of intermittent, non-routine scenarios.	No
85.	1	Flavio's Hall 16 May 2022	Does the AOI include Region 1?	Respond	Region 1 is not included in either the Direct or Indirect AOIs.	No
86.	1	Mabaruma RDC Office 19 May 2022	Who will pay for damaged mangroves? Will Guyana have to pay to replace mangroves lost as a result of the Project?	Respond	The Project is expected to require the clearing of three individual mangrove trees, the loss of which would be mitigated at EEPGL's expense.	No
87.	1	Mabaruma RDC Office 19 May 2022	What is the amount the government will borrow and the amount to repay?	Out of Scope	Government finances are beyond the scope of this EIA.	NA
88.	1	Mabaruma RDC Office 19 May 2022	Is this the only project or is there another project? I see two projects joining to bring in this pipeline. Is it possible that Liza and Destiny combine to make one project?	Respond	The Application for Environmental Authorisation associated with the EIA is only for the GTE Project. The GTE Project will bring gas from the Liza Destiny and Liza Unity FPSOs to shore, each of which were developed as separate projects.	No
89.	1	Mabaruma RDC Office 19 May 2022	What type of pipe are you using? How long will it last?	Respond	The pipeline will be constructed of steel pipe that will be designed for at least a 25-year operational life.	No
90.	1	Mabaruma RDC Office 19 May 2022	What is meant by the continued risk of spread of communicable disease?	Respond	Communicable diseases are illnesses that spread from person to person rather than arising from environmental conditions or lifestyle factors. There is some level of risk that communicable diseases may be transmitted whenever people are in close proximity to one another, but these risks can increase when different groups that have had little or no previous contact with each other come into close contact. If this novel contact occurs over a prolonged period of time, the risk of disease transmission could continue to be elevated. The Project's potential impacts on communicable disease transmission are assessed in Section 9.2.3.3, Impact Magnitude Ratings—Community Health and Wellbeing, of the EIA. The significance of a potential increase in communicable disease transmission and impacts on social cohesion during construction are	No

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					expected to be Negligible if the Project worker camp is employed in a “closed” fashion, and Small if the worker camp is not employed or is not operated in a “closed” fashion. The significance of potential increases in communicable disease transmission is expected to be Negligible during the Operations and Decommissioning stages, as the number of workers involved with these stages are relatively low. No potential impacts on non-communicable disease transmission are identified as a result of the GTE Project.	
91.	1	Mabaruma RDC Office 19 May 2022	I'm suggesting that you use floating obstacles so boats don't drop anchor near the lines.	Respond	The manner in which the marine exclusion zone is to be physically demarcated to avoid potential interference with third parties will be determined in collaboration with MARAD.	No
92.	1	Mabaruma RDC Office 19 May 2022	I'm suggesting the use of the boat to come to this meeting. Next time give the money to the community and we will get here. Hire local boat transport so the money benefits the communities and more people can come.	Out of Scope	The comment is acknowledged; however, transportation arrangements for meetings that may be conducted in support of future EIAs are beyond the scope of this EIA.	No
93.	1	Mabaruma RDC Office 19 May 2022	Will this Project only benefit the Government of Guyana and the companies? We the people are suffering from the high gasoline prices.	Out of Scope	The GTE Project involves the transport and treatment of natural gas. It does not involve oil or products derived from the oil refining process, such as gasoline or petrol.	No
94.	1	Mabaruma RDC Office 19 May 2022	How will this Project cater to this hinterland region?	Respond	The Project is not expected to have any direct impacts on hinterland regions.	No
95.	1	Mabaruma RDC Office 19 May 2022	We pay a high cost for gasoline. Will the Project help bring the cost of gasoline down?	Respond	The GTE Project does not involve oil or products derived from the oil refining process, such as gasoline or petrol. Therefore, it is not expected to have a measurable impact on the price of gasoline/petrol.	No
96.	1	Mabaruma RDC Office 19 May 2022	We have 7 persons employed with Exxon. We would like to see more employment from the region. We have persons who would like to benefit from jobs from these projects.	Respond	As described in various sections of the EIA, the Project is expected to support several potential benefits for Guyanese society, including increased economic development, increased employment, and growth of businesses. Although these opportunities will be open to all qualified Guyanese, the socioeconomic impact of these new job opportunities is expected to vary by project stage as well as being limited and concentrated in the vicinity of the Project AOI in Regions 3 and 4. In addition, the economic benefits of the Project are expected to extend beyond direct employment to include the expansion of job opportunities in the oil and gas sector, other sectors and the economy overall. Employment opportunities with EEPGL and its contractors are advertised on EEPGL’s social media accounts and/or the CLBD website under “Opportunities” at https://centreguyana.com/opportunities.	No
97.	1	Mabaruma RDC Office 19 May 2022	I am on Facebook and when we do get the information about a job opening, the vacancy is already filled or it’s too late to apply. Can you create a WhatsApp group? The RDC sends the information to the various villages but we get late notices, etc.	Respond	Employment opportunities with EEPGL and its contractors are advertised on EEPGL’s social media accounts and/or the CLBD website under “Opportunities” at https://centreguyana.com/opportunities.	No
98.	1	Mabaruma RDC Office 19 May 2022	We don't see anyone from the Government in meetings like these. They should be present so they can respond to questions.	Out of Scope	The comment is directed to the government.	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
99.	1	Mabaruma RDC Office 19 May 2022	What are the types of waste? If anything goes wrong, what type of cleanup will happen? If there is chemical waste, what is the impact on the environment?	Respond	As described in the CWMP submitted in Volume III of the EIA, the Project will generate a variety of wastes. Wastes generated offshore will include waste oils (lube, hydraulic, and fuels), deck and machinery space drainage waters and wastewaters, consumables (paint, aerosols, oil filters, oily rags, etc.), scrap wood, scrap metal, and empty containers. Wastes generated onshore will include cleared vegetation (slash and stumps), unsuitable fill (spoil), oily rags, general/domestic waste from temporary offices and camp, black and grey water from offices and camp, spent welding rods, wood, poly slings (for carrying pipe joints), spent welding rods, and some oily soils from small spill clean-ups. As described in Section 7.7.3.1 of the EIA, wastes generated during an emergency response (including chemical wastes) will be assessed to determine the most appropriate handling/on-site management and treatment/disposal methods. Any waste produced during a response to an unanticipated event would, by definition, be different in terms composition and/or volume than wastes generated from planned Project activities but would likely be managed using a combination of methods similar to those used to manage wastes from planned Project activities. These methods include segregation/sorting/storage, wastewater treatment, solidification/stabilization, thermal desorption treatment, incineration, container cleaning, and specialty hazardous waste treatment.	No
100.	1	Mabaruma RDC Office 19 May 2022	Are the EIA studies being done by ERM or by other organizations? Did these studies require fieldwork?	Respond	The studies required to support the EIA were led by a combination of staff from a number of Guyanese organizations including the University of Guyana Centre for the Study of Biological Diversity, E&A Consultants, Caribbean Engineering and Management Consultants Inc., Leon Moore Nature Experience, and ERM Guyana. Several of the studies required fieldwork, including studies on soils, groundwater and surface water quality, geotechnical conditions, terrestrial biodiversity, socioeconomics, traffic, sediments, water quality, and marine benthic biodiversity In addition to the above studies that were commissioned primarily to support the GTE Project EIA, in recent years EEPGL has commissioned several other studies including various environmental baseline surveys, marine and coastal bird studies, marine and riverine mammal studies, marine fish studies, participatory fishing studies, and air quality studies, all of which required fieldwork and provided recent data from the Project AOI that were incorporated in the EIA as appropriate.	No
101.	1	Mabaruma RDC Office 19 May 2022	I received a package with these documents last Friday. I didn't get the date of the meeting. Next time I need the date early.	Respond	Notice that the EIA was available for public review was made in local media as required by law. In addition to the legally required notice of availability, the Consultants endeavored to provide as much advance notice as possible directly to the local communities where meetings would be held.	No
102.	2	Anna Regina Town Hall 12 May 2022	I see in the report the Project has a life cycle of 25 years. After 25 years, what will happen to this Project? Will all the pipes that are laying in the ocean eventually become a hazard?	Respond	At the end of the Project's operational lifetime, it will be decommissioned in accordance with the requirements of a detailed decommissioning plan, which will be prepared toward the end of the operations phase and as decommissioning approaches. The preliminary plan for decommissioning the offshore pipeline is to empty the pipe of any hydrocarbons, clean it appropriately, cap/seal it, and abandon it on the seafloor, but this conceptual approach will be reviewed and finalized as the detailed decommissioning plan is prepared.	No
103.	2	Anna Regina Town Hall 12 May 2022	Years ago, I heard we had oil and I'm happy we discovered oil. Now I would like to know if Guyana is getting its fair share of employment (Guyanese jobs)? Would those positions be advertised?	Respond	Employment opportunities with EEPGL and its contractors are advertised on EEPGL's social media accounts and/or the CLBD website under "Opportunities" at https://centreguyana.com/opportunities.	No
104.	2	Anna Regina Town Hall 12 May 2022	I would like to commend the team and the EIA and commend our Government for having the Project at Wales and Exxon for doing the Project.	Respond	The comment is acknowledged.	No
105.	2	Anna Regina Town Hall	I am concerned with the pipeline passing close to homes. What is the impact of an explosion, if it were to happen?	Respond	As described in Section 10.1.4 of the EIA, an explosion would only be likely to occur if the gas is released into a congested space, which can be identified as any space within which there is an obstruction to the free movement of a gas through the space, and if the gas encountered a source of ignition. The strength	No

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		12 May 2022			of the explosion would be correlated to the proportion of the gas cloud within the congested area. The higher the proportion of the gas cloud that is within a congested area, the stronger the resultant explosion would be. Consequently, open areas—such as that characterized by the onshore pipeline corridor—are unlikely to be conducive to an explosion in the case of a natural gas release from the onshore pipeline. The consequences of an explosion would be highly location-dependent and could be high in a worst-case scenario where an explosion occurred along a segment of the onshore pipeline corridor near residences.	
106.	2	Anna Regina Town Hall 12 May 2022	The pipeline and the depth it is going onshore…there needs to be trenching for installation of the pipeline?	Respond	The onshore portion of the pipeline will be installed so that there is a minimum of 1.22 meters of cover once it is buried. Portions of the onshore pipeline will be installed using open-cut trenches, but other portions will be directionally drilled, in which case trenching will not be required.	No
107.	2	Anna Regina Town Hall 12 May 2022	What impact on employment will there be for Region 2. How can Region 2 benefit from the jobs?	Respond	Please see response to comment 96.	No
108.	2	Anna Regina Town Hall 12 May 2022	Can we get fertilizer as a byproduct from the gas for the rice industry in Region 2?	Respond	Natural gas can be used as a raw material in the production of nitrogen-based fertilizer. Production of fertilizer is not included as a component of the GTE Project, but natural gas could be used in a separate industrial process if a fertilizer plant was developed as part of a separate project.	No
109.	2	Ana Regina Town Hall 12 May 2022	Regarding the design of the pipe system, the ocean beds have seismic movements. Is there any measure being implemented to account for seismic movements? Do you have electronic valves to shut off sections if necessary?	Respond	The Project design process includes a number of geotechnical and geophysical studies designed to ensure that the substrate on which / in which the pipeline will be installed is sufficiently stable to safely support it. As part of these studies, a Probabilistic Seismic Hazard Assessment has been carried out to assess seismic risk along the pipeline route. The findings of this study will be incorporated in the detailed design of the offshore pipeline. Section 5.3.2 has been updated to include additional information provided in this response. The pipeline will be equipped with multiple valves that will provide the capability to shut off gas supply to the pipeline in the event a decrease in pressure is detected in the pipeline (e.g., due to a leak). If a leak were to occur (due to seismic activity or other causes), these valves are designed to prevent gas from continuing to flow into the pipeline.	Yes
110.	2	Ana Regina Town Hall 12 May 2022	If there a gas leak, do we have to wear gas mask? Is the gas dangerous?	Respond	The consequences of a gas leak at either the NGL Plant or along the onshore pipeline (and the response to such a leak) would be highly dependent on several factors, including but not limited to the size of the leak, the location of the leak, and weather conditions (e.g., wind speed) at the time of the leak. The primary concerns with a loss of natural gas is not toxicity, but rather the potential for the gas to ignite if it is exposed to an ignition source and is at a concentration that would promote ignition (i.e., not too lean and not too rich) and the potential for methane to displace oxygen if it is at a sufficient concentration at the location of a receptor.	No
111.	2	Ana Regina Town Hall 12 May 2022	Where the gas is coming from, it leaves a hole. Will that hole cause a landslide or a tsunami?	Respond	The reservoir that will produce the gas is a solid rock reservoir that contains pores. The gas exists within these pores between the grains in the rock matrix. As the gas is extracted, seawater moves into the pores. The rocky structure of the reservoir will remain unaltered after extraction, and there is no evidence that the process of gas extraction would increase risks of submarine landslides or seismic activity.	No
112.	2	Ana Regina Town Hall 12 May 2022	If there is a gas spill in the ocean, how long would that last?	Respond	The duration of a gas leak in the ocean would depend on the size of the defect in the pipeline. A gas leak from a smaller hole would likely persist for a longer time than for a larger hole because the gas in the pipeline would escape at a slower rate through a small defect as opposed to a larger defect. The pipeline will be equipped with valves that provide the ability to shut off the gas supply to the pipeline in the event a decrease in pressure (indicative of a potential leak) is detected in the pipeline. In such an event, during the period after shutdown when gas that is in the pipeline at time of shutdown is being released to the ocean, gas in the pipeline at the time of the shutdown would also continue to move toward the NGL Plant (assuming the pipeline is not completely severed, which is highly unlikely). This situation would continue until the leak was repaired or the pipeline was emptied; however, in no case would the amount of gas	No

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					entering the ocean be larger than the volume of gas that can be accommodated in the offshore pipeline at any particular point in time. Section 10.1.2 provides additional detail on a potential loss of integrity in the offshore pipeline resulting in a release of natural gas.	
113.	2	Ana Regina Town Hall 12 May 2022	This gas to shore - will it run to each person's home?	Respond	The Project does not include gas distribution to residences.	No
114.	2	Ana Regina Town Hall 12 May 2022	When will the Project happen?	Respond	At the time of the EIA, construction was planned to start as early as August 2022 (pending acquisition of all necessary approvals) and is planned to take approximately three years. The combined offshore and onshore pipeline system is targeted to be ready to deliver rich gas by end of 2024, and the NGL Plant is targeted to be operational by mid-2025.	No
115.	2	Ana Regina Town Hall 12 May 2022	Will you generate cooking gas from the Project?	Respond	The NGL Plant will remove natural gas liquids from the gas transported to shore, and these will be sold to the market by third parties. These NGLs may be used for several purposes, including as cooking gas.	No
116.	2	Ana Regina Town Hall 12 May 2022	The Government comes and makes promises, and we don't get anything. I have a document here where they failed to meet their agreement.	Out of Scope	This Project is being proposed by EEPGL; the government's obligations with respect to other projects is beyond the scope of this EIA.	No
117.	3	Leonora Technical Institute 13 May 2022	We would like to know the duration of the Project and whether late-night work will cause loss of sleep for nearby residents.	Respond	Guyana's Environmental Protection Noise Management Regulations 2000 establish noise limits for a variety of activities including construction and industrial activities. The significance ratings in the EIA are developed to align with the residential thresholds established in the Guyana noise regulations. The Project has committed to limit, when practicable, construction activities (including onshore construction activities) to daytime hours aside from infrequent instances in which a particular activity could not be stopped mid-completion. The activity with the highest likelihood of needing to occasionally extend into nighttime hours is horizontal directional drilling, during which there are instances where a portion of the activity cannot be paused once it is initiated. In this respect, the Project has committed to plan onshore pipeline HDD operations to avoid operation during nighttime hours, such that nighttime operations are conducted only if an unexpected situation results in a delay that extends an uninterruptable activity into nighttime hours or if the length of the boring is such that there is not reasonable means for avoiding nighttime hours. As described in Section 7.5 of the EIA, modeling predicts that, if HDD activities are unavoidable at night for whatever reason, there are potential residential structures that could be exposed to noise above the Guyana regulatory threshold at night—depending on the location of the HDD activity being conducted at night. The duration of exposure for a residential structure during nighttime drilling activities would be expected to be less than one night (and likely no more than a few hours). These results suggest that sleep disturbance during construction could occur at certain locations but would be temporary.	No
118.	3	Leonora Technical Institute 13 May 2022	How long will the Project last?	Respond	The Project is planned to have an operational life of at least 25 years.	No
119.	3	Leonora Technical Institute 13 May 2022	Would this Project create much more marine traffic that could impact marine life?	Respond	Project-related marine traffic will be highest during the Construction and Decommissioning stages, which will have relatively short durations compared to the Operations stage. As described in Section 9.4.2, Existing Conditions and Baseline Studies, Georgetown Harbour experiences a high volume of vessel traffic, including cargo, tanker, fishing, and passenger vessels. Vessel counts from a 2022 study conducted for the GTE EIA observed an average of 113 and 138 vessels per 24-hour period at two locations close to the mouth of the Demerara River. The volume of Project-related vessel trips from various foreign locations to Georgetown Harbour will be limited to approximately 50 deliveries across the Project Construction stage; in combination with an estimated two weekly vessel round trips between	No

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					shorebases and the offshore pipeline corridor, this element of the Project would not substantially increase vessel traffic in the harbor or in the marine environment in general. These short-term increases in marine traffic are expected to have Negligible impacts on marine biodiversity in most cases, although as discussed in Chapter 8 of the EIA, the potential impacts of underwater noise on marine mammals may be slightly more significant than on other marine biological receptors, owing to marine mammals' relatively high sensitivity to acoustic impacts in general.	
120.	3	Leonora Technical Institute 13 May 2022	Will fishermen that are excluded from the area around the pipeline be compensated for that loss?	Respond	Should Project-specific impacts on fisherfolk or fishing grounds access occur, the appropriate compensation framework will be developed to address these Project-specific impacts. This will be developed under the advice of the Guyana Ministry of Agriculture Fisheries Department. Sections 9.1.5, 9.1.6, 15.2, and the ESMMP (Section 3.2.2.3) have been updated to include additional information provided in this response.	Yes
121.	3	Leonora Technical Institute 13 May 2022	This EIA is for the pipeline. Some people live along the way and were not consulted. I don't know how these people are getting into an already submitted document. This Letter from Exxon contradicts the EIA. On what basis was the EIA being conducted? There was no evidence in the document [of people being consulted]. The document needs to be recalled.	Respond	The Consultants conducted an extensive engagement program with the public and specific stakeholders, to support the assessment within the EIA. The extent of this engagement is described in Chapter 6 of the EIA. In line with the Guyana EIA process and consistent with international EIA practice, broad public engagement was conducted during the scoping stage, and engagement during EIA development focused on establishing a robust baseline and understanding potential impacts and mitigation measures. This was achieved through engagement with people living within 500 meters of the onshore pipeline, among other residents and businesses, and engagement with the NDCs representing communities in the primary and secondary study areas. It is important to note that engagement during EIA development does not typically involve public forums as it is focused on supporting the understanding of baseline conditions, potential impacts, and development of effective and meaningful mitigation measures. Of note, Part IV, paragraph 11, sub-paragraph 9(a) of the EP Act states, "During the course of the environmental impact assessment the developer and the person carrying out the environmental impact assessment shall…. consult members of the public, interested bodies and organizations," but the Act does not specifically prescribe the extent of consultation that is required to support an EIA.	No
122.	3	Leonora Technical Institute 13 May 2022	Can we expect an increased incidence of communicable diseases and non-communicable diseases? Why wasn't this included in the EIA?	Respond	Please see response to comment 90.	No
123.	3	Leonora Technical Institute 13 May 2022	Can LNG tankers be used to transport the gas instead of a pipeline, so that the number of gas producing wells can expand and Guyana can sell gas on the international market?	Respond	The Project does not include plans to export gas via LNG tankers. As discussed in Section 4.1.2, The Government of Guyana commissioned a study that evaluated the costs, benefits, and risks of a pipeline versus LNG vessel(s). This study concluded that a pipeline is the better option to bring natural gas to shore. Transporting natural gas in the form of LNG would require the construction of additional infrastructure offshore and onshore, including an offshore liquefaction vessel and a coastal regasification plant, in addition to one or more specialized LNG vessels. The LNG vessel(s) may be limited in size and capacity by the limited draft (water depths) near shore and in Guyana's major rivers. Considering the distance to shore is approximately 200 kilometers, the fixed costs of LNG infrastructure would form the majority of the total cost of transporting LNG and would be costlier than transporting natural gas via pipeline.	No
124.	3	Leonora Technical Institute 13 May 2022	Inside the Non-Technical document, I would like to know what you mean by routine flaring. Will the leakage go through the pipeline and cause flaring? I want to know if the flaring can come through the pipeline.	Respond	The non-technical summary states that a reliable pilot ignition system will be used to reduce *non-routine* flaring. To clarify, the Project has assumed for the purpose of the EIA that some non-routine flaring will occur during the Project lifecycle, as a result of intermittent activities such as initial startup; storage bullets venting; loading rack venting; maintenance purging; maintenance pigging; gas-freeing of process equipment during maintenance events, Power Plant turbine trips, power demand swings; and blowdown events. The only continuous stream that will be sent to the flare is flare pilot and purge gas, which is	No

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					required to maintain the flares in a safe operational state. The purpose of the flare pilot and purge gas is to prevent oxygen from potentially entering the flare if there is not a constant supply of gas.	
125.	3	Leonora Technical Institute 13 May 2022	You spoke of anti-corrosive paint. Is there any way of checking the thickness of the pipeline while it's in the ground? What is the design thickness of the pipeline wall? I have seen pipelines destroyed from the inside, so I want to know if you have a way of "X-raying" the pipeline thickness.	Respond	The pipeline's wall thickness will be measured regularly by a process known as intelligent pigging. Intelligent pigging is an inspection technique whereby an intelligent pipeline inspection gauge tool, also known as an intelligent pig, is propelled through a pipeline while gathering data, such as the presence and location of corrosion or other irregularities on the inner walls of the pipeline. It is further noted that the gas flowing through this pipeline is a "dry gas," meaning it has been de-hydrated prior to entering the pipeline. Dry gas greatly reduces or eliminates the internal corrosion mechanism to which the comment refers.	No
126.	3	Leonora Technical Institute 13 May 2022	Could a flame from the flare enter the pipeline?	Respond	The Project design includes two flare systems, both of which will be supplied with pilot gas and purge gas on the flare lines that will fuel a flare pilot on each flare system. The flare pilot will operate in a similar fashion to the pilot light on a residential gas stove. The purpose of the flare and purge gas is to prevent oxygen from potentially entering the flare and causing a combustible environment inside the flare or pipeline. Section 5.3.4.3 has been updated to include additional information provided in this response.	Yes
127.	3	Leonora Technical Institute 13 May 2022	How much gas will the Project produce?	Respond	The pipeline will transport up to an average of approximately 50 million standard cubic feet per day (MMscfd) of dry gas to the NGL Plant.	No
128.	3	Leonora Technical Institute 13 May 2022	What is the management plan for a gas leak? There are tremors in this area.	Respond	Operating procedures, pipeline management system, and emergency response procedures are being developed throughout the detailed design of the various facilities. These will be in place prior to commissioning and Project operations startup. The pressure in the pipeline and the NGL Plant will be monitored at several locations in real time during operations. In the event of a loss of integrity at any point in the gas system, the loss in pressure would be detected and the flow of natural gas would be stopped. This would limit the potential impacts that could occur as a result of a natural gas release and allow repair procedures to commence.	No
129.	3	Leonora Technical Institute 13 May 2022	Is there insurance for compensation for people? This project is 25 years. That is a lot of money.	Respond	The Stabroek Block co-venturers' first priority is to put in place mitigations and processes that prevent adverse events. In the unlikely case of an adverse event, the co-venturers would immediately minimize and rectify any impacts. The co-venturers have the financial capacity to meet the responsibilities for an event including obligations under Guyanese law and respective petroleum agreements. Regarding insurance, the Stabroek Block co-venturers secure comprehensive insurance for petroleum activities as required by environmental permits and will do the same for this Project. Under the existing legal framework and agreements with the government, there are extensive assurances of EEPGL's and co-venturers' commitments, including environmental protection measures to respond to operational incidents. The Government of Guyana has multiple mechanisms in place, including the Stabroek Block Petroleum Agreement and the environmental permits, to ensure that the companies would take responsibility for any adverse events. Joint insurance coverage is obtained in the name of EEPGL and the other Stabroek block co-venturers for the appropriate lines of coverage, depending on the project and scope of work. Specifically for the GTE Project, should it receive necessary approvals, the co-venturers would have insurance coverage including Third Party Liability.	No
130.	3	Leonora Technical Institute 13 May 2022	How much gas is there? Is there a market for the excess gas?	Respond	The Project is expected to transport an average of approximately 50 MMscfd of natural gas from offshore to the NGL Plant onshore. The only times when "excess" gas will be produced would be during transitional activities, which include operations that occur under conditions other than normal operating conditions (e.g., Project startup, inspections and maintenance, upsets, etc.). The Project design includes a flare system, which would be used to combust excess gas generated during transitional activities.	No
131.	3	Leonora Technical Institute	You recommend a lower speed limit for the safety of wildlife. The minibus industry will suffer. It will be a negative impact.	Respond	The speed limit would only apply to Project vehicles.	No

