

**AVOCAT GUYANA HOLDINGS INC.
(AGHI)**

**CONSTRUCTION & OPERATION OF
WAREHOUSE FACILITY AND LAYDOWN YARD**

**ENVIRONMENTAL ASSESSMENT AND MANAGEMENT PLAN
(EAMP)**



April 2023

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ACRONYMS

AGHI	Avocat Guyana Holdings Inc.
BOD	Biological Oxygen Demand
CCU	Cargo Carry Units
CHPA	Central Housing and Planning Authority
CIA	Cumulative Impact Assessment
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO	Carbon Monoxide
DO	Dissolved Oxygen
EAMP	Environmental Assessment and Management Plan
EBD	East Bank Demerara
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPRP	Emergency Preparedness and Response Plan
GFS	Guyana Fire Service
GHS	Globally Harmonized System
GPF	Guyana Police Force
GLASS	Guyana Logistics and Support Services Inc.
GoG	Government of Guyana
GPL	Guyana Power and Light Company
GTT	Guyana Telephone and Telegraph Company
GWI	Guyana Water Inc.
HDPE	High Density Polyethylene
HSE	Health, Safety and Environment
IBAs	Important Bird Areas
ISO	International Standards Organisation
ITCZ	Inter Tropical Convergence Zone
IUCN	International Union for Conservation of Nature
LCDS	Low Carbon Development Strategy
MCC	Motor Control Center
NDC	Neighbourhood Democratic Council
NDS	National Development Strategy
NEAP	National Environmental Action Plan
NO ₂	Nitrogen Dioxide
PAoI	Primary Area of Influence
PM	Particulate Matter
PPEs	Personal Protective Equipment
PTCCB	Pesticides and Toxic Chemicals Control Board
QA/QC	Quality Assurance/Quality Control
SAoI	Secondary Area of Influence
SDS	Safety Data Sheets
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UN	United Nations
VECs	Valued Environmental Components
VOCs	Volatile Organic Compounds
WHO	World Health Organisation

1.0 INTRODUCTION

1.1 Overview

The emerging oil and gas sector in Guyana requires facilities to be developed to support the activities of the sector, including facilities such as warehouses and laydown yards for the storage of materials. In response to this need Avocat Guyana Holdings Inc. (AGHI) proposes the development of a chemical storage facility and laydown yard at Lot “A” of Tract “Y”, Land of Canaan, East Bank Demerara.

1.2 Background to the EAMP

AGHI has submitted an application to the Environmental Protection Agency (EPA) for environmental authorisation for the construction and operation of the chemical warehouse and laydown yard at Land of Canaan. The EPA, after screening of the project, determined that AGHI should prepare an Environmental Assessment and Management Plan (EAMP) for submission to the EPA prior to the issuance of the environmental authorisation. In this regard, this EAMP was prepared to satisfy the EPA’s requirement for the issuance of the environmental authorisation.

1.3 Objectives and Scope of the EAMP

The EAMP aims at identifying potential environmental, social, health and safety risks associated with the construction and operation phases of the project, and developing recommendations to mitigate and manage such risks. The general objective of the EAMP is to ensure that the potential environmental, social, health and safety impacts of the activities of the project are identified, evaluated and addressed as part of the project’s design phase, and measures are implemented during the construction and operation phases to mitigate negative environmental, social, health and safety impacts.

The EAMP outlines practical measures to address all the potential impacts of the project on the physical, biological and socio-economic environment. Measures included are geared towards avoiding, preventing and minimizing the negative impacts to enhance the positive impacts. The EAMP concentrates on the environmental and social components of the project, but many of the activities also involve elements of occupational health and safety which are integrated, as far as is necessary, with environmental management. As such, these areas were also addressed where relevant. The EAMP also includes a detailed Emergency Response Plan and Monitoring Plan. In addition, the ESMP provides a description of the project and the project environment, the institutional and legislative framework within which it would have to be implemented and details of consultations with the relevant stakeholders.

The key tasks undertaken in the preparation of the EAMP include:

- Collecting and assembling relevant baseline information on the project area including its soils, hydrology, climate, water quality, air quality, and biological and social environment.
- Assessing the regulatory and institutional framework for the project. This included identifying the relevant national policies, legislation, standards and guidelines that define the implementation framework of the project, as well as the responsible institutions.
- Reviewing project information and other relevant documentation to compile a project description.

- Identifying, as far as is possible, and assessing the environmental impacts of both the construction and operation phases of the institute. An Impacts Prediction Matrix is utilized to identify whether impacts are positive or negative, localised or extensive, short- or long-term, or direct or indirect. Impacts are also assessed to determine significance and likelihood. The main potential environmental impacts examined relate but are not be limited to: soils, water resources, noise and dust nuisance, biological resources, land use and land tenure, public health and workers safety, and waste generation and management.
- Identifying and assessing, for impacts which cannot be avoided, practical and cost-effective mitigation measures to minimise these impacts.
- Preparing an Environmental Management Plan (EMP) that recommends measures to prevent or reduce adverse impacts to acceptable levels, including plans for monitoring and contingency and emergency response. This covers both the construction and operation phases of the project.
- Preparing an implementation framework for the EMP including outlining roles and responsibilities, schedule, contractor plans, monitoring and reporting requirements, grievances mechanism, training, etc.

1.4 Approach and Methodology

AHGI commissioned a multi-disciplinary team comprising of various expertise to prepare this EAMP. The EAMP was prepared in accordance to the EPA Guidelines for the preparation of EAMPs. The EAMP was prepared during the period of August 2022 to November 2022 and revised in April 2023 based on feedback provided by the EPA.

The EAMP is intended to be a working document and will be updated from time to time, based on any changes relating to the project that may have occurred, or any evaluation done on the effectiveness of the mitigation measures.

During the initial phase of the preparation of the EAMP the following was done to gain an in depth understanding of the project and the project environment:

- Meetings between company personnel and the consultants to discuss the proposed project and collect project related information. These discussions continued throughout the EAMP preparation process.
- Review all project related information to gain a clear understanding of the project and to determine the scope and magnitude of project activities. Some amount of existing data and literature relevant to the type of project and the project environment also exist and were therefore reviewed.
- Conducted an initial visit to the project area to understand the project area and footprint. Site visits to the project site continued throughout the process so as to gain a better understanding of the project, the existing condition of the area and to assess the physical, biological and social conditions. These visits were beneficial in determining the characteristics of the project environment, which in turn assisted in the categorisation of all physical, environmental and biological impacts. It is important to note that these visits were instrumental to the process since

they allowed for critical ground-truthing, which provided useful information, and also validated information obtained from literature reviews.

- Determined the project's Area of Influence. This is described in Chapter 6.

A project description was also compiled, and a review of the policy, legislative and institutional framework relevant to the project was done. This includes pertinent national policies and plans, regulations, standards, and the institutions which will have some oversight of the project. Thereafter, the preparation of the EAMP was done in three phases as follows:

1. Establishing the Baseline Conditions
2. Impact Determination
3. Environmental Management and Mitigation Planning.

Establishing the Baseline Conditions

This phase comprised the following:

1. A description of the project environment was compiled. This required the collection primary and secondary data on the physical, biological and socio-economic environment.
 - Primary data was collected as part of the field work at the project site and include water quality analyses, noise measurement, air quality analysis, and a rapid biodiversity assessment. It also included collection of socioeconomic data such as on land uses, population, etc. The methodology utilized for the collection of primary data is further described under the respective sections of Chapter 3.
 - Secondary data was obtained from existing sources such as reports relating to the project area. This include weather data obtained by the Hydrometeorological Department and population data from the Bureau of Statistics.
2. Consultations with stakeholders was also done including with relevant institutions, and the surrounding community. Engagements were done through structured interviews with institutions, as well as residents and commercial entities within the community. Record of these consultations, including persons/institutions engaged and issues raised and recommendations provided are included in the document. Prior to the stakeholders' consultations the stakeholders relevant to the project were identified and categorised. The methodology utilized for the stakeholders' engagement and the feedback provided are outlined in Chapter 5.

Review of Data and Impact Analysis

Once the project and the project environment, along with the regulatory requirements and stakeholders concerns were understood, the impact prediction and assessment was conducted. The potential environmental and social effects and impacts were assessed utilising an impact assessment matrix. The matrix was used to predict the significance of the impacts by establishing the interactions between the proposed project activities and the characteristics of the existing environment and within the effective area of direct and indirect influence. The full range of potential impacts were examined using these

qualitative assessments to identify and recommend appropriate and adequate mitigation and management measures.

Mitigation and Management Planning

Once the potential physical, biological and social impacts were known and understood, mitigation and management planning commenced. During this phase the following were done:

1. Feasible and practical measures were identified and recommended to reduce and mitigate the potential negative impacts of the project, as well as, maximise the expected positive impacts. These were compiled into an Environmental Management Plan.
2. Measures for emergency preparedness and response were outlined.
3. A Monitoring Plan was prepared outlining the social and environmental parameters to be monitored during project implementation.