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		13 May 2022				
132.	3	Leonora Technical Institute 13 May 2022	Is this industry and the gas and energy a project from Exxon, and how will the people benefit from it? They doing a pipeline but we have problems such as availability of gas bottles for cooking gas.	Respond	The GTE Project is being proposed by EEPGL and includes the offshore pipeline, onshore pipeline, temporary MOF, and NGL Plant. The Government of Guyana has proposed a gas-fired Power Plant that would be supplied with natural gas from the GTE Project, but the Power Plant is not part of the Project. The NGL Plant will remove natural gas liquids (NGLs) from the natural gas for sale to third parties. These NGLs may be used for several purposes including as cooking gas.	No
133.	3	Leonora Technical Institute 13 May 2022	What can the poor do to benefit from the Project?	Respond	As described in various sections of the EIA, the Project is expected to support several potential benefits for Guyanese society, including increased economic development, increased employment, and growth of businesses. Guyanese should have the opportunity to access these benefits, for example by gaining or improving employment or by starting or expanding businesses, and many are expected to benefit from the Project.	No
134.	3	Leonora Technical Institute 13 May 2022	I noticed that the plant will use a lot of groundwater. Did you look at other alternative sources of water, like the Boerasirie River?	Respond	Various sources of water for the NGL Plant were considered. These included groundwater wells and pulling water from either surrounding canals or the Demerara River. Baseline water quality samples were taken from each of these locations. Based on environmental considerations, capital and operating expenses of water treatment facilities, and anticipated water usage, groundwater well(s) were determined to be the optimal solution. Section 5.3.4.3 has been updated to include additional information provided in this response.	Yes
135.	3	Leonora Technical Institute 13 May 2022	What is happening to the cooling water that is heated and coming out of the plant?	Respond	As stated in Section 5.5.3.2, any cooling water for the NGL Plant operations will be consolidated in a process water stream to be conveyed to a process wastewater treatment plant (WWTP) at the NGL Plant site. After being treated, the process water will be discharged to the stormwater retention pond for holding, analysis, and monitoring. As conditions allow, water from the stormwater retention pond will be discharged directly to the Demerara River or via existing canals.	No
136.	3	Leonora Technical Institute 13 May 2022	Why are there bends in the offshore pipeline?	Respond	The offshore and onshore pipeline bends in multiple places along the route to follow the selected optimized corridor, avoid obstacles, and avoid interference with existing infrastructure.	No
137.	3	Leonora Technical Institute 13 May 2022	How many compressor stations are there along the way and how will pipe joints be welded together to construct the pipeline?	Respond	No compressor stations will be required along the pipeline. The offshore pipeline segments will be welded together onboard a pipeline installation vessel. The onshore pipeline segments will be strung and welded along the pipeline RoW. For open-cut segments, a trench will then be excavated, and the welded pipe segments will be lowered in the trench and backfilled. Segments to be horizontal directionally drilled (HDD) will be welded from one side of each borehole and pulled from the other side using a pulling head and a winch.	No
138.	3	Leonora Technical Institute 13 May 2022	Can gas turn into oil?	Respond	No, gas cannot turn into oil.	No
139.	3	Leonora Technical Institute 13 May 2022	Where are the gas leak and gas management plans? Are they provided separately?	Respond	Operating procedures, pipeline management system, and emergency response procedures are being developed throughout the detailed design of the various facilities. These will be in place prior to commissioning and Project operations startup. As part of these procedures, there will be operations monitoring of the pipeline 24 hours a day, 7 days a week, and the Project will utilize a combination of different leak detection technology to identify small or large gas leaks.	No
140.	3	Leonora Technical Institute 13 May 2022	Is EEPGL part of ExxonMobil?	Respond	EEPGL is an affiliate of Exxon Mobil Corporation.	No

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141.	3	West Demerara Secondary School 18 May 2022	If the right of way is passing on someone's land where they are planting hundreds of acres of crops, how will that person be compensated?	Respond	The Government of Guyana is responsible for land acquisition and the determination of associated compensation. EEPGL will support the Government of Guyana in this process with the intention that Project-related land acquisition, resettlement, and livelihood restoration activities is aligned with internationally recognized good practice for resettlement as defined by IFC Performance Standard 5 (PS5): Land Acquisition and Involuntary Resettlement.	No
142.	3	West Demerara Secondary School 18 May 2022	How will I get in and out of my land if the pipeline is passing through my land? I have 100 acres of rice and pineapple at Java Canal #1 and the pipeline may cut off access to my land.	Respond	The majority of the onshore pipeline RoW is planned to use or abut to State-owned land, therefore not impeding access to privately owned land. The Government of Guyana is responsible for evaluating and conducting any required land acquisition. Additionally, during construction, the Project will liaise with any impacted land owners to facilitate any required crossings and access to private lands.	No
143.	3	West Demerara Secondary School 18 May 2022	Has the pipeline route been finalized?	Respond	Yes, the pipeline route that is shown in the EIA has been selected as the final pipeline route. Small adjustments to the pipeline route may occur as the construction process progresses, but significant adjustments that would affect the conclusions of the EIA are not expected.	No
144.	3	West Demerara Secondary School 18 May 2022	For fish pens where we set the seines, I know Exxon pays out for the pen that they remove from fishing. I don't think the money is enough. $5 million or $3 million is not enough to pay us. When we remove our fishing pens, we need to rent them out. According to what I know, they pay you to move. I don't know how long it's going to be.	Respond	EEPGL will establish a claims process to determine the appropriateness of compensation to address claims of Project-induced losses of livelihoods, and, depending on the magnitude of claims, a livelihood remediation program. The purpose of the claims process would be to provide compensation as appropriate for asset losses and the purpose of a livelihood remediation program would be to restore the welfare and livelihoods of affected persons to conditions no less than pre-impact conditions. Both processes would be transparent, fair, and conducted in a timely manner. EEPGL, in consultation with the Government of Guyana would establish the designated geographic zones associated with the claims and, as applicable, livelihood remediation processes.	No
145.	3	West Demerara Secondary School 18 May 2022	All of Exxon's environmental studies are being conducted by ERM. Why does Exxon choose ERM and what can you stay about the independence of the two?	Respond	EEPGL conducts a rigorous contractor evaluation and selection process for its various environmental and socioeconomic study and impact assessment needs, and currently has a number of Guyanese and international consultancies (including ERM) under contract to support EIAs and other studies.	No
146.	3	West Demerara Secondary School 18 May 2022	Who is hosting these seminars? ERM, EEPGL, or EPA?	Respond	The EIA Consultants team, of which ERM is a member, conducted the public disclosure meetings for the GTE EIA, in accordance with guidance provided by the EPA.	No
147.	3	West Demerara Secondary School 18 May 2022	Is there a fence or wall around the pipeline?	Respond	Because the onshore pipeline will be buried, there is currently no plan to fence the onshore pipeline RoW, with the exception that the aboveground valve compound for the onshore pipeline will be equipped with anti-cut / anti-climb perimeter fencing around the valve.	No
148.	3	West Demerara Secondary School 18 May 2022	Was my family invited to this meeting? Were residents of Reitua invited? I'm not talking about the land acquisition meeting; that's government. The newspapers say West Demerara Secondary School. You cannot assume that people know where these places are.	Respond	The Consultants employed a number of methods to advertise the disclosure meetings, including the issuance of a public notice of availability announcing the EIA and the disclosure meetings that was published in local print media and on social media, as well as announced through local howlers.	No
149.	3	West Demerara Secondary School 18 May 2022	You are dumping waste and flaring. Where is the duty of care on these things?	Respond	Wastes from all of EEPGL's operations are managed according to the provisions of EEPGL's CWMP, which was submitted to the EPA in Volume III of the EIA for the GTE Project. With the exception of flare pilot and purge gas, which are required to be continuously routed to the flare for safety reasons, there are no plans to routinely flare gas as part of the GTE Project; non-routine flaring will occur on an intermittent basis to combust excess gas generated during transitional activities (e.g., Project startup, inspections and maintenance, upsets, etc.).	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
150.	3	West Demerara Secondary School 18 May 2022	How long is this Project expected to last?	Respond	As stated in Section 5.4, at the time of the EIA, construction was planned to start as early as August 2022 (pending acquisition of all necessary approvals) and is planned to take approximately three years. The combined offshore and onshore pipeline system is targeted to be ready to deliver rich gas by end of 2024, and the NGL Plant is targeted to be operational by mid-2025.	No
151.	3	West Demerara Secondary School 18 May 2022	If there is a breakdown with the compression plant and there is a shutdown, there is a backup in the gas. Where does the excess gas go?	Respond	The Consultants assume that the term “compression plant” in the comment refers to the NGL Plant. The only times when “excess” gas will be produced would be during transitional activities, which include any operations that occur under conditions other than normal operating conditions (e.g., Project startup, inspections and maintenance, upsets, etc.). The Project design includes two flare systems (one wet flare system for streams containing water and one cold flare system for remaining streams), both of which will be used on an intermittent basis to combust excess gas generated during transitional activities.	No
152.	3	West Demerara Secondary School 18 May 2022	How does the system deal with backup gas in the pipeline?	Respond	As stated in Section 5.3.4.3, there are a number of reasons that gas in the pipeline could potentially not be sent to the NGL Plant, including Project startup, inspections and maintenance, or system upsets. The Project design includes two flare systems (one wet flare system for streams containing water and one cold flare system for remaining streams), both of which will be used on an intermittent basis to combust excess gas in the pipeline that cannot be sent to the NGL Plant. The gas in the pipeline can be safely blocked in whenever the Power Plant does not need gas. The pipeline stays pressurized and inventoried, and there is no need to de-pressurize the system. Section 5.3.4.3 has been updated to include additional information provided in this response.	Yes
153.	3	West Demerara Secondary School 18 May 2022	This question is about the pigs. Is it easier for them to work in straight lines or lines with bends?	Respond	Both types of pigs that will be used to inspect the pipelines that are included in the GTE Project can be operated equally well in straight or curved pipelines, including the full range of curve radii that are included in the GTE Project design. The pipeline design will specify bending radius requirements to allow for proper piggability.	No
154.	3	West Demerara Secondary School 18 May 2022	I want to thank Exxon. I learned in a lot on these sessions. They should look into having more educational sessions. Especially on the governance of Exxon.	Out of Scope	The Consultants acknowledge the comment related to educational sessions on ExxonMobil’s corporate governance.	No
155.	3	Patentia Primary School 20 May 2022	When the pipes come to weld, what is their size?	Respond	The outer diameter of the pipeline would be 323.9 millimeters (mm) for both the onshore and offshore sections. The inner diameter of the onshore pipeline would be 304.9 mm. The inner diameter of the offshore pipeline would range from 308 mm to 298.5 mm, depending on location. Pipe dimensions at the welded ends will be the same as through the adjacent pipe body. Standard line pipes (approximately 12.2 meters in length) will be used to construct onshore and offshore pipelines.	No
156.	3	Patentia Primary School 20 May 2022	If you get any seepage between the first and last flange, do you have to dig it up?	Respond	It is assumed that the comment is referring to a potential leak in the pipeline. If a loss of pressure is identified in the pipeline system, the Project will have processes and equipment to identify the location of the source of pressure loss, so repair activities can be concentrated on the specific location of the issue. If the location is where the pipeline is buried, this may involve an excavation to expose the pipeline for a repair. This potential requirement supports the justification for retaining a permanent pipeline corridor (12-meter-wide).	No
157.	3	Patentia Primary School 20 May 2022	How far is this pipeline going out to sea?	Respond	The pipeline will connect the Liza Destiny and Liza Unity FPSOs to shore. The Liza Destiny FPSO is approximately 190 kilometers offshore, and the Liza Unity FPSO is approximately 183 kilometers offshore.	No
158.	3	Patentia Primary School 20 May 2022	We welcome the Project. The Project brings back life on the West Bank. We have no industries here. Most persons have to go to Georgetown for work.	Respond	The comment is acknowledged.	No

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159.	3	Patentia Primary School 20 May 2022	My only concern is the farmers. Will this impact the farmers?	Respond	The Project will result in some agricultural land becoming unavailable for future agricultural activities due to the presence of a 12-meter-wide permanent RoW during the Operations stage. Farmers with land adjacent to the onshore pipeline RoW may also be temporarily affected during the construction phase (i.e., as a result of additional temporary construction areas outside of the permanent RoW, which will be restored following construction activities). Potential impacts on agriculture and farmers, including mitigation and controls, are described in Section 9.6.3, Impact Prediction and Assessment, of the EIA.	No
160.	3	Patentia Primary School 20 May 2022	Some farming and residents are just 1,000 to 2,000 feet from where the pipeline is laying. Will there be any relocation in the area?	Respond	Although the Project as planned will result in limited physical displacement/relocation (including three households near the temporary MOF), potential displacement from farming lands (i.e., “economic displacement”) was also assessed in Section 9.6, Land Use and Ownership, of the EIA. EEPGL will offer support to the Government of Guyana to develop a Resettlement and Livelihood Restoration Strategy in alignment with internationally recognized good practice for resettlement as defined by IFC Performance Standard 5 (PS 5): Land Acquisition and Involuntary Resettlement.	No
161.	3	Patentia Primary School 20 May 2022	We are scared about any explosion where the pipeline is. What will be the plans for the farmers that farm in the area of the pipeline? There are also farmers where Maria's Lodge is and the wind blows on that side, about half of a mile from the plant.	Respond	As described in Section 10.1.4 of the EIA, an explosion would potentially only occur if the gas is released into a congested space and encounters a source of ignition. Open areas—such as that characterized by much of the onshore pipeline corridor—are unlikely to be conducive to an explosion in the case of a natural gas release from the onshore pipeline. Should an explosion occur, the consequences of the explosion would be highly location-dependent and EEPGL’s Emergency Response Plan would be implemented. A discussion of the potential risks to various resources from an unplanned loss of integrity from the pipeline or NGL Plant is provided in Section 10.2.	No
162.	3	Patentia Primary School 20 May 2022	We have a lot of skills in the area, heavy duty equipment operators, civil engineers etc. Will all this work will be given to big contractors? We need some work to trickle down here.	Respond	Please see response to comment 96.	No
163.	3	Patentia Primary School 20 May 2022	Where will the road be starting?	Respond	The heavy haul road will start at the temporary MOF and terminate at the NGL Plant. The location of the heavy haul road is depicted in Figure 5.1-1 in the EIA.	No
164.	3	Patentia Primary School 20 May 2022	Is there employment?	Respond	Please see response to comment 96.	No
165.	3	Patentia Primary School 20 May 2022	Is the company taking on people to work? I worked for 22 years with Guysuco. Exxon pays more money than Guysuco.	Respond	Please see response to comment 96.	No
166.	3	Patentia Primary School 20 May 2022	I don't understand where the Project will be within Wales.	Respond	The Project’s location is depicted in Figure 5.1-1 in the EIA.	No
167.	3	Patentia Primary School 20 May 2022	Will there be training for the jobs required?	Respond	EEPGL’s local content strategy takes a coordinated, focused and sustainable approach and is designed to deliver lasting and shared value to host countries, local communities and our business. EEPGL is committed to working collaboratively with its contractors, the Government and the people of Guyana to develop opportunities for nationals and local businesses in a structured and sustainable way. A key area of focus for local content strategy is workforce development, which includes building the capabilities and capacity of Guyanese people and businesses to support activities and operations.	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
168.	3	Patentia Primary School 20 May 2022	When this is completed, if there is a spillage, what do you have in place to deal with that?	Respond	The GTE Project is a gas project rather than an oil project, so the only oil spills with a potential to occur as part of the GTE Project would be those associated with a loss of fuel from a Project vehicle or vessel (e.g., in the event of a collision). If an oil spill were to occur, EEPGL would respond to the spill according to the provisions of EEPGL's affiliate-level Oil Spill Response Plan (OSRP), which was submitted to the EPA in Volume III of the GTE Project EIA.	No
169.	3	Patentia Primary School 20 May 2022	Will the people who will be in the work camp be local people?	Respond	If a temporary Worker Camp is established during the Construction stage of the Project, it would be intended to provide accommodation for non-local workers.	No
170.	3	Patentia Primary School 20 May 2022	I want to know more specifics on the relocation of farmers in Re-en-State south. Will everyone have to evacuate?	Respond	Please response to comment 160.	No
171.	3	Patentia Primary School 20 May 2022	The barge road is where my farm is going to be. I've been there since 2007. I farm pigs and coconut trees, etc. If I have to move, I want to know if I will get another farm. I've spent millions of dollars. I won't stand in the way of progress. I came from the states and that farm is my retirement. I had plans to make a resort.	Respond	Please response to comment 160.	No
172.	3	Patentia Primary School 20 May 2022	If Exxon is coming, we will not say no. Your MOF is referred to as a wharf. Where is the wharf going? Can it be located so that we can still be there and you can still be doing your work?	Respond	The MOF will be located directly east of the NGL Plant, on the West Bank of the Demerara River. The MOF's location is depicted on Figure 5.1-1 in the EIA.	No
173.	3	Patentia Primary School 20 May 2022	What is the average sound level emitted from the plant?	Respond	The sound levels associated with operation of noise-generating units at the NGL Plant will vary based on the type of equipment. Average sound levels emitted from each type of equipment are described in Section 7.5.4.3 of the EIA; estimated aggregate sound levels emitted from the NGL Plant at various distances from the facility are presented in Tables 7.5-11 to 7.5-13.	No
174.	3	Patentia Primary School 20 May 2022	The pipeline is fabricated in Brazil. When was it fabricated and what is the estimated completion time?	Respond	Based on the current working schedule for the Project, line pipe manufacturing is estimated to be completed in Q3 of 2023.	No
175.	3	Patentia Primary School 20 May 2022	Question for ERM. Did you meet with residents directly in the path of the pipeline?	Respond	Yes. Door-to-door socioeconomic surveys (at both the household and business level) were conducted in the vicinity of the Project in Region 3, including but not limited to households within 500 meters of the proposed onshore pipeline.	No
176.	3	Patentia Primary School 20 May 2022	Gas price is going up every day. Will the price go up or down when you finish?	Respond	The NGL Plant is expected to increase the supply of natural gas to Guyana, thereby creating downward pressure on natural gas prices in the Guyanese market.	No
177.	3	Patentia Primary School 20 May 2022	I live in Patentia, Skull City. I can't wrap my head around where this is going. Will we be affected? It's the southern side of Patentia. We are off the road so we don't have a road at the back there. Will we be affected?	Respond	The Project's location is depicted in Figure 5.1-1 in the EIA.	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
178.	3	Patentia Primary School 20 May 2022	Also about jobs – how many and what type of jobs will be generated? Who will get them?	Respond	Please see response to comment 96.	No
179.	3	Patentia Primary School 20 May 2022	Why not invest in a factory and refine the oil here?	Out of Scope	The Project is not an oil project. As such, an oil refinery is beyond the Project scope.	NA
180.	3	Patentia Primary School 20 May 2022	Are these jobs being only for experienced personnel? What affect this will have on youths who don't have the experience? Is anyone following up on the subcontractors to see if they will be contacting people for jobs?	Respond	Please see response to comment 96.	No
181.	3	Patentia Primary School 20 May 2022	What are the byproducts from this Gas to Energy Project?	Respond	The Project will not produce “byproducts” as such. Section 5.3.4 has been updated to reflect this. The Project will produce a variety of consumable products and wastes. The consumable products that will be produced from the natural gas in the NGL Plant will include propane, butane, and pentane. The Project will produce several types of waste, including waste oils (lube, hydraulic, and fuels), deck and machinery space drainage waters and wastewaters, consumables (paint, aerosols, oil filters, oily rags, etc.), scrap wood, scrap metal, and empty containers. Wastes generated onshore will include cleared vegetation (slash and stumps), unsuitable fill (spoil), oily rags, general/domestic waste from temporary offices and camp, black and grey water from offices and camp, spent welding rods, wood, poly slings (for carrying pipe joints), spent welding rods, and some oily soils from small spill cleanups.	Yes
182.	3	Patentia Primary School 20 May 2022	I noticed there are a lot of projects around and the contractors bring their men to work. We need Exxon to make sure the locals benefit from the jobs. The people from the area are often left out. ExxonMobil needs to work with people in the village and their leaders to make sure things run smooth.	Respond	As part of its local content workforce strategy, and in alignment with the 2021 Local Content Act, EEPGL identifies and implements programs to give fair and adequate opportunity and first consideration for employment of Guyanese nationals having appropriate qualifications and necessary experience to safely perform job responsibilities.	No
183.	4	Umana Yana 11 May 2022	I am concerned about the lack of due process in this government. Recall the EIA and have a meeting with Residents around Canal #1 and #2.	Respond	The EIA was conducted according to the procedures and requirements set forth in the EP Act and the Terms and Scope issued by the EPA. With specific respect to stakeholder engagement, focus group meetings were held during development of the EIA with several NDCs, including the Canals Polder NDC, which represents communities along both Canals 1 and 2.	No
184.	4	Umana Yana 11 May 2022	The address of the developer is not attached to the EIA.	Respond	The developer’s address was included on the cover letter that accompanied the EIA when it was submitted to the EPA as part of the regulatory submittal. EEPGL’s address is also a matter of public record.	No
185.	4	Umana Yana 11 May 2022	Impacts on marine turtles need to be addressed in the EIA.	Respond	Potential impacts on marine turtles from the Project are addressed in Section 8.6.3.3 (potential impacts from planned Project activities) and Sections 10.2.9 and 10.2.13 (potential risks from unplanned events).	No
186.	4	Umana Yana 11 May 2022	A pipeline cannot exist without the plant. We need one EIA. Why isn’t there one EIA for the whole Project?	Respond	The Power Plant is not addressed in the EIA because EEPGL is not the developer for the Power Plant, which is being proposed separately by the government, and EEPGL is not seeking an environmental authorization for the Power Plant. It is noted, however, that potential cumulative impacts from the Project and other non-Project activities – including the Power Plant - are assessed in Chapter 11 of the EIA.	No
187.	4	Umana Yana 11 May 2022	The pipeline that connects the power plant and NGL Plant needs to be addressed in the EIA.	Respond	As the pipeline that would supply gas to the Power Plant would exist solely to support the Power Plant, and as the Power Plant is being proposed as a separate government-sponsored project, it was not included in the EIA. That said, it is noted that the Power Plant is expected to be installed immediately	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
					adjacent to the NGL Plant, so the length of pipe between the two facilities would be relatively short, and confined to an area with no sensitive resources.	
188.	4	Umana Yana 11 May 2022	Will EEPGL be taking responsibility for losses caused by explosions etc.? If so, how soon will we see an insurance document?	Respond	Please see response to comment 129.	No
189.	4	Umana Yana 11 May 2022	This process continues up to the Natural Gas Plant. What responsibilities will EEPGL have after construction of the pipeline? Please be specific as to when the Government of Guyana takes over.	Respond	The Project includes three major components comprised of the offshore connections to the FPSOs, the offshore and onshore sections of the pipeline, and the NGL Plant. The Project also includes several supporting facilities including a worker camp, a temporary MOF, and various other ancillary facilities, several of which will be temporary. As the Project proponent, EEPGL will have responsibility for the operation of these facilities. The government has proposed to construct a Power Plant that will be fueled by natural gas supplied by the NGL Plant. As the proponent of the Power Plant and the associated pipeline, the government would have responsibility for the operation of these facilities.	No
190.	4	Umana Yana 11 May 2022	Who will operate the NGL Plant and who will operate the power plant?	Respond	Please see response to comment 68.	No
191.	4	Umana Yana 11 May 2022	What is the exact cost to transport gas from the two vessels to shore?	Respond	The overall capital investment for the Project has been estimated at $260 billion GYD ($1.3 billion USD) as reported in Chapter 1.[1]	No
192.	4	Umana Yana 11 May 2022	What discharges will the Project cause and how will those discharges be managed?	Respond	Planned effluent discharges from the Project, and the means by which they will be managed, are described in Section 5.5.3, Effluent Discharges.	No
193.	4	Umana Yana 11 May 2022	Are you going to do seismic studies for tremors to ensure the pipeline is sufficiently resilient?	Respond	The Project design process includes a number of geotechnical and geophysical studies designed to ensure that the substrate on which / in which the pipeline will be installed is sufficiently stable to safely support it. As part of these studies, a probabilistic seismic hazard assessment was conducted to determine seismic risk along the pipeline route. The findings of this study will be incorporated in the detailed design of the offshore pipeline. Section 5.3.2 has been updated to include additional information provided in this response.	Yes
194.	4	Umana Yana 11 May 2022	Why are signatures not attached to the EIA?	Respond	The developer's signature and address were included on the cover letter that accompanied the EIA when it was submitted to the EPA as part of the regulatory submittal, as was the signature of a representative from the Consultants.	No
195.	4	Umana Yana 11 May 2022	Was the Leonora-Boerasirie route considered for the pipeline?	Respond	The EIA considered two routes for the pipeline route, the so-called "eastern" and "western" routes. A route through Leonora and the Boerasirie reserve was not considered for detailed analysis because it would be longer, more expensive, and present additional technical challenges compared to the two routes considered for detailed analysis.	No
196.	4	Umana Yana 11 May 2022	Up to where will EEPGL be taking responsibility for the pipelines?	Respond	Please see response to comment 189.	No
197.	4	Umana Yana 11 May 2022	Do you have a gas management plan? Places like America, Mexico etc. have gas management plans.	Respond	Please see response to comment 139.	No
198.	4	Umana Yana	On a slide in the presentation, you have storage and flaring. What type of storage?	Respond	In the disclosure presentation, the term "storage" referred to storage of natural gas liquids (NGLs). As described in Section 5.3.4.2, NGLs, once separated from the natural gas stream, will be stored at the NGL	No

[1] $1 U.S. dollar (USD) = $200 Guyanese dollars (GYD)

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
		11 May 2022	What type of flaring? What does storage include?		Plant in carbon steel storage tanks. One type of tank, known as a “bullet,” will be used for storing NGLs until they are offloaded to trucks and transported for sale to third parties. The Project design includes two flare systems (one wet flare system for streams containing water and one cold flare system for remaining streams), both of which will be used on an intermittent basis to combust excess gas generated during transitional activities.	
199.	4	Umana Yana 11 May 2022	What type of flaring does the EIA refer to?	Respond	As stated in Section 5.3.4.3, the Project design includes two flare systems (one wet flare system for streams containing water and one cold flare system for remaining streams), both of which will be used on an intermittent basis to combust excess gas generated during transitional activities. The combustion of flare pilot and purge gas will be required to maintain the flares in a safe operational state. The purpose of the flare pilot and purge gas is to prevent oxygen from potentially entering the flare if there is not a constant supply of gas. Non-routine emission sources could include flaring from initial startup; storage bullets venting; loading rack venting; maintenance purging; maintenance pigging; gas-freeing of process equipment during maintenance events, Power Plant turbine trips; power demand swings; and blowdown events.	No
200.	4	New Diamond Primary School 17 May 2022	What kind of training/skills do workers need to get jobs? How can Guyana labor get the ability to access the jobs?	Respond	EEPGL’s local content strategy takes a coordinated, focused and sustainable approach and is designed to deliver lasting and shared value to host countries, local communities and our business. EEPGL is committed to working collaboratively with its contractors, the Government and the people of Guyana to develop opportunities for nationals and local businesses in a structured and sustainable way, and in alignment with the 2021 Local Content Act. A key area of focus for local content strategy is workforce development, which includes building the capabilities and capacity of Guyanese people and businesses to support activities and operations. Employment and supplier opportunities with EEPGL and its contractors are advertised on EEPGL’s social media accounts and/or the CLBD website under “Opportunities” at https://centreguyana.com/opportunities.	No
201.	4	New Diamond Primary School 17 May 2022	What quality works does this entail?	Respond	Section 5.3.7 of the EIA cites the main Guyanese, U.S., and international design codes and standards with which the subsea, umbilicals, risers, and flowlines (SURF); pipeline; and NGL Plant will be designed to comply. These codes and standards include component-specific specifications for various Project elements including risers, subsea structures, pipelines, boilers, pressure vessels, and others. In addition, they include quality standards for critical construction work, including welding and electrical installation.	No
202.	4	New Diamond Primary School 17 May 2022	What is the timeline for the start of the Project?	Respond	At the time of the EIA, construction was planned to start as early as August 2022 (pending acquisition of all necessary approvals) and is planned to take approximately three years. The combined offshore and onshore pipeline system is targeted to be ready to deliver rich gas by end of 2024, and the NGL Plant is targeted to be operational by mid-2025.	No
203.	4	New Diamond Primary School 17 May 2022	A lot isn’t mentioned about the ecosystem and farmland and the depth of pipe on land. What is the process if anything happens to someone in an oil spill or gas leak?	Respond	Chapter 8 provides a description of existing conditions for biological resources, and ecological balance and ecosystems in particular are discussed in Section 8.5. As described in Section 10.1.4.1 of the EIA, the impacts of a leak in the onshore pipeline would depend in large part on the size of the defect in the pipe. Small leaks would be unlikely to release natural gas above ground, but large leaks have the potential to lead to full-bore ruptures, which would be likely to create a crater in the soil adjacent to the pipeline in the process of releasing natural gas to the atmosphere. As described in Section 10.1.4.3 of the EIA, several factors would affect the consequences of a hydrocarbon release to the atmosphere, including the physical and chemical properties of the hydrocarbon released, the temperature and pressure of the release, the inventory available to be released, the types of terrain surrounding the release, the meteorological conditions at the time of the release, and the presence of an ignition source. The consequences of such a release could include creation of a non-flammable cloud, a flammable cloud, a jet fire, and/or an overpressure	No

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					condition/explosion. The consequences of each of these potential conditions are further analyzed in Section 10.1.4 of the EIA. Additionally, please see response to comment 129.	
204.	4	New Diamond Primary School 17 May 2022	Why is there a slug catcher attached if there is only gas coming through the line?	Respond	The purpose of the slug catcher will be to receive any liquids that may accumulate in the pipeline during so-called “transitional” operations. Transitional operations include any operations that occur under conditions other than normal operating conditions (e.g., Project startup, inspections and maintenance, upsets, etc.). Section 5.3.4.3 has been updated to include additional information provided in this response.	Yes
205.	4	New Diamond Primary School 17 May 2022	What happens to the liquids that remain in the line? Is there a waste component there too?	Respond	Under upset conditions, NGLs may form inside the pipeline. If this occurs, the liquids can be removed from the line and sent to the flare for safe handling prior to resumption of normal pipeline operations. Section 5.3.4.2 has been updated to include additional information provided in this response.	Yes
206.	4	New Diamond Primary School 17 May 2022	What section of the Environmental Protection Act describes how these meetings are being conducted and how input received is to be addressed?	Respond	The EP Act does not specifically prescribe public meetings as part of an EIA; however, Part IV, paragraph 11, sub-paragraph 9(a) states “During the course of the environmental impact assessment the developer and the person carrying out the environmental impact assessment shall…. consult members of the public, interested bodies and organizations”.	No
207.	4	New Diamond Primary School 17 May 2022	Can you tell me the exact streets in Crane Village and which communities along Canal #1 and #2 were surveyed?	Respond	In Crane: Nouvelle Flanders and LaUnion Canal 1: Bordeaux, Genieve, L’Oratoire, and Canal 1 Canal 2: Resource, Alliance, Canal 2, and Stanleytown	No
208.	4	New Diamond Primary School 17 May 2022	What are the rare/unplanned events?	Respond	As stated in Section 10.1, the EIA assesses the potential risks associated with six categories of unplanned events: marine or riverine fuel spills; loss of integrity of the offshore pipeline resulting in a natural gas release: vessel collision with a third-party vessel, structure, or animal; loss of integrity of the onshore pipeline or NGL Plant resulting in a hydrocarbon release; untreated wastewater release at NGL Plant; and vehicular accidents.	No
209.	4	New Diamond Primary School 17 May 2022	On what basis did ERM conduct the EIA since Exxon and the government said the route wasn’t finalized?	Respond	ERM conducted the EIA on the pipeline route that was considered most likely by EEPGL’s design at the time the Application for Environmental Authorisation was submitted to the EPA. The route presented in the EIA represents the outcome of a route alternatives analysis in which a number of different pipeline routes were considered. Small adjustments to the pipeline route may occur as the construction process progresses, but significant adjustments that would affect the conclusions of the EIA are not expected.	No
210.	4	New Diamond Primary School 17 May 2022	What percentage of the community will be disrupted?	Respond	The socioeconomic assessment describes a number of different potential impacts on Region 3 communities between Crane (in the north) and Free and Easy (in the south). Some of these impacts will directly affect people living nearest to the onshore pipeline through temporary disturbance related to noise, dust, and traffic. Other impacts are more indirect (e.g., increased pressure on housing and services) and may be noticed by a broader number of people. Given the diverse impacts considered in the EIA, it is not possible to state a number or percentage of people who may be affected.	No
211.	4	New Diamond Primary School 17 May 2022	What are the indigenous person’s take on the disruption of their livelihood?	Respond	As described in Section 9.9, Indigenous Peoples, no impacts on Indigenous livelihoods are anticipated.	No
212.	4	New Diamond Primary School 17 May 2022	What part of Crane Village will be crossed by the pipeline? I don’t see the schematic on the map.	Respond	The pipeline will be located approximately 200 meters west of the main village. Detail of the pipeline route, including the shore crossing and lands west of Crane, are shown in Section 9.6, Land Use and Ownership, (Table 9.6-1) and Appendix M, Pipeline Alignment and Vegetation Mapbook.	No

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213.	5	Latchman Singh Primary School May 2022	How can the Project prevent disasters if the Project engineers do not know the pressure at which the pipeline will operate?	Respond	The EIA was based on preliminary design information that indicates different operating pressures at different locations within the Project infrastructure. As stated in Section 5.3.4.2, the operating pressure is expected to be 196.5 bars-gauge (barg; 2,850 pounds per square inch-gauge [psig]) at the offshore topside inlet and onshore inlet. The operating pressure at the NGL Plant inlet is expected to range from 27.6 to 196.5 barg (1,850 to 2,850 psig). These operating pressures are subject to change as the detailed design process is completed.	No
214.	5	Latchman Singh Primary School May 2022	Does the company have insurance?	Respond	Please see response to comment 129.	No
215.	5	Latchman Singh Primary School May 2022	If there is a mistake and fish are damaged, is there an insurance that will help the fishermen?	Respond	Please see response to comment 129.	No
216.	5	Latchman Singh Primary School May 2022	Will the noise affect the environment during construction and operations?	Respond	The potential impacts of noise associated with construction and operation of the Project are described in Section 7.5.4, Impact Prediction and Assessment [Sound and Vibration].	No
217.	5	Latchman Singh Primary School May 2022	This Project can make or break Guyana. More people need to be schooled on this. We are not doing too well with this. Teachers are supposed to be here. EPA is not doing too well in telling people. It is unfortunate that the local offices did not have the ads for this meeting today. We also could not access the EIA in order to prepare appropriately for the meeting.	Respond	Electronic and printed (hard) copies of the EIA were distributed to local NDC offices in advance of the disclosure sessions. In addition to copies of the EIA, copies of the Non-Technical Summary were provided. Howling was also done in communities. The meetings are also advertised using local media and are open to attendance from any member of the public.	No
218.	5	Latchman Singh Primary School May 2022	Guyana shares a border with Venezuela. As far as I can see this pipeline will be a very soft target by them. Did you look at this aspect?	Respond	The EIA did not explicitly consider the likelihood of a hostile action targeting the pipeline but, as stated in Section 10.1, did consider the consequences of a number of situations that could conceivably result from such an action, up to and including a full-bore rupture of the pipeline.	No
219.	5	Latchman Singh Primary School May 2022	Concerning the shoreline with mangroves – if they are destroyed will they restore them? I plant mangroves and I was never paid for them. I want to know when I will get paid. I planted many acres of mangroves along the coast.	Respond	The Consultants assessed potential impacts on mangroves in detail and concluded that construction of the Project would require the potential removal of three individual mangrove trees. As stated in Section 8.6.4, the Consultants have recommended that EEPGL replace these mangrove trees in cooperation with the National Agricultural Research and Extension Institute (NAREI) in accordance with Guyana law.	No
220.	5	Latchman Singh Primary School May 2022	What would be the effect on fishing in Region 5 when the oil and gas construction begins? Right now, the fishermen complain about low catch. What effect will drilling have on fishing?	Respond	As discussed in Section 8.2.3.3 and Section 9.1.4, the impacts of pipeline construction activities on fish and fishing activities are expected to be confined to the vicinity of the offshore pipeline corridor. No significant impacts on fish or fishing are expected in Region 5 as a result of planned Project activities. It is also noted that EEPGL has recently initiated a marine fisheries stock assessment study, to assess the stock status and spawning potential of the key marine species captured by Guyana's artisanal and industrial fisheries sector. The Project does not include any drilling in the marine environment. Therefore, there will be no impacts on marine fish and fishing from drilling.	No

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221.	5	Latchman Singh Primary School May 2022	I think I see the life of the pipeline is 25 years. What will happen after 25 years – will the Project still be operating?	Respond	The Project is currently designed for an operational life of at least 25 years. At the end of the Project's operational lifetime, the Project will be decommissioned. As described in the Preliminary Decommissioning Plan, which was submitted as part of Volume III of the EIA, decommissioning consists of five primary decommissioning activities: planning, subsea facilities decommissioning, pipeline decommissioning, NGL Plant decommissioning, temporary MOF decommissioning, and waste management. EEPGL will develop a more detailed decommissioning plan in consultation with appropriate Guyanese regulators as the Project nears the end of its operational life.	No
222.	5	Latchman Singh Primary School May 2022	After working with NAERI for years, I got experience and shared it. I did some research and it bore fruit already. I worked closely with the fishermen, who are seeing changes in crabs and fish. All of this is showing that the shoreline is building back and this is the time to plant mangroves. This project is 98% completed and only promises. I am asking to be part of this system to give advice.	Out of Scope	Prior mangrove projects are beyond the scope of the EIA.	No
223.	5	Latchman Singh Primary School May 2022	Will waste from the NGL plant be recycled?	Respond	As discussed in the Section 5.4 of the EIA, there are multiple Project stages (including Construction, Operations, and Decommissioning). For the Construction stage of the NGL Plant, the majority of the wastes are expected to be domestic (general trash) and construction (equipment tires, fuels, lubes, and solvents). At present, there is capacity for scrap metal recycling, so EEPGL would seek recycling for this waste stream where available. The other waste streams are generally not anticipated to be recycled, as there are limited recycling facilities in Guyana. Additionally, it is anticipated that contractors may bring temporary incinerator(s) for disposal of organic/food waste. For operations of the NGL Plant, waste streams will be largely similar to the Construction stage (although in much lower quantities); therefore, the same comments on disposal apply to the Operations stage. For any decommissioning of the NGL Plant, other waste streams are anticipated (such as concrete, steel, pipe, equipment, etc.). It is unknown what the in-country recycling capacity will be at the time of decommissioning. At present, there is capacity for scrap metal recycling, so steel and pipe would be largely considered for recycling. In summary, the Project will seek to maximize waste recycling in line with the approved in-country capabilities for recycling at the time the waste is generated. Since Guyana has limited waste recycling facilities, the plan is to employ EEPGL's waste management hierarchy, including waste minimization: • Minimize packaging on products wherever possible; • Package products in recyclable materials; • Limit waste generation at each stage of its projects; • Whenever practicable, return surplus and unused materials to a vendor; • Avoid single use items where re-useable items could be used; • Use biodegradable materials; • Order only what is needed.	No
224.	5	Latchman Singh Primary School May 2022	Will there be a rise in tide during construction?	Respond	The Project is not expected to affect natural tidal cycles.	No
225.	5	Latchman Singh Primary School	What are the plans for recycling the waste from the Project?	Respond	Please see response to comment 223.	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
		May 2022				
226.	5	Latchman Singh Primary School May 2022	In terms of local content, we are looking for local employment. There are limits as to how many local people can be employed in offshore projects, but how many local people will be employed by the Gas to Energy Project?	Respond	As part of its local content workforce strategy, and in alignment with the 2021 Local Content Act, EEPGL identifies and implements programs to give fair and adequate opportunity and first consideration for employment of Guyanese nationals having appropriate qualifications and necessary experience to safely perform job responsibilities. Employment and supplier opportunities with EEPGL and its contractors are advertised on EEPGL's social media accounts and/or the CLBD website under "Opportunities" at https://centreguyana.com/opportunities.	No
227.	6	#66 Fishport Complex 10 May 2022	The Presentation was too long. I was overwhelmed with the content.	Respond	The comment is acknowledged. The EIA is an extensive document due to the robustness of the study conducted, meaning that even a summary of the information is still somewhat lengthy to ensure coverage of the key components. It is noted, however, that the Consultants produced a non-technical summary, which was distributed at the disclosure meetings and is available for public review along with the EIA.	No
228.	6	#66 Fishport Complex 10 May 2022	Reports from our Region 3 fishermen are that there are restrictions to fishing.	Respond	Please see response to comment 81.	No
229.	6	#66 Fishport Complex 10 May 2022	The pipeline is being run on the seafloor and some portions of it will be buried and others will not be buried. Will the soundness or integrity of the structure be affected by the tides?	Respond	The pipeline will be designed to safely withstand all relevant environmental loading conditions including currents, waves, and tides. Section 5.3.2 has been updated to include additional information provided in this response.	Yes
230.	6	#66 Fishport Complex 10 May 2022	This pipeline is 200 km long from the FPSO to the plant. What speed is the gas going at in the pipeline?	Respond	The gas velocity will depend on the export flow rate and will range from approximately 0.2 to 1 meter per second. Section 5.3.1 has been updated to include additional information provided in this response.	Yes
231.	6	#66 Fishport Complex 10 May 2022	Who will be there to monitor the welds as the pipeline is being installed and what is the life of the pipe?	Respond	As stated in Section 5.3.7, design codes and standards to be used by the Project include those of the American Welding Society. The offshore and onshore pipeline installation contractors will be responsible for quality assurance relating to weld integrity. This quality assurance will include inspections and non-destructive testing in accordance with industry standards, which will be specified in the contract requirements for the contractors. The pipeline will be designed for the anticipated Project life (at least 25 years), but in actuality will have a longer lifespan. Additionally, the pipeline will be subjected to routine inspection to monitor for signs of deterioration during the Project life.	No
232.	6	#66 Fishport Complex 10 May 2022	How far apart are these emergency top valves? Don't you think that more valves are necessary for that distance?	Respond	A detailed engineering study and consequence analysis will be carried out to ensure that shutdown valves, if found to be required, are appropriately spaced.	No
233.	6	#66 Fishport Complex 10 May 2022	Will there be compressors installed along with the pipeline?	Respond	As stated in Section 5.3.3, no compressor stations along the pipeline will be installed as part of the GTE Project.	No
234.	6	#66 Fishport Complex 10 May 2022	What will be the impact of gas being leaked?	Respond	The consequences of a gas leak at either the NGL Plant or along the onshore pipeline (and the response to such a leak) would be highly dependent on several factors, including but not limited to the size of the leak, the location of the leak, and weather conditions (e.g., wind speed) at the time of the leak. Section 10.2, Resource-specific Risk Assessments, of the EIA describes the potential risks to various resources from an unplanned event resulting in a release of gas.	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
235.	6	#66 Fishport Complex 10 May 2022	The pipeline to shore is going through different water depths, currents, conditions, and scenarios. What are the different impacts?	Respond	The different potential impacts on resources related to the marine environment will occur at different locations within the Project AOI and at different stages in the Project cycle. These impacts can be broadly categorized into impacts on marine physical habitat, marine water quality, marine biota, and marine fisheries. Each of these impacts are discussed in EIA Sections 7.3 (marine sediments), Section 7.4 (marine water quality), Sections 8.2 and 8.6 (marine biota), and Section 9.1 (livelihood related to marine fisheries).	No
236.	6	#66 Fishport Complex 10 May 2022	I want to know who owns the Project.	Respond	Please see response to comment 68.	No
237.	6	#66 Fishport Complex 10 May 2022	What is the cost of the Project?	Respond	The current Project capital cost estimate is approximately $260 billion GYD ($1.3 billion USD) as reported in Chapter 1 of the EIA.	No
238.	6	#66 Fishport Complex 10 May 2022	Was a feasibility study done on the Project? What is the cost of piping versus shipping?	Respond	Please see response to comment 123.	No
239.	6	#66 Fishport Complex 10 May 2022	Our concern is mobilizing in one area. If there is an accident the whole country would be out of power. It would be better to have redundant power stations along the coast to ensure uninterrupted delivery of power in case of a problem at the power plant.	Out of scope	The country-wide infrastructure for power generation is beyond the scope of the EIA.	NA
240.	6	#66 Fishport Complex 10 May 2022	What are the major measures in the oil spill plan?	Respond	EEPGL's affiliate-level OSRP (contained in Volume III of the EIA) contains a number of response strategies, any of which may be employed during a spill event as appropriate given the characteristics of each particular spill. These measures broadly include but are not limited to containment, recovery, burning, and dispersal of spilled oil. In all cases, the methods used to respond to a spill event would be determined by the spill response team, which would conduct a rapid spill assessment to estimate the total volume of the spill, the location of the spill, and how the spill is moving through the environment.	No
241.	6	#66 Fishport Complex 10 May 2022	How many local persons will be employed?	Respond	Please see response to comment 96.	No
242.	6	#66 Fishport Complex 10 May 2022	The silk-cotton trees have jumbies [ghosts]. Are you preserving them because of our folklore?	Respond	As discussed in Section 9.5, silk-cotton trees are a physical marker of a significant element of Guyana's intangible cultural heritage (e.g., oral histories, folklore, spiritual beliefs, etc.). Beliefs surrounding the presence of spirits and jumbies (ghosts), as well as local traditions and practices associated with these trees, are among the reasons these silk-cotton trees are recommended by the Consultants for protection/avoidance.	No
243.	6	#66 Fishport Complex 10 May 2022	We are concerned about the safety of the operations. We read that since 2010, there were 378 hazardous incidents, 15 explosions, property damage etc. We are saying they should have used renewable and safe energy. The EPA is stronger and better funded in foreign countries. We are happy that the standards you get overseas	Respond	The source for the number of incidents/explosions/etc. cited in the comment is not provided, so the Consultants are unable to comment on the information or the degree to which it may or may not be relevant to the GTE Project. However, the Project has committed to designing and operating the Project facilities in accordance with good industry practice, including Guyanese codes, standards, and regulations, as well as applicable international design codes and standards (see Section 5.3.7).	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
			are brought to Guyana. We are not against the Project but we want it to remain safe.			
244.	6	#66 Fishport Complex 10 May 2022	What is the danger caused by the leak in the pipeline? The bubbles will cause rough waters.	Respond	As discussed in Section 10.1.2, should a leak develop in in the offshore pipeline, it would cause a drop in pipeline pressure, which would be detected by the pipeline monitoring system and would cause the gas supply to be shut off at the flow control valves on the Liza Destiny and Liza Unity FPSOs. This would limit the amount of gas that could be released through the defect to the inventory that is in the pipeline at the time the flow control valves are activated. The duration of the leak would be determined by the size of the defect, with larger defects increasing the rate at which the gas is released (which would cause a corresponding decrease the duration of the release), but in no case would a leak be expected to be large enough and last long enough to cause a navigation hazard.	No
245.	6	#66 Fishport Complex 10 May 2022	How long would it take to respond to and repair a leak if the pipeline ruptures?	Respond	As discussed in Section 10.2.9.2, a loss of pressure in the pipeline system would trigger an immediate notification, which would be followed by isolation of pipeline from additional gas supply pending repair of the issue. The duration of repair activities would depend on the size and location of the defect.	No
246.	6	#66 Fishport Complex 10 May 2022	Our fishing vessels have to share waters with these vessels out in the water. Our vessels do not have all the safety equipment: it is difficult to obtain, e.g., life jackets, radios, flares etc. I was told to ask in this meeting if Exxon can equip us with this equipment. The fisherman need training as well. How will this work out?	Response	The Consultant acknowledges the question related to provision of fishing safety equipment and associated training. However, the question is beyond the scope of the EIA.	No
247.	6	#66 Fishport Complex 10 May 2022	MARAD puts out Notices to Mariners but we don't have the navigation equipment to know if we are in a restricted area. Only 30% of our captains know how to read this type of navigation equipment and no one has the equipment.	Respond	The Consultant acknowledges the comment related to navigation equipment and training. However, the question is beyond the scope of the EIA. With regard to potential restriction areas or exclusion zones specific to the GTE Project, should there be a need, the Project will work with impacted stakeholders, including fisherfolk, to facilitate the information being communicated in an accessible way that can be understood.	No
248.	6	#66 Fishport Complex 10 May 2022	The Chairman is trying to see what Exxon can do for the fishermen. There have been other comments on previous engagements.	Out of Scope	The Consultant acknowledges the question related to previous non-Project-related engagements. However, the question is beyond the scope of the EIA.	NA
249.	6	#66 Fishport Complex 10 May 2022	What is the diameter of the pipeline?	Respond	As discussed in Sections 5.3.2 and 5.3.3, the outer diameter of the pipeline would be 323.9 mm for both the onshore and offshore sections. The inner diameter of the onshore pipeline would be 304.9 mm. The inner diameter of the offshore pipeline would range from 308 mm to 298.5 mm, depending on location.	No
250.	6	#66 Fishport Complex 10 May 2022	If there is a major leak, who will compensate the people of Guyana and how would EPA address the situation?	Respond	As described in Section 10.1.8 of the EIA, in the unlikely event that an unplanned event causes losses to stakeholders, EEPGL would establish a claims process and, depending on the nature of the unplanned event, a livelihood remediation program. The purpose of the claims process would be to provide compensation as appropriate for asset losses and the purpose of a livelihood remediation program would be to restore the welfare and livelihoods of affected persons to conditions no less than pre-impact conditions.	No
251.	6	#66 Fishport Complex 10 May 2022	What compensation would be available to fishermen in the event of a leak?	Respond	Please see response to comment 250.	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
252.	6	#66 Fishport Complex 10 May 2022	How close are the lines next to people's homes and is there insurance if there is a leak?	Respond	The residences closest to the onshore pipeline route are approximately 25 meters away. Section 7.5.4.4 has been updated to include this information. With respect to insurance, please see the response to comment 129.	Yes
253.	6	#66 Fishport Complex 10 May 2022	You said you go under the canals. You know the canals are cleaned regularly with mechanical equipment, so the pipeline must be buried sufficiently deep to accommodate operation of heavy equipment in the canals.	Respond	As discussed in Sections 5.3.3 and 5.4.1.3, the onshore pipeline will be directionally drilled under major canals and open cut through minor canals and/or drains. The pipeline depth of cover at these crossings will vary, but in all cases will be more than 1.22 meters below the bed of the canal.	No
254.	6	#66 Fishport Complex 10 May 2022	If this pipe gets a leak, we cannot weld the pipe. You have to flush out the pipe. Where does the gas go?	Respond	As discussed in Section 10.1.2, if the offshore pipeline develops a defect that leads to a release, gas in the pipeline at the time the defect occurs will either be released to the marine environment through the defect or proceed through the pipeline to the NGL Plant. Gas that is released to the marine environment will generate a gas plume that rises from the seafloor to the sea surface. If the onshore pipeline develops a defect that leads to a release, gas in the pipeline at the time the defect occurs will either be released into the subsoil strata overlaying the pipeline or proceed through the pipeline to the NGL Plant.	No
255.	6	Rosehall Primary 10 May 2022	At what pressure does the gas come into the pipe?	Respond	As discussed in Section 5.3.1, the operating pressure is expected to be 196.5 barg (2,850 psig) at the offshore topside inlet where gas will enter the offshore pipeline.	No
256.	6	Rosehall Primary 10 May 2022	What is the duration of the Project?	Respond	Please see responses to comments 114 and 118.	No
257.	6	Rosehall Primary 10 May 2022	Is the pipeline anchored in the floor? Seines are on the seafloor for fishing.	Respond	The nearshore portion of the pipeline will be buried under the seafloor, although the potential exists for portions of the pipeline to become exposed over time as the seafloor shifts. As discussed in Chapters 9 and 15 of the EIA, EEPGL has committed to proactively engaging with nearshore artisanal fisherfolk in advance of construction to establish a marine safety exclusion zone in collaboration with MARAD and advertising a cut-off date for all fisherfolk to remove fishing equipment from the zone to prevent loss of fishing equipment due to entanglement with the pipeline installation vessels or the pipeline.	No
258.	6	Rosehall Primary 10 May 2022	You mention the animal on the seabed moving away from the area. That area is usually zoned as a free zone for fishing. Is there compensation since we can't fish there?	Respond	Please see response to comment 120.	No
259.	6	1 Rosehall Primary 10 May 2022	Would there be any significant level of radioactivity? Last year I read in the news there was a radioactive spill in Georgetown.	Respond	As discussed in Section 5.4.1.2, the only radioactive sources associated with the Project will be those used during construction, when completed pipe joint welds will be examined by a welding inspector using radiographic or other approved methods to assess weld quality. Radiographic examination is a nondestructive method of inspecting the inner structure of welds and determining the presence of defects. Appropriate personal protective equipment and shielding procedures will be used to manage exposure of Project workers to acceptable levels during radiographic inspections.	No
260.	6	Rosehall Primary 10 May 2022	I am happy you guys are here and created a lot of jobs. I am sorry you weren't here a long time. I know they say that the Americans are coming to take 98% but I don't think so.	Out of Scope	The comment is acknowledged.	No
261.	6	Rosehall Primary 10 May 2022	What happens to excess gas? With all the presentations, there was nothing on the consumption of the gas.	Respond	The only times when "excess" gas will be produced would be during non-routine activities, which, as discussed in Section 5.3.4.3, include any operations that occur under conditions other than normal operating conditions (e.g., Project startup, inspections and maintenance, upsets, etc.). The Project design includes a flare system that would be used to combust excess gas generated during non-routine activities.	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
262.	6	Rosehall Primary 10 May 2022	What will be the volume of gas that's coming? I'm asking because of safety.	Respond	As discussed in Section 5.3.4.2 and 5.4.2.2, the Project is expected to transport an average of approximately 50 MMscfd of natural gas (with a design maximum of 60 MMscfd) from offshore to the NGL Plant.	No
263.	6	Rosehall Primary 10 May 2022	What's the estimated probability of oil spills in Guyana versus other countries? How probable is a gas leak to occur in Guyana as a result of this Project?	Respond	The Consultants are not aware of any condition that would indicate that the probability of an oil spill would be significantly different for Guyana as opposed to other countries. Oil spills of significant size are very rare on a global basis. Similarly, the chance of a significant gas leak occurring would not be expected to differ substantially for Guyana versus other countries, as the likelihood of a gas leak is influenced most by design and operating measures, and these will be implemented for the GTE Project consistent with good international industry practice (GIIP).	No
264.	6	Rosehall Primary 10 May 2022	The presentation only mentioned Minor and Moderate impacts. What other categories of impacts are there?	Respond	As discussed in Chapter 3, ERM's impact assessment methodology allows for the significance of potential impacts from planned Project activities to be rated as Negligible, Minor, Moderate, or Major. Without application of the mitigation measures recommended by the Consultants, the significance of potential impacts from planned Project activities is predicted to range across the full spectrum from Negligible to Major, but the application of recommended mitigation measures is expected to reduce this range to Negligible to Moderate. The risk ratings from unplanned events is predicted to range from Minor to Moderate. Unlike other impacts, cumulative impacts are rated according to their priority for management rather than their significance. In the methodology used in the EIA, priority ratings for cumulative impacts can range from Low to High. The priority ratings for the Project's contribution to cumulative impacts range from Low to Medium.	No