1.5 Organisation of the EAMP

The EAMP is outlined in a number of Chapters, as summarized below:

- **Chapter One** – provides an introduction and background to the project and the EAMP
- **Chapter Two** – provides a description of the company and the project
- **Chapter Three** – provides a description of the project environment
- **Chapter Four** – provides a description of the national policies relevant to the project, the various legislation the project will have to comply with, and the regulatory bodies which will have oversight of the activities
- **Chapter Five** – documents the findings of the stakeholders' consultations, including the interviews conducted with institutions consultations with residents and commercial entities within the communities
- **Chapter Six** – identifies and discuss the potential impacts of the project on the physical, biological and sociological environments
- **Chapter Seven** – outlines practical measures to prevent and manage potential adverse impacts
- **Chapter Eight** – presents an Environmental Management and Monitoring Framework
- **Chapter Nine** – presents an Emergency Preparedness and Response Plan

2.0 COMPANY AND PROJECT DESCRIPTION

2.1 Company Description

AGHI is collaborating with Guyana Logistics and Support Services Inc. (GLASS) to construct and operate the chemical warehouse facility and laydown yard. The project is being executed through a joint venture arrangement between AGHI and GLASS, whereby AGHI is the owner of the facility and GLASS, is the intended operator. In this regard, a Memorandum of Understanding (MOU) was established on November 01, 2021 between the two parties for the sole purpose of developing a mutually beneficial, cooperative and productive relationship for the development of a chemical storage facility and laydown yard at the parcel of land located at Lot “a” of Tract “Y”, Land of Canaan, East Bank Demerara. A copy of the MOU is presented in Appendix A. In the agreement, GLASS proposes to lease the facility and sub-let to prospective clients, prior to its construction, while operating a logistic base for the potential client.

2.1.1 Overview of AGHI

AGHI is a privately owned company that is duly incorporated under the Companies Act of Guyana No. 29:1991, with its registered office located at Lot 1 Croal Street, Stabroek, Georgetown, Guyana. The Company was incorporated in Guyana on April 02, 2019 and is wholly owned by its two main principals Malcolm A. Dookharan, and Monica A. Dookharan. A copy of the AGHI Company’s registration can be found in Appendix B.

The firm’s main business is in real estate development, which has been one of its core businesses in Trinidad and Tobago for over twenty years. As such, the development of lands for extending its rental portfolio, both industrial and residential, is core to the intended success of AGHI in Guyana’s transforming landscape.

2.1.2 Overview of GLASS

GLASS is the only full-service, one-stop logistics company that has been successfully servicing the emerging oil and gas sector in Guyana since 2011. The company provides all service needs through its long-term relationships with local providers who have the experience and knowledge of local business procedures. GLASS service model specially targets the needs of international companies conducting business in Guyana. Services provided include logistics, equipment rental, procurement, recruitment, custom brokerage, relocation and domestic support, office and residential rental, and support services to foreign clients operating, or looking to do business, in Guyana. The company primarily works with expatriate companies working specifically for the oil, gas and mining sectors. Table 2-1 provides more information on the key elements of GLASS.

Table 2-1: Key Elements of GLASS

Key Elements of GLASS	
Vision Statement	<ul style="list-style-type: none">To be a premier provider of logistics and support services in the region.
Mission Statement	<ul style="list-style-type: none">To provide customized services and logistics solutions by connecting our network of suppliers, partners and clients.

Objectives	<ul style="list-style-type: none"> • To maintain the ISO 9001: 2015 Certificate and to continually identify ways how to improve the system; • To ensure customers are satisfied with our performances in the delivery of our services; and • To ensure our employees are in a safe and comfortable working environment.
Values	<ul style="list-style-type: none"> • Integrity - Honesty and transparency are at the heart of everything we do. We hold ourselves to the highest moral and ethical standards. We always live up to our commitments: our word is our bond. • People Matter - Humility, empathy and respect are cornerstones of our culture. We extend this to all as we build deep and meaningful relationships and prioritize continuous learning and personal growth. • Quality, Health & Safety - Managing potential hazards and risks and achieving operational excellence are critical to our mission. We provide safe workplaces and ensure standardized processes are followed. • Ingenuity - Flexibility, creativity, and innovation drive us. We excel at creating bespoke solutions designed to exceed the needs of our clients. • Collaboration - The success of our clients is the driving force behind everything we do. We believe in building mutually rewarding and lasting relationships with our suppliers, customers, employees, and members of our community. • Environment - We endeavor to operate in a manner that protects the environment and preserves natural resources. We strive to exceed expectations by managing risk, preventing pollution, and adopting established best practices.

2.2 Company Policies

2.2.1 AGHI Health, Safety and Environmental Policy Statement

AGHI’s environmental policy is outlined below. In executing the Project AGHI will:

- I. Take all reasonable and economically feasible measures to protect the environment during the execution of construction works, and also during the post-construction/operational period.
- II. Ensure all personnel onsite directly involved with the project comply with the recommended management and mitigation requirements stipulated in the Environmental Assessment Management Plan (EAMP).
- III. Ensure that employees, partners and sub-partners understand their responsibility with regard to prudent environmentally friendly management practices.

- IV. Comply with national legislations related to the protection of the environment and social welfare, health and safety as well as management of natural resources within the area of direct influence of the project.
- V. Take all reasonable measures to protect the Health and Safety of the Public, road users and affected residents.

2.2.2 GLASS Environmental and Health and Safety Policy

GLASS has developed and established both an Environmental and a Health and Safety Policies. The Environmental Policy, which can be found in Appendix C, focuses on the company's commitment to providing quality services in a manner that ensures a safe and healthy workplace for its employees, while minimizing its potential impact on the environment. The policy also notes GLASS commitment to operate in compliance with all relevant environmental legislation and its willingness in striving to use pollution prevention and environmental best practices in all its operations.

The Company's Health and Safety Policy, which can be found in Appendix C, focuses on its continued commitment of holding the health, safety and security of its employees, stakeholders and the environment in which it operates as the most important elements of the organization, while outlining the Company's commitment to Health and Safety.

2.3 Organisational Structure

An organizational chart for the project has not yet been developed. However, the organizational chart for GLASS, who will be operating the facility, is presented in Figure 2-1.

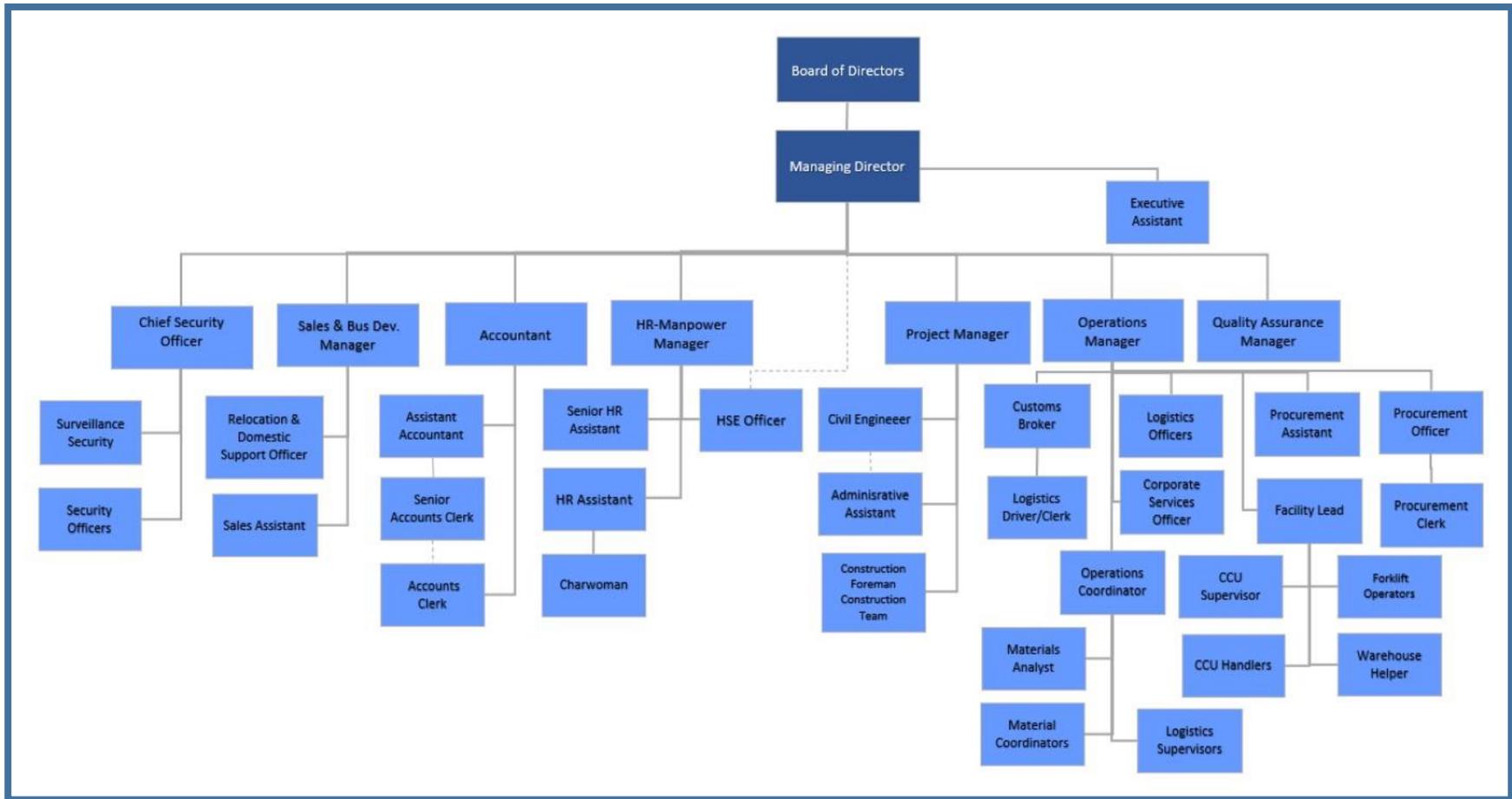


Figure 2-1: GLASS's Organizational Chart

2.4 Project Justification

In 2015, Guyana became a subject of interest among the oil industry operators. After decades of the receiving an exploration license in the Stabroek Block, Exxon Mobil announced the discovery of prolific oil reservoirs within the Block. The discovery of hydrocarbons in the Liza 1 field, qualified as the biggest discovery that year in the world, placed the country on the map of this industry, and attracted the attention of other operators interested in business opportunities in the new oil producing nation. Since then, additional discoveries has opened up the possibility of Guyana becoming a major oil producer and using that wealth as a basis to boost the economic development of the country. However, to facilitate the development of the new oil and gas sector and to rapidly increase petroleum production Guyana requires investments in local infrastructure to adequately provide shore base services to offshore oil and gas operators. Additionally, the birth of the local content policy and the Government's drive for offshore oil and gas operators to utilize supply bases in Guyana instead of overseas firmly justify the importance of the project. As such, AGHI, in partnership with GLASS, intends to construct and operate a chemical warehouse facility to service Guyana's offshore energy projects.