Table 3: Additional Public Comments

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
265.	Alfred Bhulai	30 May 2022	NA	**A** The associated gas from the oil wells is best reinjected and the money earned from Guyana's oil be used to install the equivalent in solar power as recommended in https://www.stabroeknews.com/2021/11/01/features/in-the-diaspora/the-solar-alternative-for-guyana/ 1. The recommended version of solar power will completely eliminate the need for any environmental impact whatsoever. 2. It can be implemented gradually, beginning in areas unserved by electricity. 3. People will be empowered with reliable power and not be subject to large-scale blackouts. 4. It is at least 5 times cheaper than the Gas to Energy scheme, not dependent on unrevealed source gas prices.	Respond	EEPGL was asked by the Government of Guyana to propose a concept using natural gas to generate electricity. EEPGL was not asked to evaluate a concept using other sources of energy (e.g., renewables). Feasibility studies for the GTE Project were conducted by EEPGL with global subject matter experts during initial phases of the Project consideration. The results of these studies informed an optimized concept after weighing in not only investment and operational costs but all other required factors such as available technology, gas volumes available, gas demand requirements, logistics considerations, environmental impacts, etc.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				B That Floating Liquid Petroleum and Natural Gas plants as recommended in the attached presentation of a February 2021 update of an Oil & Gas Master Plan for the Republic of Guyana by the Japan Cooperation Center for Petroleum, Chiyoda Corporation, (appendix 1) 1. Have no significant difference in economics between onshore and floating gas to power plants; 2. Are more flexible and longer lasting, by being able to move to many more wells than Liza; 3. Are more suitable for selling gas on the world market, if the power plant is not realized in time, and after we use what we need; and 4. Will eliminate the onshore pipeline environmental impact. Alternative A is far better than B.			
266.	Michael Hackett	11 May 2022	NA	One very important activity that should be done, if it has not been done already, is a rainfall and flood risk assessment of the proposed location of the NGL plant site as that area used to be cultivated sugar cane fields with drainage and irrigation canals. Care should be taken on filling in canals or changing the D&I networks so as not to increase the flood risk to the plant site. The NDIA and GuySuCo should be linked to get D&I maps of the area.	Respond	Precipitation events and flooding risks, including the network of drainage and irrigation canals in the Project area, were taken into consideration for the siting and in the preliminary engineering design of the NGL Plant infrastructure and onshore pipeline. The siting of the preferred locations included desktop and field surveys to evaluate environmental and engineering / Project development conditions of multiple sites identified by the Government of Guyana. The siting included a consideration of site resilience—elevation, flood risk, and presence of sea defenses. Appendix C, Water Quality Modeling Report (Volume II of the EIA) includes a Site Flood Risk Assessment. The exact locations and elevations of the aboveground facilities and buildings within the NGL Plant will be finalized during detailed design phase of the Project, and will take into account results of a detailed flood study. Additionally, the Project has and will continue to work with the NDIA and GuySuCo with respect to temporary / construction and permanent drainage plans for the Project.	No
267.	Elizabeth Deane-Hughes	17 June 2022	NA	If the Purpose of the Project (Executive Summary Section 1.3) is to utilise a portion of the available associated gas to produce NGLs and export dry natural gas for use by third parties including the GoG to generate power, given the small volume of gas currently available, why not wait until there is much more gas to monetise, generate power offshore and export onshore via a power cable whilst maximising oil recovery or transport gas to shore in CNG ships, in the interim?	Respond	Please see response to 265.	No
268.	Elizabeth Deane-Hughes	17 June 2022	NA	Given the scale and duration of the project the feasibility of such a project has to be more clearly articulated to the owners of the project	Respond	The EIA has been conducted—after feasibility and conceptual studies were completed—in order to assess the environmental and socioeconomic impact of the selected Project concept. As of the writing of this response, the feasibility study can	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				infrastructure, the Guyanese citizens, before an EIA can be properly conducted since the feasibility of the project will properly frame the social and environmental impacts that could potentially eroded the project's benefits to all stakeholders?		be found on the Ministry of Natural Resources website. The results of this EIA have been shared with the Guyanese people to communicate the potential adverse impacts of the Project and the anticipated benefits associated with the Project.	
269.	Elizabeth Deane-Hughes	17 June 2022	NA	The preliminary schedule shown in Executive Summary Section 2.7 makes no reference to Contracts and Procurement shouldn't these impacts be understood for a more complete Social Impact / Local Content assessment?	Respond	Procurement and contracting are not represented in the Project schedule in the Environmental Impact Statement (EIS) because they are not discrete Project stages. Procurement of various goods and services will start well before manufacturing of Project components begins and will last throughout the Project's lifetime, including decommissioning. Although the procurement process cannot be easily shown on a Project schedule, certain impacts of the procurement process such as increased local employment and procurement opportunities in alignment with the 2021 Local Content Act, increased competition for local labor, and heightened expectations related to job opportunities and business benefits - especially in Region 3, are reasonably predictable and are assessed in various sections in Chapter 9 of the EIA.	No
270.	Elizabeth Deane-Hughes	17 June 2022	NA	Why does Executive Summary Section 2.9 Alternatives only address LNG and not CNG given the small volumes of gas that has to be transported to shore in the near term? Wouldn't this project be faster to execute with relatively minimal and manageable risks? If not, shouldn't this also be confirmed in this EIA?	Respond	Natural gas can be converted to liquefied natural gas (LNG) and transported via ships when it is not feasible to transport it directly to market via pipeline. This is because the volume-to-mass ratio is decreased approximately 600 times when converting to a liquefied state. While LNG was an alternative considered for the GTE Project because of the volume that could have been carried to shore for off-loading and regasification, it was not pursued for the reasons given in the EIA. Transport of compressed natural gas (CNG) via ships was not considered because there is no viable technology that can be used to transport compressed natural gas via ship.	No
271.	Elizabeth Deane-Hughes	17 June 2022	NA	Given that the 'new to country' project components are i) offshore feed gas pipeline, ii) onshore feed gas pipeline, iii) NGL Plant and iv) onshore 'export to power plant' gas pipeline, which GoG regulatory agency referred to in the EIA Section 2 Policy, Regulatory and Administrative Framework, will oversee the HSE legislative aspects of managing this high potential risk infrastructure and what international, national and industry standards have been adopted for their technical verification?	Out of Scope	The comment is directed to the government.	NA
272.	Elizabeth Deane-Hughes	17 June 2022	NA	Section 5.3.7 Design Codes and Standards i) which GoG regulatory body is responsible for SURF and pipeline design? Is this the same regulatory body that will be responsible for overseeing the pipeline construction activities and subsequent pipeline inspection? ii) which GoG codes, standards and regulations will the NGL plant developer and operator have to adhere to? iii) shouldn't the GoG codes and standards (or adoption of international variants) be clearly	Out of Scope	The comment is directed to the government.	NA

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				articulated in this EIA given the far-reaching implications and global reach of the project supply chain?			
273.	Elizabeth Deane-Hughes	17 June 2022	NA	Which GoG regulatory body is responsible for overseeing the operator's Pipeline Integrity Management System and how frequently will this be monitored? Given the nature of the industry that is being developed 'new to country' shouldn't this be clearly stated in this EIA so that Guyanese citizens can be assured of accountability and indemnity should there be any loss of containment during operations?	Out of Scope	The comment is directed to the government.	NA
274.	Elizabeth Deane-Hughes	17 June 2022	NA	Given that the Gas Pipeline, NGL Plant and Power Plant have different operators which GoG regulatory bodies are responsible for ensuring business continuity by way of Emergency Response Plans and other contingencies should a high potential risk event occur within this critical infrastructure?	Out of Scope	The comment is directed to the government.	NA
275.	Elizabeth Deane-Hughes	17 June 2022	NA	The residents in the AOI in Crane, Canal #1 & Cana#2, were not consulted in breach of the constitution of Guyana, EPAct and the Environment Impact Plan contained in the EIA/EIS for GTE pipeline project.	Respond	Please see response to comments 35 and 279.	No
276.	Elizabeth Deane-Hughes	17 June 2022	NA	The developer has failed to comply with Section 11 EP Act	Respond	It is unclear as to which aspect of Section 11 of the EP Act the comment is referring. As per Section 11(8) of the EP Act, the EIA was conducted in compliance with the approved Terms and Scope for the EIA, which meets the requirements of the EP Act.	No
277.	Elizabeth Deane-Hughes	17 June 2022	NA	The developer has failed to comply with Section 17 Authorization Regulations 2000.	Respond	It is assumed that the comment is referring to the Environmental Protection (Authorisations) Regulations 2000. The only component of Section 17 of the Environmental Protection (Authorisations) Regulations 2000 that is relevant to the EIA is paragraph 2(xiv), which requires the applicant to submit an EIA (if required) to the EPA. EEPGL submitted the GTE Project EIA to EPA in accordance with this regulation and in accordance with the more detailed requirements established in the EPA-approved Terms and Scope for the EIA, as per Section 11(8) of the EP Act.	No
278.	Elizabeth Deane-Hughes	17 June 2022	NA	The developer's independent contractor is/was negligent in including a draft technical report in the EIA/EIS for GTE pipeline project.	Respond	The Consultants acknowledge that the Demerara River Oil Spill Modeling Analysis (Appendix S in Volume II of the EIA) was not modified to remove the draft designation. This was inadvertent and has been corrected for the revised EIA. Please note that aside from removal of the draft designation, the content and conclusions of this report have not changed.	Yes
279.	Elizabeth Deane-Hughes	17 June 2022	NA	As a resident farmer in Canal#1, an area through which the proposed pipeline will pass, I was not invited to any consultations by the developer or any other institution neither were any notices placed in any one or any newspaper for such consultations, at any time before the submissions of the EIA and EIS for	Respond	EP Act Chapter 20.05 s11(9) requires that the developer and the entity conducting the EIA "consult members of the public, interested bodies and organisations." As discussed in the responses to comments 35 and 36, meetings and focus groups were held with a variety of individuals and groups representing the primary and secondary study areas. Furthermore, the consultations to support the EIA were performed in accordance with the requirements established in the EPA-approved Terms and Scope for the EIA.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				the gas-to-energy project. This is a breach of the Environmental Protection Act Chapter 20.05 s11(9). This omission is in conflict with the Gunning Principles.		The Gunning Principles are a set of good practices for public consultations authored by an attorney in the United Kingdom during a court case concerning management of schools in the United Kingdom in the 1980s. As such, the Gunning Principles are one instance of principles applied by a particular jurisdiction regarding consultation but are not considered to predominate as principles to be followed in specific for projects around the world.	
280.	Elizabeth Deane-Hughes	17 June 2022	NA	Further the developer has not affixed as evidenced in the documents, any of the following to the EIA/EIS for the gas-to-energy project - (i) the company or corporate name, the names of directors if any, the name and position of the applicant, the name of the owner or occupier and exact location of the facility; (ii) proof that the applicant either owns the facility or has a lease or other agreement with the landowner or occupier to enable the applicant to conduct the activity on the facility or has the legal right or ability to conduct the activity without the consent of the landowner or occupier;	Respond	The EP Act does not require the information listed in the comment to be included in the EIA. Please see response to comment 285 for additional discussion.	No
281.	Elizabeth Deane-Hughes	17 June 2022	NA	We, the “primary stakeholders”, residents and farmers of Canal #1, were not consulted as part of the EIA/EIS even though we are a major factor in the AOI. Extensive stakeholders’ meetings, focus groups, etc., were held throughout regions 1 -6 yet still none of us in the direct neighbourhood of the proposed pipeline were ever graced with the courtesy of having either our concerned or our opinions heard. If this was done the proposal hereinunder (appendix 2) would have come to light at an earlier stage. This omission in itself calls into question the validity of the EIA/EIS as this is a fundamental omission both in terms of your own Stakeholder’s Engagement Plan and the EPA. We take this opportunity to propose the attached alternative route (appendix 2) which will be free of acquisition of private transported lands and others with specific covenants not yet changed, the erosion of cultural heritage of ownership, danger to human life, restrictions of land usage, etc., inter alia. This route which was not considered in the EIA/EIS lands at Leonora and runs along the conservancy dam owned and controlled by the Government of Guyana. Please see attached schematic diagram.	Respond	Initial route planning for the onshore pipeline was performed by EEPGL and the Government of Guyana with the consideration to maximize the use of State-owned land, thereby minimizing impacts to private lands. The Government of Guyana ultimately issued an order under the Acquisition of Land for Public Purposes Act regarding a proposed route. Several minor optimizations to this route have been implemented, for which the Government of Guyana has issued a revised order. EEPGL is ultimately not responsible for selecting the final route for the onshore pipeline, acquiring any privately held land, and/or performing any required resettlement. These activities have been retained by the Government of Guyana.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				Any possible increase in financial terms may be a small percentage of the current budget and could be recouped in the long term while protecting the life of Guyanese citizens a major consideration in EEPLG/ExxonMobil CSR and Stakeholder's Engagement Plan.			
282.	Elizabeth Deane-Hughes	17 June 2022	NA	Where is the Gas Management Pipeline Plan or Gas Management Pipeline System Guyana?	Respond	Please see response to comment 139.	No
283.	Elizabeth Deane-Hughes	17 June 2022	NA	If there is a gas leak accident, we Guyanese have to pay for any damage to ourselves and our environment and we still have to pay for the pipeline construction as a recoverable expense.	Respond	Please see response to comment 129.	No
284.	Elizabeth Deane-Hughes	17 June 2022	NA	ExxonMobil Guyana and ExxonMobil say they obey the laws of Guyana, so where is the feasibility study for this GTE project?	Respond	A feasibility study, which is not a requirement of the EP Act or the Terms and Scope, is beyond the scope of the EIA. Nonetheless, please see response to comment 265. As of the writing of this response, the feasibility study can be found on the Ministry of Natural Resources website.	No
285.	Elizabeth Deane-Hughes	17 June 2022	NA	ExxonMobil Guyana and ExxonMobil say they obey the laws of Guyana, why did they not put their name and the names of the Board of Directors on the submitted Environmental Impact Assessment and Environmental Impact Strategy that was submitted to the Environmental Protection Agency?	Respond	Please see response to comment 280. As required by Section 11 of the EP Act, the EIA was carried out by an independent consultant approved by the EPA. Also as required by the Act, EEPGL as the developer along with the consultant who carried out the EIA submitted the EIA to the EPA. The Act does not specify how the EIA submittal should occur, but in this case EEPGL and the EIA consultant submitted the EIA jointly under a cover letter on EEPGL letterhead and signed by both parties. There are no laws or regulations requiring the developer to place its name in a particular place on the EIA, and there are no requirements to identify or include names of Directors on an EIA. The EIA clearly identified EEPGL, on behalf of itself and its co-venturers, as the developer of the Project.	No
286.	Elizabeth Deane-Hughes	17 June 2022	NA	Why did ExxonMobil not follow their own plan and consult the people they describe as "primary stakeholder" living along the pipeline route.	Respond	As discussed in the responses to comments 35 and 36, engagements including surveys, meetings and focus groups were held with a variety of individuals and groups representing the primary and secondary socioeconomic study areas (both of which are defined in Section 9.1.1.1, Study Areas, of the EIA). Additional detail regarding this information is included in the Stakeholder Engagement Plan (SEP) in Volume III of the EIA.	No
287.	Elizabeth Deane-Hughes	17 June 2022	NA	Oil & Gas is not the same thing. There are different risks for each. We want protection against any and all gas leakages.	Respond	As discussed in Sections 10.1.2, 10.1.4.1, and 10.1.4.2, the design and construction of the facilities have a series of robust measures (e.g., pipeline material, wall thickness, coating, and burial depth; quality control procedures; hydrotesting prior to introduction of hydrocarbon product; etc.) to prevent gas leaks from occurring. In addition to these design and construction measures, operating procedures, a pipeline management system, and emergency response procedures are being developed throughout detailed design and will be in place prior to commissioning and Project startup.	No
288.	Elizabeth Deane-Hughes	17 June 2022	NA	We really leaving our children without any protection, regulations and governance in this gas sector.	Out of Scope	Issues of sector-wide governance of the gas sector are beyond the scope of the EIA.	NA

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				We already have many problems in the oil sector with no good regulations and governance. Enough is Enough we want protection and good governing laws for this GAS sector in the Oil & Gas Industry			
289.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Lack of genuine consultative process** Neither the EIA nor EIS has been genuinely consultative according to the principles and best practices wherein rigorous scientific, social, economic, environmental and cultural assessments are conducted over a series of consultative and participatory sessions. The consultative period and process were inadequate and insufficient. There was no Matrix of Stakeholder inputs documenting inputs and recommendations maintained on a continuum and made publicly available to stakeholders at follow-up sessions. The "consultations" were merely introductory, one-off sessions – with the vast majority of the time allocated to the developer and/or EPA and an insulting, miniscule allowance available for participants. Neither the principle nor the process of Free, Prior and Informed Consent (FPIC) was applied nor reported. Project Cycle Timelines: A big rush to push through this project: The EIA was published on April 20, 2022 with a 60-day period for objections, queries and comments which ends on June 18, 2022. Yet the EIA sets out the following timeline "…a target date of August 2022 for start of NGL Plant site preparation and will take approximately 3 years. The combined offshore and onshore pipeline system is targeted to be ready to deliver rich gas by end of 2024, and the NGL Plant is targeted to be operational by mid-2025…" and thence continuing for a planned life cycle of at least 25 years. The above timeline of some two months only before commencing the project is "eye pass" and indicates the rush without due process: to review the EIA, take into account objections, corrections, answer all	Respond	The EIA has been conducted in line with GIIP for environmental and social impact assessment. It has incorporated input from local residents and communities gathered during the scoping stage (including public scoping meetings in Regions 1 to 6), as well as through the development of the socioeconomic baseline (i.e., household and business surveys, meetings with NDCs, interviews with government agencies). These also informed the identification of impacts and mitigation measures and were key inputs to the overall EIA. As discussed in Chapter 6 of the EIA, comments made by stakeholders during the regulatory consultation and disclosure periods in the scoping stage and the EIA disclosure stage have been thoroughly documented, along with thorough responses by the Consultants and/or EEPGL, and these registers of comments and responses are publicly disclosed and available to all interested stakeholders in Appendix T to the EIA. The format of the scoping and EIA disclosure public meetings—the latter conducted during the 60-day public comment period prescribed in accordance with Section 11(10) of the EP Act—were established in consultation with the EPA and sought to provide an accessible overview of the Project and findings of the EIA, targeted at a non-technical audience, to support comments and questions that could be submitted both in the meeting or in written submissions to the EPA. In regard to the principle of Free, Prior, and Informed Consent, the proposed GTE Project is not expected to impact Indigenous Peoples rights to land, territory, or resources. The nearest Amerindian community is Santa Aratak, and the Project will not overlap with or impact the title lands of this community. Potential impacts on Indigenous Peoples, including Santa Aratak, are assessed in Section 9.9. In regard to the Project timelines, the proponent is aware that the Project will not be able to be implemented unless the required approvals are issued. The proponent has established a target timeline with the understanding that this timeline depends on receipt of approval to proceed with the Project, and with the understanding that the required activities and timeline of the EIA review process—including responses to comments received on the draft EIA, and any required updates to the content and/or findings of the EIA—are under the direction of the EPA.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				queries, hold feedback consultations and then either have a new ESIA produced or publish a final version or withdraw the project altogether. This rushed "target date" exposes the scant regard by EEPGL for due process and credible consultations.			
290.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	Five year limit on Environmental Permits: We assume, nonetheless, that the Environmental Permit, when granted by the EPA, will be up for review every five years in accordance with the Environmental Protection Act and its relevant regulations. We do not however see any mention of this fact in the EIA. It needs to be prominently stated and included in the EIA.	Respond	The purpose of the EIA is to assess potential impacts of a Project on the environment, as required by the EP Act. Details regarding permit terms and conditions—in accordance with Section 13 of the EP Act, if the Project is approved, are beyond the scope of an EIA.	No
291.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Our allegations of insufficient detail in references by ERM to best international or oil field practices, making the ERM assertions not reasonably checkable** The Environmental Resources Management (ERM) firm hired repeatedly by EEPGL has been exposed as not being sufficiently independent in its conduct of EIAs. The pattern of single-sourcing this one company has been publicly and repeatedly questioned in terms of its viability and acceptability as independent and autonomous. These questions have not been addressed by EEPGL, ERM or the EPA.	Respond	EEPGL conducts a rigorous contractor evaluation and selection process for its various environmental and socioeconomic study and impact assessment needs, and currently has a number of Guyanese and international consultancies (including ERM) under contract to support EIAs and other studies. That said, it is noted that the manner in which an EIA is contracted has no bearing on the technical adequacy of the EIA to support the application for environmental authorization, nor does it affect the EPA's ability to rely on the EIA to make a permitting decision on the GTE Project.	No
292.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Objection to "Negligible to Moderate Impacts":** As per usual, ERM and its associates would have us believe that all impacts are "negligible to moderate" and that we, Guyanese, have nothing to worry about concerning this substantial development the kind of which has never yet been undertaken in our country and with which Guyana has had no experience. All we have is the ERM "magic wand" prediction that only *"negligible to moderate impacts on physical resources, negligible to moderate impacts on biological resources, and negligible to moderate impacts on socioeconomic resources—with a number of positive impacts on socioeconomic conditions."* This is the identical language used in all of ERM's predictions for all of EEPGL's projects. Presumably, just another "cut and paste" that is repeated ad nauseam in all of these botched EIAs.	Respond	Chapter 3 of the GTE EIA provides a detailed description of the analytical methodology underpinning the impact ratings for each environmental and social resource assessed in the EIA. The narrative provided in the impacts discussion for each receptor in Chapters 7 through 12 explain how the methodology described in Chapter 3 was applied to each resource. The similarity in language between the GTE EIA and previous EIAs for EEPGL's development projects is a reflection of several factors, including: • ERM applies a standard impact assessment methodology to its EIAs; • A significant portion of the GTE Project AOI is located in the same marine environment as EEPGL's prior development projects; and • Many of the construction and operating procedures cited in the EIA reflect global oil and gas industry practice and are similar between the offshore production projects and the GTE Project (particularly in the marine portion of the GTE Project AOI). In summary, the similarities between the GTE EIA and EEPGL's previous development project EIAs reflect a consistent methodology and application of this methodology to potential impacts that share commonalities between different projects.	No

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				We object to and query this negligent assessment in the EIA by ERM. We indicate in this submission several queries and comments related to this objection.			
293.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Lack of Gender Analysis, Gender Action Plan and Impact Assessment on Women** The lack of Gender Analysis and impact assessments on Women are glaringly absent in the EIA. The world is in the "Generation Equality" era as designated by the United Nations. The Extractive Industries Transparency Initiative (EITI) of which Guyana is an implementing country now mandates sections on both Gender and the Environment to be included in its annual Reporting according to its 2019 Standard. But the EIA for the Gas to Energy project is gender blind - devoid of any meaningful gender assessment or women related content. Hence some 51% of the Guyanese population is rendered invisible in it. Any EIA worth its salt must include social impacts and gender impacts writ large. All that this EIA has to say on the matter is in the negative and stresses inequality: *"… it is very likely that women will **not** have equal access to Project employment opportunities with Guyanese businesses unless they are directly targeted for recruitment."* But where are the mitigating guarantees? There is no indication of proposed policies or quotas to guarantee women's employment. There is no inkling of a Gender Action Plan (GAP), which, nowadays, is standard procedure for feasibility studies and EIAs/ESIAs – and its absence in this EIA constitutes a very big gap. In a very convoluted way, the EIA says that: *"… to offset the gender imbalance, EEPGL will develop contract language for pipeline and NGL Plant contractors encouraging recruitment and training of women for various Project-related construction roles, as well as advertising the types of goods and services they will procure locally."* But there is no specificity, no mandate or declaratory position in this sentence to mitigate gender imbalance – just some vague language about "language" to be developed to "encourage". This is just not good enough and leaves women hanging in the imbalance.	Respond	The Project EIA and EIS have been developed in accordance with Guyana's EP Act and the articles defined by the Terms and Scope for the GTE Project. Where relevant and available, socioeconomic baseline data has been disaggregated by gender (including labor force profiles in Section 9.1.2) to provide insight into existing gender disparities. The potential for the Project to contribute to or exacerbate gender disparities is specifically addressed as an impact in Section 9.1. As noted in the comment, the potential that women will not have equal access to Project employment is recognized in the EIA. The proposed mitigating measure for this impact is for EEPGL to improve access for women by working with contractors to encourage recruitment and training of women for various Project-related construction roles. Outside of the workforce, potential risks related to interaction between onshore construction workers and communities (including potential for conflicts related to gender and/or sexual exploitation) are addressed in Section 9.2 Community Health and Wellbeing, and mitigated through the enforcement of a worker code of conduct and closed worker camp for non-local workers. Safeguards for workers, including women, are not restricted to the mitigation and management measures identified in the EIA. Applicable national legislation and industry-specific standards, as well as EEPGL's worker code of conduct, will also provide mechanisms for protecting the safety and wellbeing of both workers and community members, including women. Comments related to worker representation and/or collective bargaining are outside the scope of the EIA.	No

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				Where are the safeguards to address the potential exploitation of and harm to women? Where is provision for strong Workers Representation and Protection? The EIA appears to be devoid of gender sensitive safeguards and measures to cushion the exploitation of women. These questions are asked in the light of the employment experience and consequences of at least one woman employed in the EEPGL's empire of Oil and Gas development in Guyana on one of its floating platforms – the offshore oil rigs. Her job entailed washing the clothes of the oilrig workers that were contaminated by hazardous substances and toxic chemicals. She is now, allegedly, permanently disabled because of ineffective implementation of environmental and human health and safety measures while on the job. The EIA for the gas to energy project needs to substantially address and recommend a suite of safeguards informed by adequate workers' representation and stringent protection policies which are also gender sensitive with full compensation provisions. We recommend a modern and effective oil & gas workers union for Guyana modeled on the Oilfields Workers' Trade Union (OWTU) which is one of the most powerful trade unions in Trinidad and Tobago.			
294.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Net Zero Employment for the Guyanese population out of a GYD$260 billion Gas to Shore project Costs:** EEPGL estimates the current project cost at approximately USD$1.3 billion (GYD$260 billion). Also projected is a "higher certainty cost estimate" which it says will be calculated after all major contracts are negotiated. In terms of *"positive socioeconomic impacts"*, the EIA states that the project aims to employ approximately 800 workers during the peak construction stage, 40 full-time workers during the operation phase and about 50 persons during the decommissioning stage. Simple calculations show that this is a very miniscule contribution: • 800 workers during the peak constriction phase = 0.100% of the Guyanese population (pegged at 793,973 as of Saturday, June 18,	Respond	The Project has the potential to impact economic conditions in Guyana, as it is expected to facilitate more energy independence as well as more reliable and less carbon-intensive power generation (as compared to the current fuel oil-fired power sources). Improved electrification at a national scale is typically linked to improvement of economic growth and overall growth in gross domestic product (GDP). As discussed in Section 9.1, economic conditions can also be impacted positively by local hiring for a limited number of new full-time positions, contracted workers, local Project procurement in alignment with the 2021 Local Content Act, and Project worker spending. As discussed in Section 9.1, in addition to direct expenditures and employment, the Project will also likely generate induced economic benefits as other non-Project-related businesses benefit from direct Project purchases. Worker spending and increased purchasing power by locals with additional income will likely expand spending in the local area. This will generate more local value-added tax. These beneficial "multiplier" impacts will occur throughout the Project life.	No

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				2022, based on the latest United Nations data) • 40 full time workers during the actual operations of the gas plant = 0.005% of our total population; and • 50 workers to close down the project for good when it is decommissioned = 0.006% of Guyanese people. **Altogether resulting in a grand total of zero percentage of employed Guyanese for all phases of this 260 billion Guyana Dollar project!** (And we do not even know how many of this Zero percentage may be allocated to expatriate workers).			
295.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Cost of Living Increase** The EIA language is muddy on the "potential" cost of living increase with ERM attributing this to: *"a higher demand for some goods and services, either through direct Project procurement or through Project worker purchases."* **Question**: What precisely does this mean? As it stands, this sounds like ducking the issue with "gobbledy-gook". Some plain English explaining how and why and by how much the cost of living would rise would be helpful and honest. Women, who mainly manage households and purchase and prepare food for families, will be severely impacted – with poor women, rural and Indigenous women bearing the brunt of this negative impact already being tangibly felt and due to the exponential increase of cost of living from the onslaught of the oil and gas industry. The EIA makes no effort to provide practical mitigation proposals or solutions to this.	Respond	The factors that drive changes to cost of living are many and complex. The EIA considers how the GTE Project could contribute to a change in cost of living—i.e., through changes in demand for some goods and services, either directly through Project-related contracts and procurement, and/or through indirect and induced demand that is driven by workers' spending in their communities. More broadly, the national and global context for cost of living is very complex at this time, with marked influences by the COVID-19 pandemic, global supply chain constraints, rising interest rates, inflation, other major capital projects underway in Guyana, and other factors that are outside the influence of the GTE Project. The EIA does not provide a quantitative analysis of economic impacts or benefits. However, as described in Section 9.1.4.3, the Project's contribution to increased cost of living is expected to be limited due to the fact that most economic activity (and therefore procurement and income generation) will occur during the relatively short construction stage. Therefore, the other global and national factors influencing cost of living are, at this time, expected to outweigh the influence of the construction of the GTE Project.	No
296.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Our allegations of insufficient relevant data, for example, in relation to fish populations and the livelihoods of fishing families.** **Questions:** Where are the detailed studies in the EIA that show the levels of impacts on the Guyana Fishing Industry in the zone of influence of the gas to energy project?	Respond	The marine biological baseline in Section 8.2.2 of the EIA cites 2 years of marine fish studies that were conducted from 2017 to 2019, both of which have been provided to the EPA previously and are available in the public domain. The EIA also cites an ongoing participatory fishing study that examines marine fisheries from a socioeconomic rather than biological perspective. Together, these studies form a robust baseline for marine fish and fisheries. Table 3-4 of the ESMMP includes development and implementation of a Livelihood Restoration Strategy, which would apply to all Project facilities and would include economic displacement from the Project's marine activities as appropriate.	No

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				Where are the mitigation measures to alleviate the loss of livelihoods of impacted fishers – including *"artisanal fisherfolk vessels that operate in shallower waters – in particular in the nearshore offshore pipeline segments and at the shore landing site"*. ERM is apparently dishonest in claiming that there "may" be such impacts and that these are "negligible" while stating that *"fishing activity will be prohibited during the operation stage to prevent damage to the infrastructure"*. The operation stage is pegged at lasting for 25 years and the construction stage for 3 years with a target date set for commencement of construction in the EIA for two some months from now – in August 2022 - where large and small scale fishing by Guyanese will be prohibited. It is also a fact that right now fishery operations are closed, boats moored and fishermen and their families are bereft of their livelihoods. Added to this dismal situation is the massively destructive seismic booming that has and will continue to drastically affect the fish themselves and we have in one fell swoop the decimation and destruction of a significant portion of the Guyanese fishing industry – courtesy of EEPGL with the expected support of the EPA and the Guyana Government. **The Realities and Impacts on the Pockets and in the Pots.** **So while the promise of cooking gas from the project is touted – the question remains – gas to cook what?** No readily available fresh local fish to cook, no income for fisherfolk to survive on but an increased cost of living to contend with – and admitted as fact in the EIA. **Fishermen are asking; are we going eat road and infrastructure?** **Women are asking what's to be in their market basket? What's to be in their cooking pot?** **Women ask can we eat the gas?** Saying how little they can actually buy to cook now and even less in the near future - with the promise all this cooking gas going hand in hand with an unbearably high cost of living. (Red Thread has published its first		In fact, the significance of potential economic impacts on fisherfolk are rated Minor to Moderate (not Negligible as asserted in the comment) in Section 9.1, Socioeconomic Conditions, of the EIA. The EIA notes that the extent and severity of the Project's economic impact on fishing interests will to some degree be dependent on the extent and nature of the marine exclusion zone (which has yet to be determined), but in any event the Project is unlikely to affect a large proportion of fishing vessels or fisherfolk at the national scale. The EIA also recognizes that at the local scale, these impacts should be managed through the Livelihood Restoration Strategy as recommended in Table 3-4 of the ESMMP. The Consultants are aware of the challenges faced by the fishing sector. Section 9.1, Socioeconomic Conditions, of the EIA describes recent trends in marine fisheries in detail, and specifically cites the closure of the shrimp season as a contributing factor to these challenges. The GTE Project does not include seismic operations of any kind; however, the CIA in Chapter 11 of the EIA recognizes that a limited amount of vertical seismic profiling may occur during other concurrent or future deepwater exploration projects. These activities are expected to have little to no economic impact on fisheries because they would occur well offshore in deep water that is far beyond the area where most Guyanese fishing vessels operate, as demonstrated by the Participatory Fishing Study submitted previously to the EPA.	

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				installment of its ongoing “Market Basket” survey in a recent “In The Diaspora” column in Stabroek News). Will the gas to energy project, miraculously, make the gas edible and cheap so as to give Guyanese people the required nutrition to convert into human energy for human life? This is the absurd conundrum that emerges from this EIA in terms of human life, well-being and socio-economic “benefits” and with all impacts on marine and human life dismissed as “negligible”.			
297.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Alternatives Not Considered** The EIA claims that EEPGL and the government explored other alternatives for sources of energy, settling on natural gas positing that it is a more reliable source when compared to renewables such as wind, solar and hydro. Twenty prospective sites for the gas to energy pipelines and plant were assessed and desk top and field feasibility surveys carried out. A “no project” option was also considered. **An alternative which was NOT considered**, however, was the comparative advantage of utilizing the massive budget of USD$1.3 billion (GYD$260 billion) reported as being dedicated to the project. **The alternative of investing this dollar amount into a** country-wide installation of renewable energy sources was not carefully enough considered. ***Especially since not all Guyanese will, for instance, benefit from the gas to shore development.*** **Alternatively, equipping each household in Guyana - urban, peri-urban, rural and hinterland – with alternative energy sources such as solar and wind would, in fact, provide lifetime sustainable and reliable source of electricity that each household could own.** Additionally, providing duty free and other financial incentives to the business sector to invest in “green” energy hardware and services might be attractive. (We have the example of Demerara Bank that converted its corporate headquarters entirely to solar power.)	Respond	Please see response to comment 265.	No

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				Most countries of the world, developed and developing are switching to these alternatives and oil and gas/fossil fuels are on the way out – universally. The UK, Canada and the USA have all set targets to completely phase out fossil fuels during the very period that we, in Guyana, are being pushed into greater consumption of these bad and outdated options.			
298.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Natural gas is a much 'dirtier' energy source than we thought (Stanford University research)** **Natural gas is mainly methane—a strong greenhouse gas:** It has been proven scientifically, and beyond the shadow of a doubt, that natural gas is not clean energy – that it is a highly destructive contributor to environmental and human hazards, climate change and global warming.	Respond	EEPGL was asked by the Government of Guyana to propose a concept using natural gas to generate electricity. EEPGL was not asked to evaluate a concept using other sources of energy (e.g., renewables), so comparison of the merits of natural gas-based electricity to other sources of electricity is not within the scope of the EIA. It is noted that the use of natural gas for electricity generation has environmental impacts, including emission of GHGs and other criteria pollutants, natural gas compares favorably to the use of fuel oil for electricity generation (the current energy source used by the national utility).	No
299.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Some alternative questions that the EIA should have considered:** **Why is natural gas bad for climate change?** Natural gas emits methane into the air, a greenhouse gas that's 86 times as potent as carbon dioxide (CO_2) over a 20-year period. Natural gas stoves also emit carbon monoxide and formaldehyde. And there are other methane emissions to consider.	Respond	Please see response to comment 298.	No
300.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Are stoves that use gas the best alternative?** No, they are not. Researchers say that more than three quarters of methane emissions occurred while the stoves were turned off, suggesting that gas fittings and connections and in-home gas lines are responsible for most emissions. **The climate and health impacts of natural gas stoves are a known problem.** In the USA, New York is considering a ban on natural gas connections in new buildings and dozens of local governments have taken similar action. **Quotes from the recent Stanford University Study:** *"One of the big take-homes from the study is that using gas stoves simultaneously*	Out of Scope	Desirability of gas stoves is beyond the scope of the EIA.	No

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				harms the environment and our health through the gases they emit," says lead author Eric Lebel, who conducted the research as a graduate student in Stanford's School of Earth, Energy and Environmental Sciences (Stanford Earth). *"We found that the methane emissions from stoves, for instance, increase the carbon impact by 39% compared to when just CO2 emissions are considered," he says. "And that's only leakage at the appliance-level, it doesn't incorporate leaks from the rest of the supply and distribution chain, all of which can leak additional methane gas as the gas is produced and distributed, etc."*			
301.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**ERM should have researched these factors and at least provided viable alternatives and options for all Guyanese people to benefit - other than that of a gas pipeline and gas plant to only benefit some Guyanese – and to have provided independent up to date research and alternatives.** **Alternative Costings for Supply of Renewable Energy for Every Household in Guyana** The number of dwellings in Guyana was reported as 221,741 in the 2012 census, up by 16,624 dwelling units reported in the 2002 census. If we add an additional 25,000 households/dwellings to the 2012 figure and use this estimated, projected figure of 246,741 households - let's see what might be benefits to each household/dwelling if the same budget for the gas to energy project was applied to this alternative: If a minimum of one million Guyana dollars were allocated to the provision of a renewable energy source per every household in Guyana (projected at 246,741 households in 2022) this would cost a total of GYD 246,741M. The budget for the gas to shore project of GYD$260 billion would adequately cover this amount with a savings of thirteen billion two hundred fifty-nine million Guyana dollars. This amount could be set aside as a contingency to increase the cost or cover related costs of installation etc. and/or applied as incentives for the business sector to itself invest in hardware,	Out of Scope	EEPGL was asked by the Government of Guyana to propose a concept using natural gas to generate electricity. EEPGL was not asked to evaluate a concept using other sources of energy (e.g., renewables).	NA

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				services and installation of renewable energy for their own businesses.			
302.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Environmental Impacts** A range of potential impacts on the physical, biological (marine, freshwater, and terrestrial) and socioeconomic environment were referred to in the EIA The EIA said that while the project, with both onshore and offshore components, will have a range of potential impacts on the physical, biological (marine, freshwater, and terrestrial) and socioeconomic environment, it will also generate benefits for Guyanese through increased employment and increased energy reliability. The EIA concluded that during both the construction and operation stage there will be sound and vibration impacts and persons will be subjected to higher than normal noise levels. Additionally, the air quality is expected to be impacted due to dust and other emissions from all three phases of the project. **The EIA states that 6.62 hectares of benthic habitat will be lost.** The EIA informed that approximately 6.62 hectares of benthic habitat will be lost as the offshore pipeline is being laid. However, the impact of this is rated from “negligible to moderate” by ERM **We object to and query this assessment.** Benthic habitats relate to/occur at the bottom of a body of water and/or relate to/occur in the depths of the ocean are of critical importance – especially in the Guyana context since they may have three dimensional structures that serve as shelter and provide storm protection by buffering wave action along coastlines. Benthic habitats can play an important role in maintaining water quality. We refer to a report by an independent organisation, ***Frontiers in Environmental Science*** published in 2016 which highlighted the detrimental environmental effects, routine oil and gas activities can have during exploration, production and decommissioning.	Respond	The GTE Project is a gas transmission and processing project. It does not have exploration-related or production-related aspects; therefore, most of the impacts that are typically associated with exploration and production projects are not relevant to the GTE Project. Furthermore, installation of all but the most shallow parts of the offshore pipeline will not involve the direct physical impacts hypothesized in the comment, because the majority of the installation vessels will not be anchored (they will be mobile during installation) and the offshore pipeline will be either laid directly on the seafloor or trenched (not drilled) into the seabed. This is discussed in Section 8.2.3.3. Impacts from exploration and development projects (from EEPGL and other operators) are explicitly identified as contributors to cumulative impacts on demersal/benthic species and their habitats, and these impacts are assessed in Chapter 11 (Cumulative Impact Assessment) of the EIA.	No

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				The study titled, *'Environmental Impacts of the Deep-Water Oil and Gas Industry: A Review to Guide Management Strategies'* was done in collaboration with 21 universities in the United States of America (USA), Canada, South Africa, Portugal and others. The document explained, *"During the exploration phase, impacts can result from indirect (sound and traffic) and direct physical (anchor chains, drill cuttings, and drilling fluids) disturbance. Additional direct physical impacts occur in the production phase as pipelines are laid and the volume of discharged produced water increases. Lastly, decommissioning can result in a series of direct impacts on the sea floor and can re-introduce contaminants to the environment."* (We also note that the Yellowtail EIA concocted by the self-same ERM mentions bethnic impacts as "negligible to moderate" unsurprisingly). **Question**: Has the cumulative impacts of current oil & gas developments and operations on benthic impacts been taken into consideration in this EIA produced by ERM? (Or in the Yellowtail EIA also produced by ERM? Or in any of the other secret, internal assessments carried out by the EPA and oil & gas developers?			
303.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Question**: Has the cumulative impacts of current oil & gas developments and operations on benthic impacts been taken into consideration in this EIA produced by ERM? (Or in the Yellowtail EIA also produced by ERM? Or in any of the other secret, internal assessments carried out by the EPA and oil & gas developers?) **Cumulative Effects** On October 8, 2021, the Chronicle reported Exxon and the Govt. of Guyana announcing that Guyana is poised to produce over 10 billion oil-equivalent barrels of oil. This is projected over the next decade at least and maybe longer. ExxonMobil further announced in March 2022 that it will be	Respond	A cumulative impact assessment is provided in Chapter 11 of the EIA and takes into account the potential combined impacts from the GTE Project and other non-Project activities, inclusive of existing and proposed oil and gas exploration and development activities. The other non-Project activities considered in the cumulative impact assessment are summarized in Section 11.3.2. As described in Section 11.7, based on the cumulative impact assessment findings, the EIA assigns priority ratings to each assessed resource and identifies where additional measures (beyond those proposed to address potential impacts from the Project already) are warranted to address potential cumulative impacts.	No