2.5 Capital Investment and Lifespan

The project site is divided into four blocks. The first phase of the project will be located on Block 1. The project's capital investment is estimated at approximately US\$4.0 million for this Block. There is the possibility of the project being replicated/expanded on the three additional blocks within the property. Once all the blocks are in full operation, the project is expected to service Guyana's offshore energy projects in excess of twenty (20) years or as long as contracts are retained.

2.6 Project Timelines

Once all approvals have been granted and AGHI has been given the green light to commence construction, the Company will commence with Block 1. This Block is estimated to take approximately two (2) years to be developed.

2.7 Workforce

During the construction phase, the project is expected to provide employment for a minimum of seventy local workers who would preferably be taken from communities within proximity to the project area. Once the operational phase commences, an estimated thirty to forty persons from Guyana are expected to be employed on a full-time basis.

2.8 Project Location

The chemical warehouse facility and laydown yard will be constructed on 9.825 acres (3.976 Hectares) of land located at Lot "a" of Tract "Y", Land of Canaan, East Bank Demerara, Region 4. The project area has a relatively flat terrain with a mild slope from the East Bank Demerara Public Road to the Demerara River and is bounded on the north by a drainage canal, which separates it from the Baker Hughes Guyana Supercenter, on the east, by the East Bank Demerara Public Road, on the south by Tripple D's Inc. and the west by the Demerara River.

The project area sites ideally between two mega companies, including the Baker Hughes Guyana Supercenter to the north and Triple D's Inc. to the south, both of which are positioned to provide oilfield services and equipment for Guyana's budding petroleum sector.

A major factor in the choice of location is the site adjacent to the Demerara River, which will facilitate river access that would allow the transition of products and supplies back and forth to the offshore operations, thus eliminating the need for road transportation and for a safer, cleaner and efficient operation since it will eliminate the risks associated with road transportation. However, the current phase of the project does not include the development of the property's waterfront.

Figure 2-2 provides shows the general location of the project area.

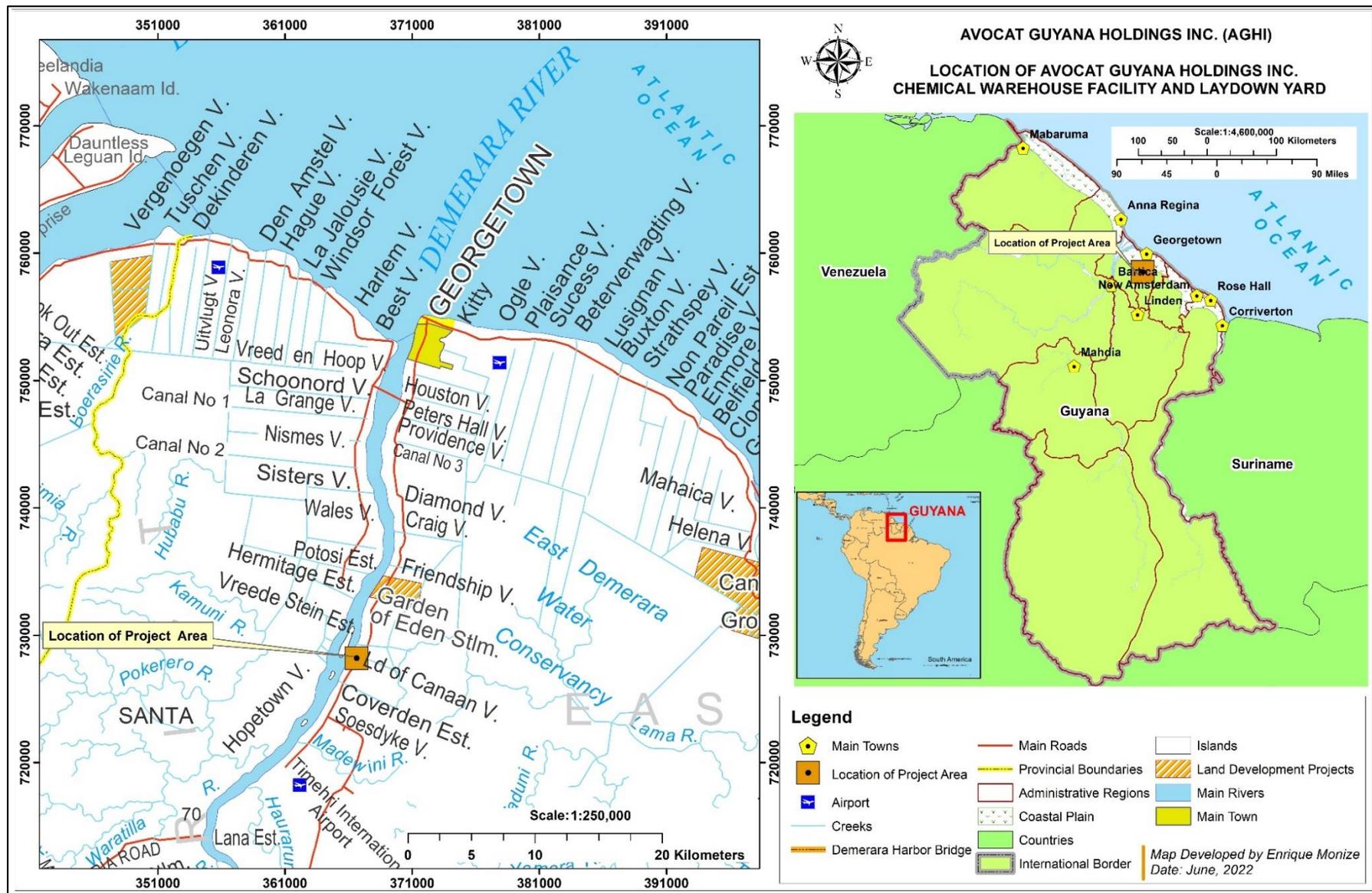


Figure 2-2: Location of AGHI Project Area

2.9 Project Components

With work in Guyana's oil and gas sector progressing rapidly, AGHI and GLASS are positioning themselves to benefit from the opportunities ahead through the construction and operation of the chemical warehouse facility and laydown yard. Construction and operation will commence on Block 1 of the property, with the intention for each of the remaining three blocks to mirror the exact facilities and operation in the near future. Commencement of works on the other three blocks will be done asynchronously or concurrently (based on demand), with each block taking about two years to be developed, as the Company plans to grow with Guyana throughout the "lifecycle" of its oil and gas resources. Each block will occupy approximately 2.46 acres (9,940 m²) of land within the property.

The first phase will occur on Block 1, which will be developed to store approximately 1,000,000 gallons of specialty and commodity chemicals and would consist of the following infrastructure:

- Internal Access Road
- A chemical storage warehouse of approximately 11,700 ft² or 1,087 m²;
- Two chemical containment pads of approximately 16,800 ft² or 1,560.8 m²
- A laydown yard of approximately 16,020.95 ft² or 1,488.4 m²
- Prefab container offices
- Prefab container unit for Quality Assurance and Quality Control (QA/QC)
- Two prefab container storage units

The project site will include additional supporting infrastructure which will include:

- A generator and housing unit
- Fuel storage area
- Security building
- Security fencing
- Internal path network
- Drainage
- Site septic system installation
- Site water supply
- Motor Control Center and electrical requirement
- Fire water supply
- Safety Requirements

The layout of this facility is presented in Figure 2-3.

AGHI has commenced the land development whereby the land was cleared and grub stripped of vegetation, topsoil and loose clays. The land was then backfilled with a clean layer of sand to an approximate height of 26 inches. Further development would include capping the sand with a minimum of 9 inches of loam. This will be followed with a layer of geotextile, which will be covered by a layer of clean loose sand of a minimum height of at least an inch. The geotextile/sand layer is used to prevent the liner from being punctured from underneath and allow the liner to move. A non-permeable layer HDPE liner will be welded in place followed by a layer of clean sand of about 6 inches thick. Another layer of geotextile will then be placed over the sand filled so as to prevent the HDPE liner from being punctured

from the top. This layer of geotextile will then be capped with 8 inches to 12 inches of crushed gravel, depending on strength requirements.