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				producing 1.2 million barrels per day of oil and gas in Guyana. There is also the potentially dangerous gas to shore pipeline and gas plant to take into consideration. And the series of shore-based “storage and calibration” facilities for hazardous substances including radioactive sources directly related to the oil & gas industry which are springing up all over East Bank Demerara in residential areas and in West Demerara – with all EIAs being waived by the EPA! The cumulative and combined impacts on the environment and humans from these all need to be taken into account to avoid piecemeal and otherwise false pictures presented to Guyanese. These cumulative impacts of this industry should never honestly or professionally be skated over and minimized as “negligible to moderate”. Guyanese who promote the industry, Guyanese who oppose it and Guyanese in the middle, or who are unsure, all need to see and understand the big, overall picture with all impacts and consequences – the good, bad and ugly – the combined short-term and the combined long-term all honestly, professionally and publicly made available to us all on a continuum.			
304.	Vanda Radzik Karen de Souza Danuta Radzik Janette Bulkan Jocelyn Dow	18 June 2022	NA	**Our allegations of non-compliance with legal requirements in relation to the EIA of the Gas-to-Energy project.** In a series of Letters addressed to and couriered to the CEO of ExxonMobil and Engine No 1 Board Members and copied to the Head of ExxonMobil in Guyana comprising several of the issues cited below was signed by Elizabeth Deane Hughes and endorsed, to date, by over 70 Guyanese. The signatories below of this submission to the EPA contributed to and endorsed the said series of Letters to ExxonMobil. A number of these issues and concerns are itemized below for the further attention of the EPA contributed to and endorsed said series of Letters.	Respond	Please see responses to the various topics in the individual rows above.	No

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				Specifically concerning the Gas to Energy project No consultation of primary stakeholders who live along the proposed pipeline route No name of developer, ExxonMobil on the submitted documents, nor that of board of directors No proof of ownership of land where proposed pipeline will be laid No evidence of feasibility study as per 1794/2017 Petroleum Agreement No professional Gender Analysis or Gender-related impact assessment or impacts on women specifically assessed No evidence of compliance with Free, Prior and Informed Consent (FPIC) from any Indigenous Community No Gas Leak Pipeline Management Plan or System in submitted EIA/EIS No response to questions being asked.			
305.	Elizabeth Deane-Hughes	18 June 2022	General	Will EEGPL meet international best practice standards or lower standards?	Respond	The Project will follow GIIP for the pipeline and natural gas processing industries. The term international best practice can refer to guidance or requirements from a wide range of institutions, so it is not possible for the Project to reference that categorically. Instead, the Project has identified throughout the EIA where it is adopting environmental and social performance measures that are consistent with those commonly considered to be examples of GIIP (e.g., measures recommended or required by the IFC Performance Standards or World Bank Group). Examples of these measures are included in Section 2.5, International Environmental and Socioeconomic Performance Criteria, of the ESMMP (included in Volume III of the EIA).	No
306.	Elizabeth Deane-Hughes	18 June 2022	General	Will EEPGL comply with the technical standards set by the US government?	Respond	The Project is not designed specifically to comply with U.S. regulatory requirements. However, the Project will be designed to comply with all Guyanese codes, standards, and regulations (the regulatory framework applicable to the Project is presented in Chapter 2), as well as a number of applicable international design codes and standards, many of which stem from U.S. organizations (e.g., American National Standards Institute, American Society of Mechanical Engineers, etc.). The design will be supplemented by EEPGL and contractor design specifications, as required.	No
307.	Elizabeth Deane-Hughes	18 June 2022	General	Will EEPGL comply with Title 49 Part 192 of the US Code of Federal Regulations – Transportation of Natural and Other Gas by pipeline? (iv) If the answer to any of the above questions is ‘no’, why not?	Respond	The Project has committed in the EIA to designing the Project pipeline components in accordance with a series of design specifications and standards, including but not limited to API RP 1111, ASME B16.49, and ASME B31.8. Section 5.3.7 discusses design codes and standards that will be used for the Project. Additional specifications are being developed as part of detailed design. While the Project is not being directly designed for regulatory compliance with Title 49 CFR 192, many of the references in Title 49 CFR 192 are directly to the standards (e.g., ASME B31.8)	No

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						being utilized by the Project. Furthermore, the design specifications will be consistent with GIIP.	
308.	Elizabeth Deane-Hughes	18 June 2022	General	How will EEPGL's proposed project comply with Guyana's international obligations? (ii) In particular how will EEPGL's proposed project comply with Guyana's international obligations under a. The United Nations Framework Convention on Climate Change b. The Paris Agreement c. The United Nations Convention on the Law of the Sea d. The Convention on Biological Diversity e. The Revised Treaty of Chaguaramas f. The Cartagena Convention and its protocols	Respond	Chapter 2 of the EIA identifies potentially applicable Guyana laws and regulations, as well as international agreements to which Guyana is a signatory, in order to present an overall administrative framework in which the Project can be assessed for environmental impacts. The Project is designed to comply with Guyana's laws and regulations and GIIP. With respect to international obligations, Guyana is a signatory to a number of international agreements and conventions relating to environmental management and community rights, although not all of these agreements have been translated into national legislation. These agreements set forth general goals and/or legal frameworks without dictating how each member country will pursue the goals or implement requirements. In cases where Guyana has not enacted national legislation to incorporate provisions of international agreements, the Project's application of GIIP, including applicable resource-specific standards, provides the appropriate level of environmental and community protections consistent with the goals of the international agreements. In particular, it is noteworthy that agreements such as the United Nations Framework Convention on Climate Change (UNFCCC), Paris Agreement, the Convention on Biological Diversity, and the Revised Treaty of Chaguaramas recognize the rights of nations to develop resources and economies with a commitment to balance such development with environmental protection. The Project will use GIIP and has incorporated many embedded controls into the overall Project design to reduce potential environmental and socioeconomic impacts. Furthermore, the Project supports the goals of Guyana's Low Carbon Development Strategy, which in turn supports the goals of the Paris Agreement. Thus, the Project's purpose and design as described in the EIA are consistent with Guyana's international obligations.	No
309.	Elizabeth Deane-Hughes	18 June 2022	Chapter 1, Introduction	No evidence of estimated costs.	Respond	Please see response to comment 191.	No
310.	Elizabeth Deane-Hughes	18 June 2022	Chapter 1, Introduction	How will EEPGL finance the gas to shore project?	Out of Scope	This comment is beyond the scope of the GTE Project EIA.	No
311.	Elizabeth Deane-Hughes	18 June 2022	Chapter 1, Introduction	What evidence can EEPGL provide to show that it has the financial capacity to carry out the project to international standards?	Respond	EEPGL registers its local financial statements with the Deeds Registrar in line with regulatory requirements annually. The statements are independently audited. EEPGL has been increasing revenue, assets, and equity since production began in 2019 and was profitable for the first time in 2021. With the second development and FPSO beginning production in 2022, it is anticipated that revenue, assets, and equity will continue to grow, subject to the impact of commodity prices and other market conditions.	No
312.	Elizabeth Deane-Hughes	18 June 2022	Chapter 1, Introduction	In light of ExxonMobil's declining financial status what credible financial assurance, as defined by section 30 of the Environmental Protection Act Cap 20:01 can EEPGL provide?	Respond	Please see response to comment 311.	No
313.	Elizabeth Deane-Hughes	18 June 2022	Chapter 1, Introduction	Does EEPGL expect Guyana to pay for proposed project?	Respond	The co-venturers will fund the pipeline and NGL Plant up-front and will recover the eligible costs from the government.	No
314.	Elizabeth Deane-Hughes	18 June 2022	Chapter 1, Introduction	(i) Is the project viable as it stands i.e. in the absence of a power plant? (ii) If yes, how is it viable? (iii) If no, what are the legal grounds	Respond	The Government of Guyana has committed to constructing a Power Plant, which will complement the GTE Project by using the gas to generate electricity.	No

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				that authorise the EPA to expend time and resources on a non-viable project?			
315.	Elizabeth Deane-Hughes	18 June 2022	Section 1.4, Regulatory Framework and Purpose of this EIA	No evidence of any policy, regulatory and administrative frame work viz a viz gas sector. There is some for the oil sector. Together forming the oil & gas sector.	Out of Scope	The comment is directed to the government.	NA
316.	Elizabeth Deane-Hughes	18 June 2022	Chapter 2, Policy, Regulatory, and Administrative Framework	The EIA must answer the following questions (i) What are the scope 1 emissions? This includes the direct greenhouse gas emissions that occur from the combustion of fossil fuels at a facility or project and associated transport.	Respond	An estimate of the Scope 1 GHG emissions that will be generated by the Project is provided in Section 7.6.3.1 (separate estimates for Construction and Operations stage emissions).	No
317.	Elizabeth Deane-Hughes	18 June 2022	Chapter 2, Policy, Regulatory, and Administrative Framework	(ii) What are the scope 2 emissions?	Respond	Scope 2 GHG emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling by a Project. The Project does not plan to purchase electricity, steam, heat, or cooling for any of the components of the Project.	No
318.	Elizabeth Deane-Hughes	18 June 2022	Chapter 2, Policy, Regulatory, and Administrative Framework	(iii) What are the Scope 3 emissions? Scope 3 emissions cover “downstream” emissions created by transportation and distribution, and by the end user burning gas for energy? While combustion of the gas by the end user may be outside EEPGL’s control that combustion of gas for fuel is the intended aim of the EEPGL proposed project to bring gas to shore and must therefore be identified, described and evaluated. Further information on the distinction between scope 1, 2 and 3 emissions can be found here: https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Acc ounting-Reporing-Standard_041613_2.pdf	Respond	Scope 3 emissions are a broad collection of 15 categories of indirect emissions, which primarily refer to emissions resulting from society’s need for and use of products. Beyond the Power Plant—for which GHG emission estimates are provided in Section 3.2 of the Air Quality Modeling Report (Appendix L in Volume II of the EIA)—any Scope 3 GHG emissions data associated with use of the GTE Project products would be highly speculative in nature and are not within the control of EEPGL. Specifically, EEPGL would not know how the products may be used by an end user or operational conditions where the gas or NGLs may be processed (e.g., practices or technologies used to address emissions resulting from processing the product, and ultimate derived products that may or may not have resulting emissions such as combustible versus non-combustible). In addition, to the best of our knowledge, ExxonMobil affiliates around the world have not been required to estimate Scope 3 GHG emissions as part of project permitting.	No
319.	Elizabeth Deane-Hughes	18 June 2022	Chapter 3, EIA Approach and Impact Assessment Methodology	Not all aspects [listed in terms and scope] addressed.	Respond	The EIA was conducted in full concordance with the approved Terms and Scope issued by the EPA for the Project and the EP Act. Section 1.3 includes an EIA roadmap that shows where in the submittal the items from the EIA Review Checklist included in the *Environmental Impact Assessment Guidelines Volume 1—Rules and Procedures for Conducting and Reviewing EIAs, Version 5* (EPA 2004) can be found.	No
320.	Elizabeth Deane-Hughes	18 June 2022	Chapter 3, EIA Approach and Impact Assessment Methodology	No evidence of any gas pipeline integrity management plan and/or system.	Respond	Please see response to comment 139.	No
321.	Elizabeth Deane-Hughes	18 June 2022	Chapter 3, EIA Approach and Impact	No evidence of any gas leak management plan and/or system	Respond	Please see response to comment 139.	No

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			Assessment Methodology				
322.	Elizabeth Deane-Hughes	18 June 2022	Chapter 3, EIA Approach and Impact Assessment Methodology	No consultations with “primary stakeholders” in the area of influence of the GtE pipeline and its project.	Respond	Please see responses to comment 35 and comment 36. Additionally, refer to Chapter 6, Stakeholder Engagement, as well as the SEP in Volume III of the EIA for the details pertaining to engagement with stakeholders, including those located in the primary study area (i.e., people living nearest to the proposed Project).	No
323.	Elizabeth Deane-Hughes	18 June 2022	Chapter 3, EIA Approach and Impact Assessment Methodology	No evidence of residents in Crane therein. A letter from “primary stakeholders” living in the area of influence of the GtE pipeline and its project. Letter sent to EPA from said residents and same acknowledged.	Respond	Please see responses to comment 35 and comment 36. Additionally, refer to Chapter 6, Stakeholder Engagement, as well as the SEP in Volume III of the EIA for the details pertaining to engagement with stakeholders, including within Crane. Note that the household socioeconomic and business surveys included people living within 500 meters of the pipeline, including Crane.	No
324.	Elizabeth Deane-Hughes	18 June 2022	Chapter 3, EIA Approach and Impact Assessment Methodology	No evidence of residents in Bordeaux, Java, L’Oretoire therein. A letter from “primary stakeholders” living in the area of influence of the GtE pipeline and its project. Letter sent to EPA from said residents and acknowledged.	Respond	Please see responses to comment 35 and comment 36. Additionally, refer to Chapter 6, Stakeholder Engagement, as well as the SEP in Volume III of the EIA for the details pertaining to engagement with Primary Stakeholders in the AOI. Note that the household socioeconomic and business surveys included people living within 500 m of the pipeline, including Bordeaux and other communities along Canal 1.	No
325.	Elizabeth Deane-Hughes	18 June 2022	Chapter 4, Alternatives	Inadequate analysis of alternative routes	Respond	Please see response to comment 281.	No
326.	Elizabeth Deane-Hughes	18 June 2022	Chapter 5, Project Description	What independent and expert seismic studies is EEPGL relying on?	Respond	Please see response to comment 193.	No
327.	Elizabeth Deane-Hughes	18 June 2022	Chapter 5, Project Description	What are the risks of mudslides or volcanic activity on the proposed pipeline route?	Respond	Please see response to comment 193.	No
328.	Elizabeth Deane-Hughes	18 June 2022	Chapter 5, Project Description	As the sea-bed is not flat what engineering techniques will EEPGL use to ensure that the pipeline does not bend resulting in a leak or rupture?	Respond	The pipeline route is selected to avoid significant pipeline spanning after pipe lay. Engineering analysis will be used to confirm suitability of the final pipeline configuration from a mechanical point of view. A detailed analysis is carried out to model the pipeline configuration over the seabed bathymetry and determine the associated stresses. These stresses are checked against the design criteria prescribed by the selected pipeline design code (API RP 1111), which is referenced in Section 5.3.7.	No
329.	Elizabeth Deane-Hughes	18 June 2022	Chapter 5, Project Description	As EEPGL intends to bury the pipeline in a shallow trench how will EEPGL know whether the pipeline is leaking or has ruptured?	Respond	Operating procedures, pipeline management system, and emergency response procedures are being developed throughout the detailed design of the various facilities. These will be in place prior to commissioning and Project operations startup. The pipeline monitoring system that will be utilized will rely primarily on identification of pressure loss in the system as an indication of a potential loss of integrity in the pipeline system. Burial of the pipeline will not affect this system.	No
330.	Elizabeth Deane-Hughes	18 June 2022	Chapter 5, Project Description	What formal risk management plans and systems does EEPGL have that clearly mitigate and control risks?	Respond	EEPGL has a mix of affiliate-level management plans that guide management of risks at all of its assets, and asset-specific management plans that are intended to manage risks that are unique to a specific asset. Affiliate-level plans that would apply to the GTE Project include EEPGL’s OSRP, CWMP, and SEP. These plans currently exist and are updated as conditions warrant, and as new assets come	No

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						online. Asset-specific plans include the ESMMP and Preliminary Decommissioning Plan. Each of these plans will be prepared for the GTE Project and are currently in various stages of completion. They will be finalized once the EPA finalizes the permit conditions for the Project, so that all Project-specific commitments can be appropriately captured in the relevant plan. This approach and each of the plans identified above are further explained in Chapter 13 of the EIA. EEPGL uses two main systems to manage implementation of the management measures contained in the various plans that will apply to the GTE Project. (1) ExxonMobil's Operations Integrity Management System (OIMS) Framework establishes common expectations used by ExxonMobil affiliates worldwide for addressing risks inherent in their businesses. This approach helps ExxonMobil affiliates communicate best practices and lessons learned across its affiliates. (2) At an affiliate level, EEPGL uses IsoMetrix to manage implementation of individual commitments and measures, reporting requirements, and general compliance. EEPGL's management systems are discussed further in Chapter 3 of the EIA and in the ESMMP Framework in Volume 3.	
331.	Elizabeth Deane-Hughes	18 June 2022	Chapter 7, Assessment and Mitigation of Potential Impacts from Planned Activities—Physical Resources and Chapter 8, Assessment and Mitigation of Potential Impacts from Planned Activities—Biological Resources	No reports released unable to do a detailed analysis to assess validity of included reports on studies therein.	Respond	All of the technical studies that are cited in the EIA are either included in their entirety in Volume II or have been submitted previously to the EPA and made public as part of a previous EEPGL EIA submittals. ERM notes that in cases where a report has not been included in Volume II of the GTE EIA, these reports are currently publicly available on the EPA's website at the corresponding link for the EIA in which they were first submitted to the EPA.	No
332.	Elizabeth Deane-Hughes	18 June 2022	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities–Socioeconomic Resources	Inadequate analysis lacks depth to comply with International best practices.	Respond	The comment provides no detail or reason for the claimed inadequacy of the analysis or the specific way(s) in which the EIA does not comply with international best practices for EIAs; therefore, the Consultants are unable to address the comment specifically. That said, each socioeconomic resource-specific section in Chapter 9 contains subsections that describe the methodology and results of impact analyses conducted for the resource.	No
333.	Elizabeth Deane-Hughes	18 June 2022	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities–	In light of EEPGL's statement that the area at Wales is the most favourable candidate for the project while listing several pages of potentially dangerous and life-threatening impacts from the Project, does EEPGL consider that the people, wildlife and environment at Wales are not of significance?	Respond	The selection process conducted to arrive at a preferred site for the NGL Plant used a standard process that compared, on a relative basis, potential factors such as environmental and socioeconomic impacts along with a range of other factors such as constructability, length of required pipeline, distance to energy users, etc. Once a preferred location was selected, the EIA then considered potential impacts to environmental and socioeconomic resources across the Project AOI, including the area in which the NGL Plant will be located.	No

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			Socioeconomic Resources				
334.	Elizabeth Deane-Hughes	18 June 2022	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities–Socioeconomic Resources	What are the risks to the residents in the Wales area from an explosion at the NGL plant?	Respond	The geographical areas that could potentially be impacted to various levels from a hypothetical worst-case loss of integrity at the NGL Plant are described in Section 10.1.4.3. The assessment of risks to socioeconomic resources from this type of unplanned event is described in Sections 10.2.14 to 10.2.22.	No
335.	Elizabeth Deane-Hughes	18 June 2022	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities–Socioeconomic Resources	If there is an explosion at the NGL plant how will EEPGL deal with it?	Respond	The Project has committed to designing and operating the Project facilities in accordance with good industry practice, including Guyanese codes, standards, and regulations, as well as applicable international design codes and standards. As described in Chapter 10, fundamental to this design and operation philosophy are specifications and procedures put in place to prevent the occurrence of an unplanned event such as an explosion. In the event of an incident involving loss of integrity of gas facilities at the NGL Plant, the pipeline would immediately be shut in to prevent additional gas flow into the NGL Plant operation. EEPGL would then initiate an emergency response to protect personnel and communities, the environment, and the asset. Operating procedures, pipeline management system, and emergency response procedures are being developed throughout the detailed design of the various facilities. These will be in place prior to commissioning and Project operations startup.	No
336.	Elizabeth Deane-Hughes	18 June 2022	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities–Socioeconomic Resources	As the Wales site is an area that is recovering from agricultural use what baseline studies have been carried out to determine the extent to which the area is recovering and the impact that EEPGL's project will have on the recovery of the site?	Respond	Chapter 8 of the EIA contains the result of extensive terrestrial biodiversity baseline studies conducted within and around the Project AOI within the Wales Estate. The EIA documents the natural state of most of the Project AOI and considers this the baseline for the impact assessment.	No
337.	Elizabeth Deane-Hughes	18 June 2022	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities–Socioeconomic Resources	What is the total area on shore that EEGPL claims will be taken up by the permanent infrastructure including the onshore pipelines and NGL plant?	Respond	As described in Section 5.1.2, the total land area required for permanent infrastructure is estimated to be slightly over 100 hectares.	No
338.	Elizabeth Deane-Hughes	18 June 2022	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities–	What does EEPGL propose to do with the pipeline, NGL plant and associated infrastructure if the power plant is illegal?	Respond	The Power Plant is not considered in the scope of this EIA. EEPGL is progressing the request for authorization for the pipeline, NGL Plant, and associated infrastructure in accordance with its application for environmental authorization and this EIA. In parallel, the Government of Guyana is progressing the request for authorization of the development of the Power Plant.	No

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			Socioeconomic Resources				
339.	Elizabeth Deane-Hughes	18 June 2022	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities–Socioeconomic Resources	In the absence of a power plant what will EEPGL do with the 50MSCFD of gas that it proposes to transport for energy according to the Project Summary?	Respond	EEPGL is not producing additional gas (i.e., beyond that which is already being produced as part of crude oil production operations) to supply the GTE Project. As described in EIA Section 5.3.1, New Connections to FPSOs, the Destiny and Unity FPSOs have pre-installed facilities to allow for gas export. From the main gas compression system, gas can be used for injection, lift, power generation, or export. Until gas is required to be exported to the NGL Plant, the FPSOs will continue to use the produced gas for existing uses. In other words, in the absence of a power plant, the gas will continue to be reinjected in the Liza Field reservoir.	No
340.	Elizabeth Deane-Hughes	18 June 2022	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities–Socioeconomic Resources	What is the maximum amount of gas that EEEPGL proposes to transport to the nonexistent 'planned power plant'?	Respond	The design for gas supply to the GTE Project is for a maximum of 60 MMscfd, with an average gas supply of 50 MMscfd.	No
341.	Elizabeth Deane-Hughes	18 June 2022	Chapter 9, Assessment and Mitigation of Potential Impacts from Planned Activities–Socioeconomic Resources	What will EEPGL do with that gas instead?	Respond	Volumes of gas not provided to the Power Plant will continue to be reinjected in the Liza Field Reservoir.	No
342.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	Undefined Risk Analysis assessment. Which International Standard was used? What method of Quantitative Risk Analysis for assessment?	Respond	Section 3.3.6 describes the approach used for the assessment of risks to resources from potential unplanned events. The approach relies on quantitative analysis for some components (e.g., numerical modeling) and qualitative analysis for other components. This is consistent with standard impact and risk assessment practice.	No
343.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	[This comment contains a numbered list of separate questions. These have been separated into individual comment numbers 343 through 353 for the purpose of this table.] The following matters must be addressed (i) Model a range of scenarios for leaks	Respond	As described in Section 10.1.4, Onshore Hydrocarbon Release, a range of loss of integrity scenarios were considered for both the onshore pipeline and NGL Plant, and several scenarios were modeled.	No
344.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	ii) What is the worst-case scenario?	Respond	As described in Section 10.1.4, Onshore Hydrocarbon Release, a number of different potential release scenarios—including worst-case scenarios—were modeled for various types of consequences (e.g., jet fire, flammable cloud) to provide a range of potential modeling results.	No
345.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(iii) How much gas will escape?	Respond	As discussed in Section 10.4.1.3, the volume of gas that would be released in a loss of integrity is a function of a number of factors, including the nature of the incident (e.g., pinhole leak vs full-bore rupture). In a worst-case situation, the volume of gas that would escape would be no more than the available inventory in the pipeline	No