Due to the fact that the HDPE liner is impermeable and will not allow water to infiltrate, the finished level of the ground will carry a slope from the middle to the north and south sides of the property so as to allow for proper drainage of stormwater, which will be collected along both sides via reinforced concrete curb and slipper drains leading to an external concrete drain that is connected to a northern canal running parallel to the property.

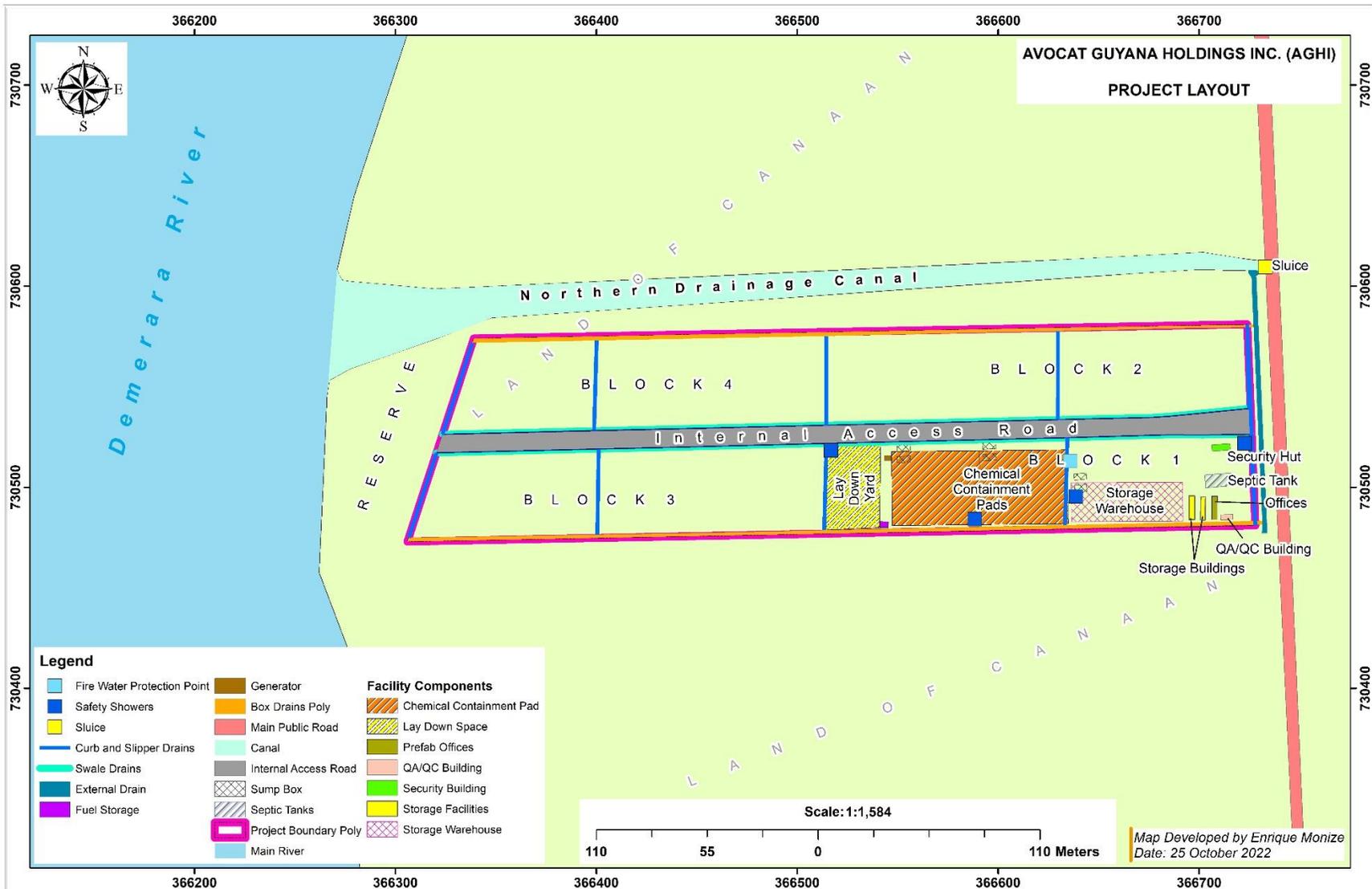


Figure 2-3: Layout of Facility

2.9.1 Internal Access Road

An internal concrete road will be constructed from the main road to the end of Block 1. This road will continue further to the end of the property once the project expands and the other three blocks are developed. The road will be approximately 200 meters long (to the end of Block 1) and approximately 10 meters wide.

2.9.2 Chemical Storage Warehouse

The project will see the initial construction of a 180ft x 65ft chemical storage warehouse, covering an approximate area of 11,700 ft² or 1,087 m² within the confines of Block 1. The structure will comprise of reinforced concrete piles and pile caps for the foundation, with reinforced, double mesh, concrete ground slabs of 20 cm thickness. Grounding system details will be confirmed upon receipt of site geotechnical survey report. The curbed area will comprise four sides and sloped to form a containment sufficient in height to contain spills, if such an event is to occur. In this case, the contained volume will be 110% of the combined capacity of the largest primary vessels. The covered area will be sloped in two directions to a grated 4ft x 4ft x 2ft deep sump. Drains will have shut-off valves to isolate in the event of chemical spill.

The framing of the structure will be constructed out of carbon steel columns and beams painted with epoxy primer and epoxy paint to withstand the highest level of exposure to salt air. Roof sheeting and side cladding will consist of Chromadeck or equivalent factory-painted sheets. Side cladding will only be provided on three sides of the structure, the back, the east and west sides, while the front will be opened. A 2 meter wide roof overhand will be included on the open side i.e. the front of the structure. Translucent sheeting will be included inside the cladding to provide direct sunlight. Rainwater gutter and downpipes will be installed along the slope end of the roof and channeled into storm drains.

Once operation commences, the storage warehouse will be sectionalized and properly demarcated for the storage and separation of various oil and gas tools, equipment, spare parts, electronics parts and maintenance consumables. The warehouse will also be used for the storage of dry chemicals in small quantities. Internal signage, smoke detectors, fire alarms, lighting and other safety measures will be installed to specification.

2.9.3 Chemical Containment Pads

In addition to the storage warehouse, the facility will have two chemical containment pads measuring 140 ft x 120 ft each, occupying a total area of approximately 33,600 ft² or 3120 m². These containment pads will have a sand filled base followed by double plastic lining. The surface will be of reinforced concrete. Each pad will contain bun walls constructed out of reinforced concrete for containment purposes. Like the storage warehouse, grounding system details will be confirmed upon receipt of site geotechnical survey. The curbed area will comprise four sides and sloped to form a containment sufficient in height to contain spills, if such an event is to occur. In this case, the contained volume will be 110% of the combined capacity of the largest primary vessels, plus a 24-hour rainfall event. The covered area will be sloped in two directions to a grated 4 ft x 4ft x 2 ft deep sump. Drains will have shut-off valves to isolate in the event of a chemical spill.

These pads will be used mainly for the storage of oil and gas chemicals, both liquid and dry, which will be contained in highly secured reinforced tanks of various sizes and description. Chemicals stored on these

pads will be separated based on types and characteristics and will contain different packaging presentations including the following:

- 55 Gal metal and plastic drums
- 275 Gal Plastic IBC with Metal cage
- 5 Gal Plastic Pail
- 25 Kilogram Sacks
- 50 Pound Sacks
- 1 Ton Big Bags
- 1.5 Ton Big Bags

2.9.4 Laydown Yard

The facility laydown yard will be approximately 148 ft x 107 ft, covering an area of approximately 15,943 ft² or 1,481.15 m². This area will be prepared with a sand-filled base course covered with a wearing course of ¾ inch aggregate.

The main purpose of this area will be for the storage of Cargo Carry Units (CCUs). These are structural units designed for repeated use in the transport of goods and equipment to the shore-based operations. It is important to note that all CCUs returning back to the facility will be returned empty and clean of all potential residues. The cleaning of these containers will be the sole responsibility of the client receiving them full. The laydown yard will also be used for the storage of large oil and gas equipment such as pumps, coil tubing, wheels, engines etc.

2.9.5 Prefab Container Offices

Administrative functions will be conducted within a modified 40-foot high cube shipping container of size 8 ft width x 40 ft length x 9 ft height. The container will contain an approximate space of 320 ft² or 29.7 m² which will be divided into sub-offices.

2.9.6 Quality Assurance and Quality Control (QA/QC)

The QA/QC building will be similar to that of the administrative/offices whereby a modified 40-foot high cube shipping container of the same dimension will be utilised.

2.9.7 Storage Building

Two modified 40-foot high cube shipping containers of the same dimensions will also be used for this purpose. These storages will be used mainly for hand tools and other miscellaneous janitorial items needed for the daily functioning and maintenance of the facility.

2.9.8 Generator and Housing Unit

A small 10ft x 10ft concrete building will be constructed between the laydown yard and the chemical containment pads for the purpose of housing a generator, which will be used to power the facility during power outages. This room will contain a compacted sand filled base followed by a plastic lining and reinforced concrete. Hollow blocks will be used for walls and Chromadeck or equivalent factory-painted sheets will be used for the roof. The building will also be equipped with guttering. A towable (trailer and

skid mounted), diesel liquid cooled generator will be used, however the capacity/kVA will be determined by the client based on their required specifications.

2.9.9 Fuel Storage Area

The quantity of fuel to be stored onsite is to be determined by the client renting of the facility. However, an area between the laydown yard and the chemical containment pads will be developed for fuel storage. This area will be comprised of a compact sand filled base covered with a layer of plastic lining and reinforced concrete. Bund walls constructed out of reinforced concrete will be constructed for containment purposes. In this case, the contained volume will be 110% of the capacity of a 2,000 litres above ground storage tank (double-wall), plus a 24-hour rainfall event. The containment area will be equipped with a shutoff valve for drainage purposes.

2.9.10 Security Hut

The facility will be equipped with a security outpost located at the entrance of the compound. A modified 20-foot high cube shipping container of size 8ft width x 20 ft length x 9 ft height will also be used.

2.9.11 Security Fencing

The entire property will be secured via a solid concrete fence.

2.9.12 Internal Path Network

A network of paths will be constructed between the various components of the facility. These paths will be of varying sizes with paved surfaces.

2.9.13 Drainage

The proposed drainage system for the site comprises the following:

- Reinforced concrete swale drains along the internal road (these drain into the curb and slipper drains)
- Reinforced concrete curb and slipper drains which run along the fence lines between adjacent blocks (and drain into the main box drains)
- Reinforced concrete box drains (which transport water either to the Demerara River to the west or to the main drain to the north)

The containment pads and storage warehouse will be built with bund walls to contain any spills. The bunds will be sized to contain a minimum of 110% of the largest tank or container in accordance with the NFPA 30: Flammable and Combustible Liquids Code¹. Inside the containment pads and storage warehouse will be sump boxes which are connected to external sump boxes. Any effluent contained in the sump boxes will be tested for contamination. If contaminated a qualified and competent hazardous waste disposal contractor would be used to collect and dispose the effluent. If there is no contamination the effluent will be discharged into the storm water drains.

¹ NFPA 30, Flammable and Combustible Liquids Code is published by the US National Fire Protection Association to provide safeguards to reduce the hazards associated with the storage, handling and use of flammable and combustible liquids.

2.9.14 Site Septic System Installation

On-site permanent septic systems equipped with soak-aways to handle sewage waste and black water will be installed. Sewage system for the facility will consist of the installation of a sewage treatment unit designed for a maximum of 50 persons. All septic systems are to be built to meet the Guyana National Bureau of Standards Code of Practice for Septic Tanks and Associated Treatment Facilities.

2.9.15 Site Water Supply

Water supply to the project site is expected to be provided by the Guyana Water Inc. (GWI). This will be complimented by a 5,000-gallon potable water tank elevated for providing water pressure. This will be supported by several other tanks so as to provide a regular supply of water to critical components of the facility such as the safety showers, office and QA/QC trailers. The possibility of drilling a water well on site will also be explored.

2.9.16 Fire Water

A fire response pump will be provided at the project site within proximity to the storage warehouse and the chemical storage pads. This is to be used during fire emergencies so as to contain fires that are small and manageable in nature.

2.9.17 Safety Showers

The facility will be equipped with up to four safety showers, two on either end of the yard and one each within the chemical storage areas. Piping will be PCVC if above ground and PVC below ground. Each safety shower will be equipped with a removable wastewater collection tank, which will be emptied, once filled, by an approved hazardous waste management company for safe disposal.

Showers will be located within 25 feet of each storage area. Eyewash stations will also be installed and functional in each shower area. Instructions for activating the shower and eyewash will be clearly posted and all personnel will be trained to use these facilities. As noted, both the shower and the eyewash station will be ideally be located next to each other, since incidents involving facial splashes are likely to involve other part of the body as well. The eyewash water supply will provide 0.4 gallons/minute of water at <25 psi to flood the eyes and face with potable, aerated, water for at least 15 minutes. The design of the eyewash will include two nozzles facing upward and aimed slightly inward. The water supply will run until it is turned off. Deluge showers will be able to deliver 50-60 gallons of water at one time.

Valves on eyewash and safety showers will be easily turned on within a second and designed so that the water flow stays on without requiring the operator to keep it on. Ideally, the water temperature should be at 90-95 degrees F (32- 35°C) but not over 100°F.

2.9.18 Motor Control Center and Electrical Requirement

Motor Control Center (MCC) and electrical requirement to be installed would include the following:

- A 480 V, 3 phase power and starters for up to 15 pumps;
- A transformer to step power down to 120/240 volts;

- Enough 110 V single phase power (transformer) for the buildings, lights, controls, etc.;
- Should be sized for ~ 20% expansion;
- Power requirements to start; and
- Configured to accept generator power to run electric pumps, lab, office and changing room.

2.10 Operation

Various specialty and commodity chemicals will be stored at the facility.

2.10.1 Chemicals and Storage

2.10.1.1 Classes of Chemicals to be Stored

The facility will be used for the purpose of storing chemicals, both liquid and dry, which will be supplied to the offshore oil and gas operations. The classes of chemicals that are expected to be stored at the facility include:

1. Asphaltene Inhibitor
2. Corrosion inhibitor
3. Biocide
4. Hydrate Inhibitor
5. Demulsifier
6. Chlorine Scavenger
7. Defoamer
8. Hydrate Inhibitor

Characteristics of each class of chemicals to be stored at the facility can be observed in Table 2-2:

Table 2-2: Characteristics of Chemical Classes to be Stored at the Facility

Chemical	Component	Properties	Potential Impact	Storage
Asphaltene Inhibitor	<ol style="list-style-type: none"> 1. Xylene 2. Kerosene 3. Ethylbenzene 4. Isopropanol 5. Toluene 6. Diethylenetriamine 	<p>A chemical used in the oil and gas industry to remove asphaltenes from crude oil. Asphaltenes are the impurities found in crude oil that if not removed can choke refining equipment. Heavy crude oil contains solid asphaltene deposits during the production stage which must be removed.</p>	<p>This product has no known ecotoxicological effects. Highly flammable liquid and vapor. May be fatal if swallowed and enters airways. Causes skin irritation. May cause an allergic skin reaction. Causes serious eye damage. May cause respiratory irritation. May</p>	<p>Store in cool, dry ventilated area away from acids, alkalis, and open flames. Keep in original container or a properly labeled and approved alternative made from compatible material.</p>

Chemical	Component	Properties	Potential Impact	Storage
			cause drowsiness or dizziness. Suspected of causing cancer. Suspected of damaging fertility or the unborn child. May cause damage to organs through prolonged or repeated exposure.	
Corrosion Inhibitor	<ol style="list-style-type: none"> 1. Carbon dioxide 2. Hydrocarbons, C10-C12, Isoalkanes, less than 2% aromatics 3. Propanol 4. Ethanol; ethyl alcohol 5. Benzene, mono-C10-13 alkyl derivs, disulfonated 6. (Z)-N-methyl-N-(1-oxo-9-octadecenyl) glycine 7. Methanol 8. 1H-Imidazole-1-ethanol, 2-(8-heptadecenyl)-4,5-dihydro 	Corrosion inhibitors are the first line of defense against corrosion. In oil and gas fields and production systems, they mitigate the risk of corrosion caused by CO ₂ , H ₂ S, organic acids, and more, addressing localized, under deposit, galvanic, and other forms of corrosion that can lead to equipment failures.	A stable compound with no hazardous reactions if used for its intended purpose. However, hazardous to the aquatic environment, chronic category 2 Toxic to aquatic life with long lasting effects. Substance not rapidly degraded.	Stored in sealed containers. Protect from sunlight. Store in a well-ventilated place. Do not expose to temperatures exceeding 50°C/122°F
Biocide	<ol style="list-style-type: none"> 1. Sodium hydroxide 	Biocides are one of the most common chemicals that are outsourced by many oil and gas companies. Biocides are used in the offshore oil and gas industry to maximize production by protecting assets through the inhibition of microbial induced biofilm and corrosion. It is used in small amounts to control the growth of bacteria and their harmful organisms in the wellbore.	May causes severe skin burns and eye damage. May cause an allergic skin reaction. May cause respiratory irritation. Very toxic to aquatic life. No evidence of carcinogenic effects.	Store in cool, dry ventilated area.
Hydrate Inhibitor	<ol style="list-style-type: none"> 1. Water 2. Pentasodium Diethylenetriaminepentaacetate 	Hydrate inhibitors are used to lower the hydrate formation temperature of the gas. Hydrate inhibitors help avoid	Trisodium Nitrilotriacetate: At levels present in product, trisodium	Store in cool, dry, ventilated area away from sources of heat