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						system, as the source of gas to the pipeline would be stopped upon detection of a loss of pressure in the pipeline system. Chapter 10 provides further discussion on this topic.	
346.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(iv) Where will the gas go?	Respond	In the event of a loss of integrity in the gas pipeline, gas would be released to the atmosphere at the location of the integrity loss (at a rate commensurate with the nature/size of the defect). In addition, during the period after shutdown when gas that is in the pipeline at time of shutdown is being released, gas in the pipeline at the time of the shutdown would also continue to move toward the NGL Plant (assuming the pipeline is not completely severed, which is itself highly unlikely). This situation would continue until the leak was repaired or the pipeline was emptied; however, in no case would the amount of gas entering the ocean be larger than the volume of gas that can be accommodated in the pipeline at any particular point in time. Section 10.1.2 has been updated to include this information.	Yes
347.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(v) How toxic is gas?	Respond	The primary concern with a loss of natural gas is not toxicity; rather, the primary concern is the potential for the gas to ignite if it is exposed to an ignition source and is at a concentration that would promote ignition (i.e., not too lean and not too rich) and the potential for methane to displace oxygen if it is at a sufficient concentration at the location of a receptor. Section 10.1.4 has been updated to include this information.	Yes
348.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(vi) What is the impact on fish and other marine life?	Respond	Potential risks to fish and other marine life from a loss of integrity in the offshore pipeline resulting in a release of natural gas are described in Section 10.2.9.	No
349.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(vii) What is the impact on fisheries?	Respond	Potential risks to fisheries from a loss of integrity in the offshore pipeline resulting in a release of natural gas would be negligible, as the gas would move through the water column and be released to the atmosphere, without the expectation for any significant effects to fisheries. Risks to marine fish from such an event are described in Section 10.2.9.	No
350.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(viii) How will EEPGL detect leaks along the pipeline?	Respond	Operating procedures, pipeline management system, and emergency response procedures are being developed throughout the detailed design of the various facilities. These will be in place prior to commissioning and Project operations startup. As part of these procedures, there will be operations monitoring of the pipeline 24 hours a day, 7 days a week, and the Project will use a combination of different leak detection technologies to identify small or large gas leaks. This will include fiber optic cable detection laid next to the onshore pipeline and a software-based system comparing flow measurements from the onshore and offshore facilities.	No
351.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(ix) How will EEPGL maintain 24-hour surveillance along the entire pipeline in order to ensure that any leaks are detected immediately?	Respond	Please see response to comment 350. In addition, EEPGL will have operators monitor the pipeline 24/7 from either the onshore or offshore control room facilities.	No
352.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(x) How will EEPGL stop leaks along the pipeline?	Respond	If a leak is detected, operations will shut down the pipeline using remote actuated valves at the FPSO and onshore inlet facility. This has been added to the summary of embedded controls included in Section 10.1.9, Section 15.1, and the Environmental and Socioeconomic Management and Monitoring Plan (Section 3.1.2).	Yes

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
353.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(xi) As the pipeline will be 1 mile below sealevel how will EEPGL know what is going on along the sea-bed? Rupture of a pipeline 21 A ruptured pipeline can cause serious damage. See for example the recent Pemex leak which set the ocean on fire: https://www.bloomberg.com/news/articles/2021-07-06/huge-fire-near-pemex-gulf-coas t-platform-was-causedby-gas-leak 22	Respond	Please see responses to comments 350, 351, and 352. In addition, pipeline internal inspection procedures will use smart pigs that measure pipeline wall thickness, and this pipeline will be transporting a dry gas, which greatly reduces or eliminates the water aspect of a corrosion mechanism.	No
354.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	[This comment contains a numbered list of separate questions. These have been separated into individual comment numbers 354 through 365 for the purpose of this table.] The following matters must be addressed (i) What are the different factors that could cause a pipeline to rupture?	Respond	As described in Section 10.1.2, there are a number of scenarios that could result in a loss of integrity and resulting release of natural gas from the offshore pipeline, including: (1) corrosion; (2) objects striking the pipeline; and (3) a buildup of stress in the pipe wall, causing buckling. As described in Section 10.1.4.1, if a loss of integrity were to occur in the onshore pipeline, the most likely causes would be a third party striking the line or corrosion of the pipe that ultimately led to a pipe wall failure.	No
355.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(ii) Model a range of scenarios for the rupture of a pipeline	Respond	Section 10.1.4.3. describes the methodology and results of modeling of a loss of integrity of the onshore pipeline.	No
356.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(iii) What is the worst-case scenario?	Respond	The worst-case scenario for a loss of integrity of the onshore pipeline is a full bore rupture of the pipeline. This is the scenario that was modeled in the EIA.	No
357.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(iv) How much gas will escape?	Respond	Please see response to comment 345.	No
358.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(v) Where will the gas go?	Respond	Please see response to comment 346.	No
359.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(vi) How toxic is gas?	Respond	Please see response to comment 347.	No
360.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(vii) What is the impact on fish and other marine life?	Respond	Please see response to comment 348.	No
361.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(viii) What is the impact on fisheries?	Respond	Please see response to comment 349.	No
362.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(ix) How long will it take for EEPGL to detect a rupture?	Respond	A pipeline rupture (large leak) will be detected very quickly (e.g., less than 2 minutes) by the software-based leak detection system that will be utilized. Smaller leaks may take longer to detect depending on the hole size.	No
363.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(x) How will EEPGL maintain 24-hour surveillance along the entire pipeline in order to ensure that any rupture is detected immediately?	Respond	Please see response to comment 351.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
364.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(xi) How will EEPGL deal with a pipeline rupture?	Respond	If a leak is detected, operations will shut down the pipeline using remote actuated valves at the FPSO and onshore inlet facility. Following shutdown, EEPGL would implement its emergency response plan (if needed based on the situation), and then – following completion of any emergency response procedures - begin the pipeline repair process.	No
365.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(xii) As the pipeline will be 1 mile below sea-level how will EEPGL know what is going on along the sea-bed	Respond	Please see response to comment 353.	No
366.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	According to the Project Summary the pipeline will be in a shallow trench. The following must be addressed: (i) How will EEPGL observe leaks? (ii) How will EEPGL fix leaks?	Respond	Please see response to comments 350, 351, 352, and 353.	No
367.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	According to John Hess, CEO of Hess Corporation, EEPGL's gas compressor leaked gas. Such apparently small issues can have a serious impact. The Challenger Shuttle exploded killing all on board following the failure of its seals. The Macondo well blew out following a series of failures. It is therefore essential that EEPGL's proposed project is subject to rigorous standards, particularly in light of EEPGL's use of faulty equipment.	Respond	As described in Section 5.3.7, the Project will apply local codes, standards, and regulations, as well as applicable international design codes and standards. The Project design will be supplemented by EEPGL and contractor design specifications. The design process will be put into practice through ExxonMobil's Operations Integrity Management System (OIMS), which establishes common expectations used by ExxonMobil affiliates worldwide for addressing risks inherent in their businesses.	No
368.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	The following matters must be addressed (i) What are the specifications for the materials to be used?	Respond	Materials specifications will be based on internationally recognized standards. Please see response to comment 371.	No
369.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(ii) What are the specifications for the manufacturing of the components to be used?	Respond	Component manufacturing specifications will be based on internationally recognized standards. Please see response to comment 371.	No
370.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(iii) What are the specifications for the construction of the joints in the pipeline.	Respond	Line pipe welding and manufacturing specifications will be based on internationally recognized standards. Please see response to comment 371.	No
371.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(iv) List all standards that are applicable to the proposed project (v) State what each standard is for (vi) State how the standard will be applied (vii) How will the EPA ensure that the standards are met?	Respond	For the key design parameters (e.g., pipeline diameter, wall thicknesses, operating pressures, NGL Plant inlet receiving, storage) of the various Project components, please see: • EIA Section 5.3.2, Table 5.3-3: Key Offshore Pipeline System Design Parameters • EIA Section 5.3.3, Table 5.3-4: Key Onshore Pipeline System Design Parameters • EIA Section 5.3.4.2, NGL Plant Systems For the primary design codes and standards that dictate the design/materials, construction, testing, etc. for all Project components (SURF infrastructure, offshore pipeline, onshore pipeline, and NGL Plant), please see EIA Section 5.3.7, Design Codes and Standards. These design codes and standards will also be validated for compliance with Guyanese codes, standards, and regulations. Standard procedure for applying these design codes and standards is to include them as requirements in contract(s) for engineering, procurement, and construction of the various portions of the facility. Contractors will be responsible for performing	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
						appropriate activities and supporting documentation to demonstrate to EEPGL the adherence to the requirements.	
372.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	[This comment contains a numbered list of separate questions. These have been separated into individual comment numbers 372 through 375 for the purpose of this table.] Quality assurance. The following matters must be addressed (i) How will the EPA ensure that the standards are met?	Out of Scope	The comment is directed to the government.	NA
373.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(ii) What technical personnel and equipment will be used?	Out of Scope	The comment is directed to the government.	NA
374.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(iii) What systems will be in place to independently verify information and assurances provided by EEPGL or its sub-contractors	Out of Scope	The comment is directed to the government.	NA
375.	Elizabeth Deane-Hughes	18 June 2022	Chapter 10, Unplanned Events	(iv) In light of EEPGL's use of faulty equipment in Liza 1 resulting in the flaring of billions of cubic feet of gas, what evidence can EEPGL provide that it is capable of carrying out the proposed gas project safely and competently and to international standards?	Respond	EEPGL is confident it can execute this Project based on ExxonMobil's extensive experience in other countries where similar projects have been developed and operated safely. Section 5.3.7 lists design codes and standards that will be used by the Project. Chapter 15 contains a summary of embedded controls and mitigation measures that will be used by the Project, a number of which are related to safety elements.	No
376.	Elizabeth Deane-Hughes	18 June 2022	Chapter 11, Cumulative Impacts	Which International Standard was used to assess this?	Respond	The approach taken for the CIA follows the IFC's *Good Practice Handbook—Cumulative Impact Assessment and Management: Guidance for Private Sector in Emerging Markets* ("the Handbook") (IFC 2013).	No
377.	Elizabeth Deane-Hughes	18 June 2022	Chapter 12, Transboundary Impacts	In adequate analysis.	Respond	The comment provides no detail or reason for the claimed inadequacy of the analysis in Chapter 12 of the EIA; therefore, the Consultants are unable to address this comment further.	No
378.	Elizabeth Deane-Hughes	18 June 2022	Chapter 13, Environmental and Socioeconomic Management and Monitoring Plan Framework	As above-forementioned.	Respond	The comment provides no detail or reason for the claimed inadequacy of the analysis in Chapter 13 of the EIA; therefore, the Consultants are unable to address this comment further.	No
379.	Elizabeth Deane-Hughes	18 June 2022	Chapter16, References	In adequate analysis. What International best practices used?	Respond	It is unclear what the comment is referring to, but in any case, the comment provides no detail or reason for the claimed inadequacy of the analysis; therefore, the Consultants are unable to address this comment further. That said, a summary of key international environmental and socioeconomic performance criteria the Project will use is provided in Section 2.5 of the Environmental and Socioeconomic Management and Monitoring Plan.	No
380.	Elizabeth Deane-Hughes	18 June 2022	Chapter16, References	No adherence to EP Act and the current in use governing regulations therefrom for developer's	Respond	Please see response to comment 194.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				information to be contained on the document in some format.			
381.	Elizabeth Deane-Hughes	18 June 2022	Chapter16, References	No evidence of ownership of the land to be used in the GtE pipeline project	Respond	Chapter 9.6 describes the process of land ownership and use.	No
382.	Melinda Janki	Undated	NA	1. The Project Summary states that the EEPGL Project is a 'gas to energy' project. This is incorrect and therefore creates a misleading impression that EEPGL's proposed project will deliver energy to the people of Guyana. It will not. 2. Page 2 of the summary says that the gas is to be received by a 'planned power plant.' In other words the power plant does not exist. Without a power plant EEPGL's proposed project cannot deliver energy to the people of Guyana 3. EEPGL's proposed project is a 'gas to shore' project that is misrepresented as a 'gas to energy' project. This is a major misrepresentation that affects the ability of the public to exercise their rights under section 11(7) of the Environmental Protection Act Cap 20:05. 4. **The Project Summary must be withdrawn and the misrepresentation corrected.** 5. The Project Summary says that, "…for the purposes of this summary, the power plant and further distribution is (sic) not included in the scope of this application except for its consideration when addressing the cumulative impacts for the Project." 6. Since the power plant and the distribution infrastructure are not included in the application the EPA cannot take them into account. This appears to be an attempt to split up the gas to energy project into smaller components to avoid the level of scrutiny that the project requires under the Environmental Protection Act Cap 20:05. **7. Questions:** **(i) Is the project viable as it stands i.e. in the absence of a power plant?** **(ii) If yes, how is it viable?**	Respond	1. The comment is acknowledged. 2. The objective of the GTE Project is to deliver gas to a Power Plant to be constructed by the Government of Guyana. 3. The comment is acknowledged. 4. The Project Summary was prepared in keeping with the EPA's Project Summary Guidelines. 5. The comment is acknowledged. 6. The Power Plant is not a component of the Project for which authorization is being sought by EEPGL. However, the Power Plant is included in the EIA in the context of a cumulative impact assessment. 7. Please see response to comment 314.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				(iii) If no, what are the legal grounds that authorise the EPA to expend time and resources on a non-viable project?			
383.	Melinda Janki	Undated	NA	**<u>The power plant is unlikely to exist</u>** 8. Any planned power plant would clearly have a significant adverse effect on the environment and would be subject to an EIA. There is no guarantee that the planned power plant would meet the requirements for an environmental authorisation. The EPA is not a rubber stamp for government or industry proposals. Therefore planned power plant might never come into being. 9. The 'planned power plant' might not obtain the necessary financing, might be prohibited as illegal, might never be built, might not be ready in time even if it is able to overcome the various obstacles. 10. The EPA must deal with the facts as they are and not proceed on the basis of speculation about a 'planned power plant.	Out of Scope	8. The comment is acknowledged. 9. The comment is acknowledged. 10. The comment is directed to the EPA.	No
384.	Melinda Janki	Undated	NA	[This comment contains a numbered list of separate questions. These have been separated into individual comment numbers 384 through 391 for the purpose of this table.] 11. Significant obstacles to the 'planned' power plant include: (i) Domestic demand does not exist. The evidence is set out in the World Bank's report "Energy Markets in Latin America Emerging disruptions and the Next Frontier". The report was published in 2017 and states that, *"In countries such as Suriname, **Guyana**, Ecuador, Paraguay, and most of Central America and the Caribbean, **<u>natural gas demand is small or non-existent</u>**."* The World Bank has not shown that demand has grown since 2017.	Respond	This comment is beyond the scope of the GTE Project EIA, EEPGL was asked by the Government of Guyana to propose a concept using natural gas to generate electricity. EEPGL was not asked to evaluate the domestic power demand in Guyana. Comments related to power demand are therefore directed to the government.	No
385.	Melinda Janki	Undated	NA	(ii) The use of associated gas to supply energy is not economic. In August 2020 concerned citizens sent David Malpass, the president of the World Bank, a Request for Evidence that the use of associated gas for energy meets the requirements for 'economy' and 'efficiency'	Respond	Please see response to comment 384.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				under the World Bank's Articles of Agreement. The World Bank has so far been unable to provide the evidence requested. Therefore it must be concluded that either there is no evidence that gas to energy project is economic or the evidence that exists does not support gas to energy.			
386.	Melinda Janki	Undated	NA	(iii) Renewable energy is regarded as having greater economic benefits than gas. On 4th May 2020, two former World Bank Chief Economists Professor Lord Nicholas Stern3 and Joseph Stiglitz4 published a paper5 on fiscal recovery following Covid-19. They recommend that spending to stimulate the economy should be directed to renewable energy not fossil fuels. They said: *"…renewable energy investment is attractive in both the short and the long run. Renewable energy generates more jobs in the short run (higher jobs multiplier), when jobs are scarce in the middle of a recession, which boosts spending and increases short-run GDP multipliers (which are derived from expanding demand). In the long run, renewable energy conveniently requires less labour for operation and maintenance (Blyth et al., 2014). This frees up labour as the economy returns to capacity. The more efficient use of labour and the savings on fuel means that renewables are also able to offer higher long-run multipliers (which are derived from expanding supply)……* *…Clean energy infrastructure is also helpfully very labour intensive in the early stages – one model suggests that every $1m in spending generates 7.49 full-time jobs in renewables infrastructure, 7.72 in energy efficiency, but only 2.65 in fossil fuels (Garrett-Peltier, 2017). In the long run, these public investments offer high returns by driving down costs of the clean energy transition (Henbest, 2020). Harnessing more of these opportunities could result in 'kick starting the green innovation machine' (Acemoglu et al., 2012) and driving an efficient, innovative, and productive economy, with higher spill overs that benefit the wider economy (Aghion et al., 2014)."6*	Respond	This comment is beyond the scope of the GTE Project EIA, EEPGL was asked by the Government of Guyana to propose a concept using natural gas to generate electricity. EEPGL was not asked to evaluate a concept using other sources of energy (e.g., renewables).	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
387.	Melinda Janki	Undated	NA	(iv) Financial experts have warned that the gas project could bankrupt Guyana, for example: https://www.kaieteurnewsonline.com/2021/01/01/gas-to-shore-project-a-recipe-for-bankruptcy-us-financial-expert-warns/?__cf_chl_jschl_tk__=pmd_ba25fafb972a76bf5501f9f6c9a19db65341f505-1626725219-0-gqNtZGzNArijcnBszQb6	Respond	Please see response to comment 384. Assessment of the government's economic strategy for managing its power infrastructure is beyond the scope of the EIA.	No
388.	Melinda Janki	Undated	NA	(v) The government has not produced an up to date economic study that takes into account the changes in the global energy market. These include global investors with US$6Tn calling for a price on carbon in order to reduce emissions: https://unfccc.int/news/investors-with-usd-6-trillion-call-for-a-global-price-on-carbon	Out of Scope	This comment is beyond the scope of the GTE Project EIA, The comment is directed to the government.	No
389.	Melinda Janki	Undated	NA	(vi) Investors are moving away from fossil fuels because of the 'massive climate risks' to their investments: https://ieefa.org/ieefa-global-investors-are-moving-away-from-the-massive-climate-related-risks-associated-with-fossil-fuels/?utm_source=rss&utm_medium=rss&utm_campaign=ieefa-global-investors-are-moving-away-from-the-massive-climate-related-risks-associated-with-fossil-fuels	Out of Scope	Global trends in industry investment levels are beyond the scope of the EIA.	No
390.	Melinda Janki	Undated	NA	(vii) Global policy changes US climate envoy John Kerry has said that there is no need for new fossil fuel investments. This has an impact on the global energy market. https://www.independent.co.uk/climate-change/news/fossil-fuels-john-kerry-climate-b1887476.html	Out of Scope	Global trends in energy markets are beyond the scope of the EIA.	No
391.	Melinda Janki	Undated	NA	(viii) Political acceptability The Project Summary says that the power plant will be owned and operated by the Government of Guyana. If EEPGL is correct then the 'massive climate risks' that are being shunned by global investors would end up being imposed on the people of Guyana. That may not be politically acceptable.	Out of Scope	The comment is directed to the government.	No
392.	Melinda Janki	Undated	NA	4 In light of the overwhelming economic and financial case against gas and in favour of	Out of Scope	The comment is directed to the government.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				renewable energy, no government can guarantee that the planned power plant is viable.			
393.	Melinda Janki	Undated	NA	5 A gas to energy project is contrary to Guyana's nationally determined contribution under the Paris Agreement. A decision to convert Guyana's power system from heavy fuel oil to gas is prima facie illegal. **6 Question** **(i) What does EEPGL propose to do with the pipeline, NGL plant and associated infrastructure if the power plant is illegal?** **(ii) In the absence of a power plant what will EEPGL do with the 50MSCFD of gas that it proposes to transport for energy according to the Project Summary?** **(iii) What is the maximum amount of gas that EEEPGL proposes to transport to the non-existent 'planned power plant'?** **(iv) What will EEPGL do with that gas instead?**	Respond	5. The comment regarding Guyana's commitments under the Paris Agreement is directed to the government. However, it is noted that the use of natural gas in lieu of fuel oil to produce power represents a net decrease in Guyana's carbon footprint on a watt-by-watt basis and is consistent with Guyana's finalized Low Carbon Development Strategy. 6(i). If the Power Plant were deemed illegal, EEPGL would make a decision on the future of the GTE Project at that point after careful consideration of the circumstances. 6(ii). Gas volumes that are not used to generate electricity will continue to be reinjected in the Liza Field reservoir. 6(iii). The Project is designed to transport an average of 50 MMscfd of natural gas, with a design maximum of 60 MMscfd. 6(iv). Please see response to item 6(ii).	No
394.	Melinda Janki	Undated	NA	**International Legal Obligations** 7 Section 13(1)(c) requires EEPGL to comply with instructions for the implementation of Guyana's obligations under any treaty or law relating to the environment. **8 Question:** **(i) How will EEPGL's proposed project comply with Guyana's international obligations?** **(ii) In particular how will EEPGL's proposed project comply with Guyana's international obligations under** **a. The United Nations Framework Convention on Climate Change** **b. The Paris Agreement** **c. The United Nations Convention on the Law of the Sea** **d. The Convention on Biological Diversity** **e. The Revised Treaty of Chaguaramas**	Respond	Please see response to comment 308.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				f. The Cartagena Convention and its protocols			
395.	Melinda Janki	Undated	NA	**Alternatives:** 9 Section 11(5)(b) requires EEPGL to include in the EIA "an outline of the main alternatives studied by the developer and an indication of the main reasons for his choice taking into account the environmental factors." 10 Article 12.1 (a) of the Petroleum Agreement says "The Associated Gas produced from any Oil Field within the Contract Area shall be with priority used for the purposes related to the operations of production and production enhancement of Oil Fields, such as Gas injection, Gas Lifting and power generation."	Respond	9. Chapter 4 includes an assessment of alternatives considered by the proponent. 10. The comment is acknowledged. The terms of the Petroleum Agreement are outside of the scope of the EIA.	No
396.	Melinda Janki	Undated	NA	11 EEPGL has admitted that reinjection of associated gas is both feasible and preferable. 12 The Liza 1 EIA states "Gas Disposition: Three primary alternatives were considered for addressing associated gas produced during Phase 1 operations: gas re-injection, gas export, and continuous flaring. Gas re-injection was determined to be feasible for Phase 1, and it also provides benefits in reservoir management. As such, produced gas not used as fuel gas on the FPSO will be re-injected under normal operations. Continuous flaring of gas on a routine basis is not preferred, primarily due to the associated air emissions. Gas export alternatives continue to be evaluated, particularly given challenges related to commercialization of associated gas."[2] 13 The Liza 2 EIA states "Gas Disposition: Three primary alternatives were considered for addressing associated gas produced during Project operations: gas re-injection, continuous flaring, and gas export. Gas re injection was determined to be feasible for the Project, and it also provides benefits in terms of reservoir management by helping to maintain pressure in the reservoir (thereby increasing the amount of crude oil that can be	Respond	11. Irrespective of the potential use of associated gas for reinjection, EEPGL was asked by the Government of Guyana to propose a concept using natural gas to generate electricity. 12. The statement is acknowledged. 13. The statement is acknowledged. 14. The statement is acknowledged. 15(i). EEPGL is reinjecting the bulk of the gas it produces; however, a portion of the gas has been requested by the Government of Guyana to be used as fuel for a Power Plant to be constructed by the Government of Guyana. The remaining portion of the gas being produced that is not exported for use as fuel for a Power Plant will continue to be reinjected. 15(ii). No. Volumes of gas that are not used for power generation will continue to be reinjected in the Liza Field reservoir. 15(iii). The description and requirements for the flare and blowdown system of the Project are provided in Section 5.3.4.3 of the EIA. The associated impacts of the various scenarios resulting in flaring have been considered in the assessment of this EIA. If the Project is approved, the ability to flare, along with any requirements and/or limitations associated with flaring, would be addressed in an environmental permit. 15(iv). Please see response to 15(iii). 15(v). As answered in response to 15 (i) and (ii), only a portion of the gas EEPGL is producing will be transported to shore via pipeline. The remainder of the gas being produced will be reinjected in the Liza Field reservoir. 15(vi). Gas reinjection is not within the scope of the Project; only transportation of gas to shore via pipeline is part of the Project. Gas reinjection and transportation of gas via an offshore and onshore pipeline system are different activities with separate	No

[2] Liza 1 EIA Vol I Page xi

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				recovered over time) and reduced air emissions (as compared to continuous flaring). Under this alternative, produced gas not used as fuel gas on the FPSO will be re-injected under normal operations. Continuous flaring of gas on a routine basis is not preferred, primarily due to the associated air emissions. Gas export alternatives for future development continue to be evaluated, with due consideration of the challenges related to commercialization of associated gas. While gas re-injection is the preferred alternative selected for the Project, the FPSO has been designed to enable gas export, should an export alternative be identified in the future."[3] 14 Indeed the Payara EIA makes it clear that that re-injection benefits production. Re-injection is therefore likely to be more profitable. "Flaring of associated gas is a method to deal with natural gas production in oil developments, but introduces significant environmental considerations. Subsurface studies indicated significant value in gas re-injection for reservoir pressure maintenance and recovery uplift purposes, thus supporting related facilities investment. From a facilities perspective, given the relatively high pressure of the Payara field, the gas compression required for reinjection is considerable. EEPGL worked extensively with leading gas compression contractors on studies that ultimately confirmed the technical feasibility of reinjecting gas into the Payara field. From a subsurface perspective, it was important to assess the implications of gas reinjection on reservoir recovery. A key concern was that reinjected gas would be immiscible (i.e., with a tendency to remain separated from the liquid phase in the reservoir) and therefore move quickly through the reservoir back to the production wells, resulting in significant gas cycling, with considerable negative implications for oil production. However, subsurface studies established that the associated gas at Payara is miscible with the reservoir fluid for several of the developed reservoir segments. This not		associated risks, and the difference in risk between these two activities was not assessed, as the scope of the Project was to deliver a portion of the gas onshore to the NGL Plant and follow-on Power Plant. 15(vii). Please see response to 15(vi). 15(viii). Please see response to 15(vi). Additionally, EEPGL is bringing a portion of the gas to shore in response to a request from the Government of Guyana to be used as fuel for a Power Plant to be constructed by the Government of Guyana.	