Chemical	Component	Properties	Potential Impact	Storage
	<ol style="list-style-type: none"> 3. Sodium Glycolate 4. Sodium Hydroxide 5. Trisodium Nitrilotriacetate 	<p>problems due to hydrate formation such as hydrate plugs and line blockages. Methanol and ethylene glycol are the most commonly used inhibitors.</p>	<p>salt of nitrilotriacetic acid does not pose any known risk to human health. This mixture contains a very small amount of trisodium salt of nitrilotriacetic acid. Formaldehyde is classified as a human carcinogen.</p>	<p>and incompatibilities. Not to be stored in aluminum, carbon steel, copper, copper alloys, zinc or nickel containers.</p>
Demulsifier	<ol style="list-style-type: none"> 1. 2-Ethylhexanol 2. Naphthalene 3. Naphtha (petroleum), Heavy aromatic 4. 1,2,4-Trimethylbenzene 5. Kerosene 6. Ethylbenzene 	<p>It is used to separate crude oil, from water. Due to a number of factors involved in the production process, oil and water are liable to mix, creating an emulsion. This is an undesirable situation because when crude oil is refined, the oil should be as dry as possible. Water will damage the refinery, induce corrosion and reduce the efficiency of the crude oil distillation process.</p>	<p>Not reactive under normal conditions. Stable under recommended storage conditions. Toxic to aquatic life with long lasting effects. Toxicity to fish and some aquatic invertebrates after 48-96 hours exposure.</p>	<p>Keep away from heat and sources of ignition. Keep in a cool, well-ventilated place. Keep away from oxidizing agents. Suitable material for storage container includes Stainless Steel 304, Stainless Steel 316L, Carbon Steel C1018, Aluminum, Brass, Copper, Hastelloy C-276, PTFE, Surface fluorinated polyethylene, Fluoroelastomer, Perfluoroelastomer,</p>
Chlorine Scavenger	<ol style="list-style-type: none"> 1. Sulfur Dioxide 2. Sodium Bisulfite 	<p>Reacts with chlorine or with chlorine-generating materials, such as hypochlorite, to eliminate or reduce the bleaching activity and corrosion effect</p>	<p>This preparation or material is not expected to bioaccumulate.</p>	<p>The head space of containers containing this product may accumulate SO₂ is a toxic and irritating gas that can be hazardous if inhaled.</p>
Defoamer	<ol style="list-style-type: none"> 1. Kerosene 2. Naphthalene 	<p>Defoamer is required to counteract foam formation</p>	<p>Stable under normal conditions.</p>	<p>Not regarded as dangerous for the</p>

Chemical	Component	Properties	Potential Impact	Storage
	3. Ethylbenzene	while promoting degassing of fluids. Defoamers provide high cost efficiency.	Possibly carcinogenic to humans. Harmful to aquatic life with long lasting effects. Component substances have a potential to bioaccumulate.	environment. Does not contain any substances expected to be bioaccumulating.

Table 2-3 provides a detailed list of the chemicals to be stored at the facility, their quantities, storage containers, composition/ingredients, hazardous characteristics and Globally Harmonized System (GHS) Rating - (Health Hazard, Physical Hazard, and Environmental Hazard).

Table 2-3: List of and Description of Chemicals to be Stored at the Facility

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
1	ALDACID E G - 5 GAL CAN	5 Gallons Plastic Can	0.698s	0.698	LIQUID	Glutaraldehyde (Percent w/w: 10 - 30%), Methanol (Percent w/w: 0.1 - 1%)	Harmful if swallowed, Causes severe skin burns and eye damage, May cause an allergic skin reaction, Causes serious eye damage, Toxic if inhaled, May cause allergy or asthma symptoms or breathing difficulties if inhaled, May cause respiratory irritation, May damage fertility or the unborn child, Very toxic to aquatic life, Harmful to aquatic life with long lasting effects	Acute Oral Toxicity Category 4 - H302 Acute inhalation toxicity - vapor Category 2 - H331 Skin Corrosion / Irritation Category 1 B - H314 Serious Eye Damage/Irritation Category 1 - H318 Respiratory Sensitization Category 1 - H334 Skin Sensitization Category 1 - H317 Reproductive Toxicity Category 1B - H360 Specific Target Organ Toxicity - (Single Exposure) Category 3 - H335 Acute Aquatic Toxicity Category 1 - H400 Chronic Aquatic Toxicity Category 3 - H412

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
2	AQUAGE L - 50 LB BAG	50 Pounds Bag	2.4s	2.4	SOLID	Crystalline silica, quartz (Percent w/w: 1 - 5%)	May cause cancer by inhalation, May cause damage to organs through prolonged or repeated exposure if inhaled	Carcinogenicity Category 1A - H350 Specific Target Organ Toxicity - (Repeated Exposure) Category 2 - H373
3	BARABLE ND-665 - 50 LB BAG	50 Pounds Bag	1.51s	1.51	SOLID	Calcium oxide (Percent w/w: 30 - 60%), Crystalline silica, quartz (Percent w/w: 0.1 - 1%)	Causes skin irritation, Causes serious eye damage, May cause respiratory irritation, May cause cancer	Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H318 Carcinogenicity Category 1A - H350 Specific Target Organ Toxicity - (Single Exposure) Category 3 - H335
4	BARABLE ND-657 - 50 LB BAG	50 Pounds Bag	0.22s	0.22	SOLID	Crystalline silica, quartz (Percent w/w: 0.1 - 1%)	May cause cancer by inhalation	Carcinogenicity Category 1A - H350
5	BARABRI NE DEFOAM - 5 GAL CAN	5 Gallons Plastic Can	0.55s	0.55	SOLID	Tributyl phosphate (Percent w/w: 30 - 60%)	Causes skin irritation, Suspected of causing cancer, May cause damage to organs through prolonged or	Skin Corrosion / Irritation Category 2 - H315 Carcinogenicity Category 2 - H351 Specific Target Organ Toxicity - (Repeated Exposure) Category 2 - H373 Acute Aquatic Toxicity Category

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
							repeated exposure, Toxic to aquatic life, Harmful to aquatic life with long lasting effects	2 - H401 Chronic Aquatic Toxicity Category 3 - H412
6	BARABUF - 25 KG BAG	25 Kilograms Bag	0.58s	0.58	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
7	BARACAR B 400 - 25 KG BAG	25 Kilograms Bag	0.5s	0.5	SOLID	Crystalline silica, quartz (Percent w/w: 0.1 - 1%)	May cause cancer by inhalation	Carcinogenicity Category 1A - H350
8	BARACAR B 400 - 50 LB BAG	50 Pounds Bag	0.56s	0.56	SOLID	Crystalline silica, quartz (Percent w/w: 0.1 - 1%)	May cause cancer by inhalation	Carcinogenicity Category 1A - H350

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
9	BARACAR B-DF 150 - 25 KG BAG	25 Kilograms Bag	9.53s	9.53	SOLID	Crystalline silica, quartz (Percent w/w: 0.1 - 1%)	May cause cancer by inhalation	Carcinogenicity Category 1A - H350
10	BARACAR B-DF 25 - 25 KG BAG	25 Kilograms Bag	3.35s	3.35	SOLID	Crystalline silica, quartz (Percent w/w: 0.1 - 1%)	May cause cancer by inhalation	Carcinogenicity Category 1A - H350
11	BARACAR B-DF 5 - 25 KG BAG	25 Kilograms Bag	3.54s	3.54	SOLID	Crystalline silica, quartz (Percent w/w: 0.1 - 1%)	May cause cancer by inhalation	Carcinogenicity Category 1A - H350
12	BARACAR B-DF 50 - 25 KG BAG	25 Kilograms Bag	9.41s	9.41	SOLID	Crystalline silica, quartz (Percent w/w: 0.1 - 1%)	May cause cancer by inhalation	Carcinogenicity Category 1A - H350
13	BARACAR B-DF 600 - 25 KG BAG	25 Kilograms Bag	1.28s	1.28	SOLID	Crystalline silica, quartz (Percent w/w: 0.1 - 1%)	May cause cancer by inhalation	Carcinogenicity Category 1A - H350

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
14	BaraCor 100 - 198 KG DRUM	198 Kilograms Metal Drum	1.32s	1.32	LIQUID	Ethanol, 2,2'-oxybis-, reaction products with ammonia, morpholine derivatives residues (Percent w/w: 10 - 30%), Methanol (Percent w/w: 10 - 30%), Nitrilotriacetic acid, trisodium salt monohydrate (Percent w/w: 1 - 5%)	Flammable liquid and vapor, Harmful if swallowed, Harmful in contact with skin, Causes skin irritation, May cause an allergic skin reaction, Causes serious eye damage, Harmful if inhaled, Suspected of causing cancer, Causes damage to organs	Acute Oral Toxicity Category 4 - H302 Acute toxicity - Dermal Category 4 - H312 Acute inhalation toxicity - vapor Category 4 - H332 Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H318 Skin Sensitization Category 1 - H317 Carcinogenicity Category 2 - H351 Specific Target Organ Toxicity - (Single Exposure) Category 1 - H370 Flammable liquids. Category 3 - H226
15	BARACOR 100 - 55 GAL DRUM	55 Gallons Plastic Drum	4.84s	4.84	LIQUID	Ethanol, 2,2'-oxybis-, reaction products with ammonia, morpholine derivatives residues (Percent w/w: 10 - 30%), Methanol (Percent w/w: 10 - 30%)	Flammable liquid and vapor, Harmful if swallowed, Harmful in contact with skin, Causes skin irritation, May cause an allergic skin reaction, Causes serious eye damage, Harmful if inhaled, Suspected of causing cancer, Causes damage to organs	Acute Oral Toxicity Category 4 - H302 Acute toxicity - Dermal Category 4 - H312 Acute inhalation toxicity - vapor Category 4 - H332 Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H318

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						- 30%), Nitrilotriacetic acid, trisodium salt monohydrate (Percent w/w: 1 - 5%)	serious eye damage, Harmful if inhaled, Suspected of causing cancer, Causes damage to organs	Skin Sensitization Category 1 - H317 Carcinogenicity Category 2 - H351 Specific Target Organ Toxicity - (Single Exposure) Category 1 - H370 Flammable liquids. Category 3 - H226
16	BARAFLC IE-513 - 25 KG BAG	25 Kilograms Bag	10.12s	10.12	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Combustible dust Combustible dust

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
17	BARAKLE AN - 55 GAL DRM	55 Gallons Plastic Drum	2.97s	2.97	LIQUID	Ethylene glycol monobutyl ether (Percent w/w: 5 - 10%), N,N-Diethylolcapramide (Percent w/w: 1 - 5%), Poly(oxy-1,2-ethandiyl), a-(nonylphenyl)-w-hydroxy (Percent w/w: 1 - 5%), Nitrilotriacetic acid, trisodium salt monohydrate (Percent w/w: 0.1 - 1%)	Causes skin irritation, Causes serious eye damage, Suspected of causing cancer, Harmful to aquatic life, Toxic to aquatic life with long lasting effects	Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H318 Carcinogenicity Category 2 - H351 Acute Aquatic Toxicity Category 3 - H402 Chronic Aquatic Toxicity Category 2 - H411
18	BARAKLE AN-648 - 1000 L IBC	1000 Liters Plastic IBC with Metal cage	2.13s	2.13	LIQUID	Ethylene glycol monobutyl ether (Percent w/w: 30 - 60%), Hydrotreated light petroleum distillate (Percent w/w: 30 - 60%), D-Glucopyranose, oligomeric, decyl octyl glycosides	Combustible liquid, Causes skin irritation, May cause an allergic skin reaction, Causes serious eye damage, Harmful if inhaled, May cause drowsiness or dizziness	Acute inhalation toxicity - dust/mist Category 4 Skin Corrosion/Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H318 Skin Sensitization Category 1 - H317 Specific Target Organ Toxicity - (Single Exposure) Category 3 - H336

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						(Percent w/w: 10 - 30%), Orange, sweet, extract (Percent w/w: 10 - 30%)		Flammable liquids - Category 4 - H227
19	BARAKLE AN-934 - 55 GAL DRUM	55 Gallons Metal Drum	26.18s	26.18	LIQUID	Alkanes, C10-14 Branched and Linear (Percent w/w: 30 - 60%): Glycol ether (Percent w/w: 10 - 30%), Alkylalcohol (Percent w/w: 5 - 10%), Glycol ether (Percent w/w: 5 - 10%)	Combustible liquid, May be fatal if swallowed and enters airways, Causes skin irritation, Causes serious eye damage	Aspiration Toxicity Category 1 - H304 Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H318 Flammable liquids - Category 4 - H227

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
20	BARALOC K 666 Coarse	2 Pounds Bag	0.011s	0.011	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
21	BARALOC K-666.F - 2 LB BAG	2 Pounds Bag	0.006s	0.006	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
22	BARALOC K-666.M - 2 LB BAG	2 Pounds Bag	0.012s	0.012	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
23	BARAVIS IE-489 - 25 KG BAG	25 Kilograms Bag	31.44s	31.44	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Non-Hazardous according to the criteria of the 3rd Revised Edition of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS), Non-Dangerous Goods according to the criteria of ADG

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
24	BARAZA N D PLUS - 25 KG BAG	25 Kilograms Bag	4.31s	4.31	SOLID	Xanthan gum (Percent w/w: 60 - 100%)	May form combustible dust concentrations in air	Combustible dust
25	BARITE - 1.5 BAG	1.5 Bag	416.75s	416.75	SOLID	Crystalline silica, quartz (Percent w/w: 1 - 5%)	May cause cancer by inhalation, Causes damage to organs through prolonged or repeated exposure if inhaled	Carcinogenicity Category 1A - H350 Specific Target Organ Toxicity - (Repeated Exposure) Category 1 - H372
26	BARITE ULTRA FINE - METRIC	1.5 Bag	908.25s	908.25	SOLID	Crystalline silica, quartz (Percent w/w: 1 - 5%)	May cause cancer by inhalation, Causes damage to organs through prolonged or repeated exposure if inhaled	Carcinogenicity Category 1A - H350 Specific Target Organ Toxicity - (Repeated Exposure) Category 1 - H372
27	BARITE ULTRA-FINE (D50=5-10)-1.5 MT BAG	1.5 Bag	69.91s	69.91	SOLID	Crystalline silica, quartz (Percent w/w: 1 - 5%)	May cause cancer by inhalation, Causes damage to organs through prolonged or repeated exposure if inhaled	Carcinogenicity Category 1A - H350 Specific Target Organ Toxicity - (Repeated Exposure) Category 1 - H372

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
28	BAROFIB RE O - 25 LB BAG	25 Pounds Bag	2.11s	2.11	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
29	BAROFIB RE® C	25 Kilograms Bag	0.5s	0.5	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
30	BDF-919 - 50 LB BAG	50 Pounds Bag	14.08s	14.08	SOLID	Crystalline silica, quartz (Percent w/w: 1 - 5%)	May cause cancer, Causes damage to organs through prolonged or repeated exposure	Carcinogenicity Category 1A - H350 Specific Target Organ Toxicity - (Repeated Exposure) Category 1 - H372
31	BENTONITE - 25 KG BAG	25 Kilograms Bag	0.62s	0.62	SOLID	Crystalline silica, quartz (Percent w/w: 1 - 5%), Crystalline silica, cristobalite (Percent w/w: 0.1 - 1%), Crystalline silica, tridymite (Percent w/w: 0.1 - 1%)	May cause cancer by inhalation, May cause damage to organs through prolonged or repeated exposure if inhaled	Carcinogenicity Category 1A - H350 Specific Target Organ Toxicity - (Repeated Exposure) Category 1 - H372
32	BRINEDRI L-VIS - 25 KG BAG (MULTIWALL)	25 Kilograms Bag	0.22s	0.22	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						been withheld as proprietary.		
33	CALCIUM BROMIDE 14.2 PPG 1700 KG IBC	1700 Kilograms Plastic IBC with Metal cage	44.2s	44.2	LIQUID	Calcium Bromide (Percent w/w: 52%)	May be harmful if swallowed, Causes serious eye damage	Acute toxicity - Oral Category 5 Serious eye damage/eye irritation Category 1
34	CALCIUM BROMIDE POWDER - 25 KG BAG	25 Kilograms Bag	1	1	SOLID	Calcium Bromide (Percent w/w: 80 - 100%)	Causes serious eye damage	Serious Eye Damage/Irritation Category 1 - H318
35	CALCIUM CHLORIDE 60 WDR - 1 METRICKTON	1 Bag	35.58s	35.58	SOLID	Calcium chloride (Percent w/w: 60 - 100%)	Causes serious eye irritation	Serious Eye Damage/Irritation Category 2 - H319

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
36	CALCIUM CHLOR, O BM/DF, P WDR - 25 KG BAG	25 Kilograms Bag	39.16s	39.16	SOLID	Calcium chloride (Percent w/w: 60 - 100%)	Causes serious eye irritation	Serious Eye Damage/Irritation Category 2 - H319
37	CALCIUM CHLORID E -	1 Bag	16.66s	16.66	SOLID	Calcium chloride (Percent w/w: 60 - 100%)	Causes serious eye irritation	Serious Eye Damage/Irritation Category 2 - H319
38	CALCIUM CHLORID E PELS - 2000 LB BAG	2000 Pounds Bag	122.92s	122.92	SOLID	Calcium chloride (Percent w/w: 60 - 100%)	Causes serious eye irritation	Serious Eye Damage/Irritation Category 2 - H319
39	CAUSTIC SODA - 25 KG CAN	25 Kilograms Plastic Can	0.93s	0.93	SOLID	Sodium hydroxide (Percent w/w: 60 - 100%)	May be corrosive to metals, Causes severe skin burns and eye damage, Causes serious eye damage, May cause respiratory irritation	Skin Corrosion / Irritation Category 1 A - H314 Serious Eye Damage/Irritation Category 1 - H318 Specific Target Organ Toxicity - (Single Exposure) Category 3 - H335 Substances/mixtures corrosive to metal Category 1 - H290
40	CHEM, M ONOETHYLENE GLYCOL, BULK	1000 Kilogram Plastic IBC with Metal cage	0.001s	0.001	LIQUID	Ethylene glycol (Percent w/w: 60 - 100%)	Harmful if swallowed, Causes damage to organs	Acute Oral Toxicity Category 4 - H302 Specific Target Organ Toxicity - (Single Exposure) Category 1 - H370

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
41	CHEM-HAI-OS CRSN INHIB - 55 GAL	55 Gallons Plastic and Metal Drums	1.36s	1.36	LIQUID	Methanol (Percent w/w: 30 - 60%), Ethoxylated alcohols (Percent w/w: 10 - 30%), Modified thiourea polymer (Percent w/w: 10 - 30%), Propargyl alcohol (Percent w/w: 5 - 10%), Olefin (Percent w/w: 1 - 5%)	Highly flammable liquid and vapor, Harmful if swallowed, Toxic in contact with skin, Causes severe skin burns and eye damage, Causes serious eye damage, Toxic if inhaled, May damage fertility or the unborn child, Causes damage to organs, May cause damage to organs through prolonged or repeated exposure, Very toxic to aquatic life, Harmful to aquatic life with long lasting effects	Acute Oral Toxicity Category 4 - H302 Acute toxicity - Dermal Category 3 - H311 Acute inhalation toxicity - vapor Category 3 - H331 Skin Corrosion / Irritation Category 1 B - H314 Serious Eye Damage/Irritation Category 1 - H318 Reproductive Toxicity Category 1B - H360 Specific Target Organ Toxicity - (Single Exposure) Category 1 - H370 Specific Target Organ Toxicity - (Repeated Exposure) Category 2 - H373 Acute Aquatic Toxicity Category 1 - H400 Chronic Aquatic Toxicity Category 3 - H412 Flammable liquids Category 2 - H225
42	CITRIC ACID	25 Kilograms Bag	1.01s	1.01	SOLID	Citric acid (Percent w/w: 60 - 100%)	Causes serious eye irritation, May form combustible dust	Serious Eye Damage/Irritation Category 2 - H319 May form combustible dust