[3] LIZA 2 EIA Vol 1 EIS-15

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				only reduces gas cycling, but it also means that use of gas reinjection—particularly as part of a water-alternating-gas strategy—results in considerable uplift in recovery."[4] **15 Questions:** **(i) Why is EEPGL not re-injecting the gas?** **(ii) Is EEPGL proposing to present the gas to shore as an alternative to flaring?** **(iii) Does EEPGL consider that it is legally entitled to flare?** **(iv) If yes on what grounds?** **(v) If gas is to be transported by pipeline what will EEPGL do with the gas injection wells that were approved in the EIA dated 1st June 2021 (Liza 1) and September 2018 (Liza 2)?** **(vi) Is it more dangerous to re-inject the gas or to transport it by pipeline?** **(vii) If EEPGL claims that re-injection is more dangerous, what evidence is there in support?** **(viii) If transportation by pipeline is more dangerous, why is EEPGL choosing the more dangerous option?**			
397.	Melinda Janki	Undated	NA	**<u>Standards</u>** 16 Guyana does not have any standards for the oil and gas industry. Such standards are sector specific and should be developed by the Minister with responsibility for petroleum. If ExxonMobil was building the pipeline in the USA it would have to comply with USA technical standards. **17 Questions:** **(i) Will EEGPL meet international best practice standards or lower standards?** **(ii) Will EEPGL comply with the technical standards set by the US government?** **(iii) Will EEPGL comply with Title 49 Part 192 of the US Code of Federal Regulations – Transportation of Natural and Other Gas by pipeline?**	Respond	Please see response to comments 305 through 307.	No

[4] Payara EIA Vol 1 page 2-73

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				(iv) If the answer to any of the above questions is 'no', why not?			
398.	Melinda Janki	Undated	NA	**<u>Leaks</u>** 20 The following matters must be addressed **(i) Model a range of scenarios for leaks** **(ii) What is the worst case scenario?** **(iii) How much gas will escape?** **(iv) Where will the gas go?** **(v) How toxic is gas?** **(vi) What is the impact on fish and other marine life?** **(vii) What is the impact on fisheries?** **(viii) How will EEPGL detect leaks along the pipeline?** **(ix) How will EEPGL maintain 24 hour surveillance along the entire pipeline in order to ensure that any leaks are detected immediately?** **(x) How will EEPGL stop leaks along the pipeline?** **(xi) As the pipeline will be 1 mile below sea-level how will EEPGL know what is going on along the sea-bed?**	Respond	Please see responses to comments 343 through 353.	No
399.	Melinda Janki	Undated	NA	**<u>Rupture of a pipeline</u>** 21 A ruptured pipeline can cause serious damage. See for example the recent Pemex leak which set the ocean on fire: https://www.bloomberg.com/news/articles/2021-07-06/huge-fire-near-pemex-gulf-coast-platform-was-caused-by-gas-leak **22 The following matters must be addressed** **(i) What are the different factors that could cause a pipeline to rupture?** **(ii) Model a range of scenarios for the rupture of a pipeline** **(iii) What is the worst case scenario?** **(iv) How much gas will escape?** **(v) Where will the gas go?** **(vi) How toxic is gas?**	Respond	Please see responses to comments 354 through 365.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				(vii) What is the impact on fish and other marine life? **(viii) What is the impact on fisheries?** **(ix) How long will it take for EEPGL to detect a rupture?** **(x) How will EEPGL maintain 24 hour surveillance along the entire pipeline in order to ensure that any rupture is detected immediately?** **(xi) How will EEPGL deal with a pipeline rupture?** **(xii) As the pipeline will be 1 mile below sea-level how will EEPGL know what is going on along the sea-bed?**			
400.	Melinda Janki	Undated	NA	23 According to the Project Summary the pipeline will be in a shallow trench. The following must be addressed: **(i) How will EEPGL observe leaks?** **(ii) How will EEPGL fix leaks?**	Respond	Please see response to comment 366.	No
401.	Melinda Janki	Undated	NA	24 According to John Hess, CEO of Hess Corporation, EEPGL's gas compressor leaked gas. Such apparently small issues can have a serious impact. The Challenger Shuttle exploded killing all on board following the failure of its seals.[5] The Macondo well blew out following a series of failures. It is therefore essential that EEPGL's proposed project is subject to rigorous standards, particularly in light of EEPGL's use of faulty equipment. **25 The following matters must be addressed** **(i) What are the specifications for the materials to be used?** **(ii) What are the specifications for the manufacturing of the components to be used?** **(iii) What are the specifications for the construction of the joints in the pipeline.** **(iv) List all standards that are applicable to the proposed project** **(v) State what each standard is for**	Respond	See responses to comments 367 through 371.	No

[5] https://www.space.com/31732-space-shuttle-challenger-disaster-explained-infographic.html

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				(vi) State how the standard will be applied **(vii) How will the EPA ensure that the standards are met?**			
402.	Melinda Janki	Undated	NA	Quality assurance 26 The following matters must be addressed **(i) How will the EPA ensure that the standards are met?** **(ii) What technical personnel and equipment will be used?** **(iii) What systems will be in place to independently verify information and assurances provided by EEPGL or its sub-contractors** **(iv) In light of EEPGL's use of faulty equipment in Liza 1 resulting in the flaring of billions of cubic feet of gas, what evidence can EEPGL provide that it is capable of carrying out the proposed gas project safely and competently and to international standards?**	Respond	See responses to comments 372 through 375.	No
403.	Melinda Janki	Undated	NA	**<u>Emissions</u>** 27 Section 11(4) of the Environmental Protection Act requires the EIA to "identify, describe and evaluate the direct and indirect effects of the proposed project on the environment including air and climatic factors." 28 Section 2 defines the environment as, *"all land, area beneath the land surface,* ***atmosphere, climate****, all water, surface water, sea, seabed, marine and coastal areas…* **29 The EIA must therefore answer the following questions** **(i) What are the scope 1 emissions? This includes the direct greenhouse gas emissions that occur from the combustion of fossil fuels at a facility or project and associated transport.** **(ii) What are the scope 2 emissions?** **(iii) What are the Scope 3 emissions? Scope 3 emissions cover "downstream" emissions created by transportation and distribution, and by the end user burning gas for energy?**	Respond	29. Please see responses to comments 316 through 318.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				While combustion of the gas by the end user may be outside EEPGL's control that combustion of gas for fuel is the intended aim of the EEPGL proposed project to bring gas to shore and must therefore be identified, described and evaluated. Further information on the distinction between scope 1, 2 and 3 emissions can be found here: https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf			
404.	Melinda Janki	Undated	NA	**<u>The Site</u>** 30 It is unclear how much land will be used. EEPGL's figures are 30 acres for the site, 100 acres for the contractor, a construction footprint of 123 to 154 acres and additional work spaces of 50metres x 100 metres. Acres are imperial. Metres are metric. The information on the site is confusing and obscure and does not meet the statutory requirement to describe the site. **31 The Project Summary should be withdrawn for failure to comply with the Environmental Protection Act Cap 20:05.** **32 What is the total area that will be affected by the proposed project?**	Respond	30. The Project's planned land use is described in Section 5.1.2. 31. The specific basis for the comment is not provided, so the Consultants are unable to provide an associated response. 32. The Project's planned land use is described in Section 5.1.2.	No
405.	Melinda Janki	Undated	NA	33 EEPGL states that a comprehensive site evaluation process was conducted and that it was determined that the Wales site is the most favourable candidate for the site based on constructability, environmental, socio-economic and biodiversity perspectives. This statement is unsupported by any evidence whatsoever and can and should be deleted from the Project Summary as unreliable. It is clearly contradicted by page 18 which states that there are effects on the environment and Attachment A which consists of a table running to 6 pages and listing the resources or receptors that will be affected. **34 Question:** **(i) In light of EEPGL's statement that the area at Wales is the most favourable candidate for the project while listing several pages of potentially dangerous and life threatening impacts from the Project, does EEPGL consider that the**	Respond	34. Please see responses to comments 333 through 337.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				people, wildlife and environment at Wales are not of significance? **(ii) What are the risks to the residents in the Wales area from an explosion at the NGL plant?** **(iii) If there is an explosion at the NGL plant how will EEPGL deal with it?** **(iv) As the Wales site is an area that is recovering from agricultural use what baseline studies have been carried out to determine the extent to which the area is recovering and the impact that EEPGL's project will have on the recovery of the site?** **(v) What is the total area on shore that EEGPL claims will be taken up by the permanent infrastructure including the onshore pipelines and NGL plant?**			
406.	Melinda Janki	Undated	NA	35 Section 4(3)(b) of the Environmental Protection Act requires the EPA to carry out surveys and obtain baseline information on natural resources including ecosystems, population counts, species identification, location and condition etc. **36 Question:** **(i) What baseline studies have been carried out on the proposed site?**	Respond	36. As described in Chapter 3 of the EIA, impacts of the GTE Project are expected to occur across the Project AOI, which extends beyond the Project area. As such, baseline studies conducted anywhere within the AOI (as opposed to only within the physical footprint of the Project) are relevant to the EIA. The following biological baseline studies were conducted within the Project AOI and informed the impact assessment in the EIA: • EIA specific studies: – Shallow water Environmental Baseline Survey (2021) – Terrestrial vegetation and habitat survey (2021) – Terrestrial bird survey (2021 to 2022) – Riverine bird survey (2021) – Freshwater biodiversity study (habitat, macroinvertebrates, and fish [2021]) – Terrestrial mammal survey (2021 to 2022) – Otter survey (2021 to 2022) – Terrestrial insect survey (2021 to 2022) • Non-EIA specific studies – Marine bird studies (2017 to 2020) – Marine mammal survey (2015 to 2021) – Marine turtle telemetry study (2018 to 2019) – Marine fish study (2017 to 2019) – Multiple Environmental Baseline Surveys (2017, 2018, 2019, 2020) – Riverine mammal survey In addition to aforementioned biological studies, several physical and socioeconomic baseline studies were also conducted in the Project AOI and informed the biological impact assessment to varying degrees.	No
407.	Melinda Janki	Un dated	NA	37 Section 11 (4) (a) requires EEPGL's EIA to identify, describe and evaluate the direct and indirect effects of the proposed project on the	Respond	38(i). The number of species found within the Project AOI varies by taxonomic group (e.g., fish, mammals, birds, etc.), but the number of species within each taxonomic group that are known to occur in the Project AOI is provided in the corresponding taxonomic group discussion in Chapter 8 of the EIA.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				environment. This includes the ocean, the coast, the riverine area and the swamps. **38 Questions:** **(i) What species are found in the proposed project area?** **(ii) How many of each species are found in the proposed project area?** **(iii) Which of those species are endemic, rare, threatened, endangered?** **(iv) What areas are used by migrants (boreal and austral)?** **(v) Which areas are nesting grounds for birds?** **(vi) Which animals use the area including breeding grounds or feeding grounds?**		38(ii). Population studies were not carried out as part of this EIA because they are not required by the EP Act, nor are they necessary to assess impacts on the animals and plants that occur within the Project AOI. 38(iii). Rare, threatened, endangered, and migratory species known or expected to occur in the Project AOI are listed in Section 8.6. A comprehensive list of endemic species was not provided because the ranges of many species that occur within the Project AOI are not definitively known; for taxonomic groups for which range data is generally more available (e.g., fish and birds), regional endemics were noted if they occurred. 38(iv). Please see response in line (iii) above. 38(v). As discussed in Section 8.3.2, two bird nesting areas were identified in the terrestrial biodiversity study area: a sunken barge located near the mouth of the Demerara River, and Inver Island located in the middle of the Demerara River near Land of Canaan. 38(vi). Please see response in line (i) above.	
408.	Melinda Janki	Undated	NA	39 Section 11(4)b requires a project to be assessed with a view to the need to protect and improve human health and living conditions and the need to preserve the stability of ecosystems as well as the diversity of species. **40 Questions:** **(i) How will EEPGL's proposed project protect and improve human health and living conditions?** **(ii) How will EEPGL's proposed project preserve the stability of ecosystems?** **(iii) How will EEPGL's proposed project preserve the diversity of species?**	Respond	As summarized in Chapter 14 of the EIA, the Project is expected to contribute to improved reliability of power and energy independence for Guyana as well as more reliable and less carbon-intensive power generation (as compared to the current fuel oil-fired power sources). The Project is also expected to increase economic activity through the purchase of in-country goods and services from Guyanese businesses, provide additional employment opportunities for Guyanese nationals, and contribute to increased experience, capacity, and skills in the local workforce, thereby creating a larger pool of advanced workers for all areas of the economy. Together, these benefits are expected to improve the health and living conditions in Guyana. As discussed in Chapter 8 of the EIA, the terrestrial portion of the Project will be constructed in an area that has been thoroughly disturbed by a long history of agriculture and the marine pipeline will be constructed in an environment where most biota are resilient to human activity. The combination of embedded controls and Consultant-recommended mitigation measures described throughout the EIA and in the ESMMP are intended to avoid, minimize, and manage Project-related impacts. Although these measures are too numerous to list in a comment response, their combined effect will be to prevent large-scale ecological degradation or significant loss of biodiversity as a result of the Project.	No
409.	Melinda Janki	Undated	NA	**<u>Restoration</u>** 39. Section 13(1)(d) requires EEPGL to restore and rehabilitate the environment. 40. Section 13(2) prohibits the EPA from issuing an environmental permit unless EEPGL can pay compensation. 41. EEPGL's accounts for the year ended 2020 show what EEPGL calls a 'total comprehensive loss' of $6,515,878,363. 42. According to the global energy think tank IEEFA,	Respond	Please see responses to comments 310 through 313.	No

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				"ExxonMobil, the lead company under the contract, is in severe financial distress. It was once the leader of the world's economy. It had a market capitalization of $527 billion in 2007. It is now worth less than $140 billion, and it recently announced that it may write off 20% of the company's assets at the end of the year. Several of the company's recent major oil investment plans have failed to meet profit expectations, and others have failed completely. The company faces an uncertain future regarding its investment priorities, and its current short-term problems make its role as a partner for Guyana more of a source of concern than a guarantor of stable future profits."[6] 43. In light of these financial issues it is essential to know whether EEPGL can meet its financial liabilities. **44. Questions:** **(i) How will EEPGL finance the gas to shore project?** **(ii) What evidence can EEPGL provide to show that it has the financial capacity to carry out the project to international standards?** **(iii) In light of ExxonMobil's declining financial status what credible financial assurance, as defined by section 30 of the Environmental Protection Act Cap 20:01 can EEPGL provide?** **(iv) Does EEPGL expect Guyana to pay for proposed project?**			
410.	Melinda Janki	Undated	NA	**<u>Unreliable statements/missing information</u>** 45. Page 2 of the project summary states that, "EEPGL is the designated operator for the Stabroek Block and is acting on behalf of itself and on behalf of other parties comprising the Contractor under the Petroleum Agreement and the Petroleum Prospecting Licence for the Stabroek Block (i.e. Hess Guyana Exploration Ltd. and CNOOC Petroleum Guyana Limited (formerly known as CNOOC Nexen Petroleum Guyana Ltd.)" 46. Article 2.2(a) of the Petroleum Agreement states	Respond	50(i). EEPGL, Hess Guyana Exploration Limited ("Hess"), and CNOOC Petroleum Guyana Limited ("CNOOC") are parties to the Stabroek Block Petroleum Agreement ("Petroleum Agreement") and Liza Petroleum Production Licence, and as entities comprising the Contractor and Licensee thereunder are therefore involved in the proposed GTE Project as co-venturers. 50(ii). See response in 50(i) above. Additional information regarding involvement of Hess, CNOOC, and EEPGL in the Project is described in detail in the Project EIA. 50(iii). EEPGL, Hess, and CNOOC recognize and support the benefits that the Project would provide to the citizens of Guyana, as described in the EIA. 50(iv). EEPGL, Hess, and CNOOC's involvement in the Project, including any such potential liabilities, are governed by the Petroleum Agreement, Liza Petroleum Production Licence and applicable laws, permits, and other agreements.	No

[6] https://ieefa.org/ieefa-u-s-oil-consortium-deal-with-guyana-far-from-panacea-for-countrys-ailing-finances/

Comment #	Commenter	Date	EIA Section	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
				"Esso shall be the Operator charge with conducting the day to day activities of the Contractor under this Agreement…" 47. In plain English being responsible for the 'day to day activities' under an Agreement and being the operator for the entire Stabroek Block are not identical. Clearly the proposed 'gas to energy' project is a major undertaking that cannot fall within the meaning of 'day to day activities' under the Petroleum Agreement. 48. The Environmental Protection Agency (EPA) must require EEPGL to provide evidence to support its claim that it is the 'operator' of the Stabroek Block and not just the operator for day to day activities. 49. EEPGL claims to act on behalf of Hess Guyana Exploration Ltd. (Hess) and CNOOC Petroleum Guyana Limited (CNOOC). The Petroleum Prospecting Licence of 7th October 2016 refers to the EEPGL, as 'Joint Venture Licensees'. A definition in a licence does not create a legal joint venture. It is unclear what the relationship is among the three (3) companies. **50. Questions** **(i) What is the relationship between EEPGL, Hess and CNOOC?** **(ii) What is the involvement of Hess and CNOOC in the proposed gas to energy project?** **(iii) Is it the intention that Hess and CNOOC benefit from the gas to energy project?** **(iv) Will Hess and CNOOC be liable for any damage to the environment or harm to the people of Guyana as a result of the proposed gas to energy project?** **(v) Does the EEPGL country manager take responsibility for the Project Document which is unsigned or does EEPGL disclaim responsibility for its contents?**		50(v). The EIA was carried out, in accordance with the EP Act, by ERM, an approved independent environmental consultant. ERM and EEPGL (as Developer of the Project, acting on behalf itself, Hess, and CNOOC) submitted the EIA to the EPA, and EEPGL supports its content.	

Table 4: Santa Aratak Stakeholder Meeting

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
411.	3	Santa Aratak Benab, 8 August 2022	When you start this plant, how fast will the project take to finish?	Respond	Please see response to comment 114.	No
412.	3	Santa Aratak Benab, 8 August 2022	The creek that goes to Patentia—would this be affected?	Respond	As described in Section 5.5.3.2, any process or sanitary discharges from the NGL Plant will be conveyed to a process wastewater treatment plant (WWTP) at the NGL Plant site. The effluent will be treated to World Bank Group effluent levels and the treated effluent will be discharged to the stormwater retention pond for holding, analysis, and monitoring. As conditions allow, water from the stormwater retention pond will be discharged directly to the Demerara River or via existing canals. On this basis, the potential impacts to water quality in surface water bodies in the vicinity of the NGL Plant site would be expected to be negligible.	No
413.	3	Santa Aratak Benab, 8 August 2022	Should the Project be approved, will Guyanese be employed over or under 50%?	Respond	Please see response to comment 96.	No
414.	3	Santa Aratak Benab, 8 August 2022	When you have this forum in November, where in Region 3 would it be?	Respond	The forum will be in Leonora.	No
415.	3	Santa Aratak Benab, 8 August 2022	How harmful would this be to the aquatic creatures? If you do surveys from 1970-2022, how much would economic activities be affected? There is a great disadvantage. Development with one plant can be very detrimental to another sector such as fisheries, hence should be studied.	Respond	Potential impacts on marine biodiversity are discussed in Chapter 8, Assessment and Mitigation of Potential Impacts from Planned Activities—Biological Resources. Most potential impacts on will occur during the Construction stage. Jetting and trenching to bury the offshore pipeline will produce temporary turbidity plumes during construction. Wastewater from pipeline installation vessels will be treated and discharged according to regulatory requirements. The potential discharge of pipeline hydrostatic test water may have potential aquatic life impacts within the immediate discharge area due to the presence of one or more test chemicals in the hydrostatic test water, depending on which hydrostatic testing chemicals are used and flow conditions at the time of the discharge. Several management measures have been incorporated into the Project design as embedded controls to minimize the significance of the Project-related impacts on marine and coastal biodiversity. The significance of potential economic impacts on fisherfolk are discussed in Section 9.1, Socioeconomic Conditions, of the EIA. The EIA notes that the extent and severity of the Project's economic impact on fishing interests will to some degree be dependent on the extent and nature of the marine exclusion zone (which has yet to be determined), but in any event the Project is unlikely to affect a large proportion of fishing vessels or fisherfolk at the national scale. The EIA also recognizes that at the local scale, these impacts should be managed through the Livelihood Restoration Strategy as recommended in Table 3-4 of the Environmental and Socioeconomic Management and Monitoring Plan.	No
416.	3	Santa Aratak Benab, 8 August 2022	I want to find out about the pipeline - if it's welded or how it's connected.	Respond	The pipeline will be welded—either at the installation site or in a fabrication yard. The weld will then be non-destructively tested as part of the quality control program. Epoxy field coating will be applied to prevent corrosion.	No
417.	3	Santa Aratak Benab, 8 August 2022	Would the community benefit as a tradesman?	Respond	Please see response to comment 96. Additionally, please see comment 414 regarding the upcoming 9 November job fair at Leonora.	No
418.	3	Santa Aratak Benab, 8 August 2022	Where is the proposed plant?	Respond	The NGL Plant will be located on the West Bank Demerara, south of Free and Easy and north of Maria's Lodge.	No

Comment #	Region	Location/Date	Comment	Respond or Out of Scope	Draft Response	EIA Edit Required?
419.	3	Santa Aratak Benab, 8 August 2022	There is a creek that runs from the Wales District to our community. Our concern is if the creek will be affected.	Respond	Please see response to comment 412.	No
420.	3	Santa Aratak Benab, 8 August 2022	Will we as a community be privileged to have roads or electricity in our community?	Out of Scope	Potential government improvements to public infrastructure are not within the scope of the EIA.	No
421.	3	Santa Aratak Benab, 8 August 2022	These conclusions from the EIA are all theories (i.e., from other plants), right? Should the plant start operating, and should we get effects, who will we inform?	Respond	The Project has committed to implement a transparent, accessible, and consistent Community Grievance Mechanism (CGM) prior to onset of Project activities, and to take measures to promote the CGM being well publicized and understood by the public, including residents of informal settlements and Indigenous Peoples—in particular in the Santa Aratak community. The Through the CGM, stakeholder feedback can be received by EEPGL or its contractors in the following ways: • In person, either to an EEPGL employee or representative • Via telephone at (592) 623-1176 • Via email at guyanacommunity@exxonmobil.com • By mail at: Esso Exploration & Production Guyana Limited c/o Grievance Coordinator 86 Duke Street Kingston Georgetown, Guyana Stakeholders are also able to inform the EPA directly.	No
422.	3	Santa Aratak Benab, 8 August 2022	Would the liability come out of our royalties?	Respond	Please see response to comment 129.	No
423.	3	Santa Aratak Benab, 8 August 2022	Due to drilling, could it cause earthquakes?	Respond	There is no well drilling proposed as part of the GTE Project. Nevertheless, for clarity, none of the activities associated with the GTE Project have the potential to cause earthquakes.	No