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
							concentrations in air	concentrations in air Combustible dust
43	DRILTRE AT - 55 GAL DRUM	55 Gallons Metal Drum	0.68s	0.68	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
44	FLO-CLEAN MD	55 Pounds Bag	1.82s	1.82	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						been withheld as proprietary.		
45	GEM GP - 200 KG DRUM	200 Kilogram Metal Drums	0.48s	0.48	LIQUID	Polyethylene glycol butyl ether (Percent: 60 - 100%)	Causes serious eye damage	Serious Eye Damage/Irritation Category 1 - H318
46	GUAR GUM - 25 KG BAG	25 Kilogram Bag	2.08s	2.08	SOLID	Guar gum (Percent: 60 - 100%)	May form combustible dust concentrations in air	Combustible dust
47	HYDRATE D LIME	25 Kilogram Bag	55.2s	55.2	SOLID	Calcium hydroxide (Percent: 80 - 100%)	Causes skin irritation, Causes serious eye damage, May cause respiratory irritation	Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H318 Specific Target Organ Toxicity - (Single Exposure) Category 3 - H335

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
48	LE SUPERM UL - 275 GAL IBC	275 Gallons Plastic IBC with Metal cage	61.88s	61.88	LIQUID	Carboxylic acid terminated fatty polyamide (Percent w/w: 60 - 100%), Isomerized alpha olefins (Percent w/w: 10 - 30%), Octadecene (Percent w/w: 5 - 10%), Ethylene glycol monobutyl ether (Percent: w/w: 1 - 5%), Diethylene glycol monobutyl ether (Percent: w/w: 1 - 5%)	Causes mild skin irritation, May cause an allergic skin reaction	Skin Corrosion / Irritation Category 3 - H316 Skin Sensitization Category 1 - H317
49	LIQUI-VIS EP - 5 GAL CAN	5 Gallons Plastic Can	4.51s	4.51	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						composition has been withheld as proprietary.		
50	MICRODENSE - 1 BAG	1 Bag	0.45s	0.45	SOLID	Iron titanium oxide, iron titanate, ferrous titanate, titaniferous oxide	Not Hazardous	The product does not meet the criteria for hazard classification in accordance with the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS, 6th rev.) and OSHA's HCS.
51	MONOETHYLENE GLYCOL - 1000 KG IBC	1000 Kilogram Plastic IBC with Metal cage	63.66s	63.66	LIQUID	Ethylene glycol (Percent w/w: 60 - 100%)	Harmful if swallowed, Causes damage to organs	Acute Oral Toxicity Category 4 - H302 Specific Target Organ Toxicity - (Single Exposure) Category 1 - H370
52	MONOETHYLENE GLYCOL - 275 GAL IBC	275 Gallons Plastic IBC with Metal cage	8.36s	8.36	LIQUID	Ethylene glycol (Percent w/w: 60 - 100%)	Harmful if swallowed, Causes damage to organs	Acute Oral Toxicity Category 4 - H302 Specific Target Organ Toxicity - (Single Exposure) Category 1 - H370
53	N-DRILL HT PLUS	25 Kilogram Bag	0.57s	0.57	SOLID	Modified starch (Percent w/w: 60 - 100%)	May form combustible dust concentrations in air	Combustible dust

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
54	N-FLOW 408 - 200 KG DRUM	200 Kilogram Metal Drums	5.73s	5.73	LIQUID	Ethyl lactate (Percent w/w: 80 - 100%)	Flammable liquid and vapor, Causes serious eye damage, May cause respiratory irritation	Serious Eye Damage/Irritation Category 1 - H318 Specific Target Organ Toxicity - (Single Exposure) Category 3 - H335 Flammable liquids. Category 3 - H226
55	NO BLOK C - 55 GAL DRUM	55 Gallons Metal Drum	4.09s	4.09	LIQUID	Isopropanol (Percent w/w: 30 - 60%), Ethylene glycol monobutyl ether (Percent w/w: 5 - 10%), Ammonium salt (Percent w/w: 5 - 10%), Quaternary ammonium compounds (Percent w/w: 1 - 5%), Xylene (Percent w/w: 1 - 5%)	Highly flammable liquid and vapor, Causes severe skin burns and eye damage, Causes serious eye damage, May cause drowsiness or dizziness, Suspected of causing genetic defects, Toxic to aquatic life, Harmful to aquatic life with long lasting effects	Skin Corrosion / Irritation Category 1 - H314 Serious Eye Damage/Irritation Category 1 - H318 Germ Cell Mutagenicity Category 2 - H341 Specific Target Organ Toxicity - (Single Exposure) Category 3 - H336 Acute Aquatic Toxicity Category 2 - H401 Chronic Aquatic Toxicity Category 3 - H412 Flammable liquids Category 2 - H225
56	N-VIS - 25 KG BAG	25 Kilogram Bag	0.91s	0.91	SOLID	Xanthan gum (Percent w/w: 60 - 100%)	May form combustible dust concentrations in air	Combustible dust

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
57	OMC 42 - 55 GAL DRUM	55 Gallons Plastic Drum	0.09s	0.09	LIQUID	Paraffin based petroleum oil (Percent w/w: 60 - 100%)	Not Hazardous	Not classified
58	OXYGON - 50 LB CAN	50 Pounds Plastic Can	0.75s	0.75	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
59	PAC-L - 50 lb bag	50 Pounds Bag	1.37s	1.37	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						composition has been withheld as proprietary.		
60	PAC™-L	50 Pounds Bag	1.68s	1.68	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
61	RHEMOD L - 55 GAL	55 Gallons Metal Drum	7.22s	7.22	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						been withheld as proprietary.		
62	SAPP - 25 KG BAG	25 Kilogram Bag	1.06s	1.06	SOLID	Sodium acid pyrophosphate (Percent w/w: 60 - 100%)	Harmful if swallowed, Causes serious eye irritation	Acute Oral Toxicity Category 4 - H302 Serious Eye Damage/Irritation Category 2A - H319
63	SAPP - 50 LB BAG	50 Pounds Bag	0.41s	0.41	SOLID	Sodium acid pyrophosphate (Percent w/w: 60 - 100%)	Harmful if swallowed, Causes serious eye irritation	Acute Oral Toxicity Category 4 - H302 Serious Eye Damage/Irritation Category 2A - H319
64	SODA ASH	25 Kilogram Bag	1.55s	1.55	SOLID	Sodium carbonate (Percent w/w: 60 - 100%)	Causes serious eye irritation	Serious Eye Damage/Irritation Category 2 - H319

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
65	SODIUM BICARBONATE - 25 KG BAG	25 Kilogram Bag	1.12s	1.12	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
66	SODIUM BROMIDE - 25 KG BAG	25 Kilogram Bag	4.72s	4.72	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
67	SODIUM BROMIDE BRINE - M3 1.42 SG	265 Gallons Plastic IBC with Metal cage	2.89s	2.89	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
68	SODIUM CHLORIDE - 1200 KG BAG	1200 Kilogram Bag	38s	38	SOLID	Sodium chloride (Percent w/w: 80 - 100%)	Causes mild eye irritation	Serious Eye Damage/Irritation Category 2B - H320
69	SOURSCAV - 25 KG BAG	25 Kilogram Bag	3.13s	3.13	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						composition has been withheld as proprietary.		
70	STEEL SEAL 50 - 50 LB BAG	50 Pounds Bag	0.62s	0.62	SOLID	Calcined petroleum coke (Percent w/w: 60 - 100%)	May form combustible dust concentrations in air	Combustible dust
71	STEELSEAL 100	50 Pounds Bag	0.62s	0.62	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
72	STEELSEAL 400	50 Pounds Bag	0.62s	0.62	SOLID	Calcined petroleum coke (Percent w/w: 60 - 100%)	May form combustible dust concentrations in air	Combustible dust

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
73	SUSPENSION PACKAGE II - 50 LB BAG	50 Pounds Bag	20.41s	20.41	SOLID	Crystalline silica, quartz (Percent w/w: 1 - 3%), Crystalline silica, cristobalite (Percent w/w: < 1%), Crystalline silica, tridymite (Percent w/w: < 1%)	May cause cancer by inhalation, May cause damage to organs through prolonged or repeated exposure if inhaled	Carcinogenicity Category 1A - H350 Specific Target Organ Toxicity - (Repeated Exposure) Category 2 - H373
74	WALL-NUT COARSE - 50 LB BAG	50 Pounds Bag	0.28s	0.28	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
75	WALL-NUT MEDIUM - 50 LB BAG	50 Pounds Bag	0.5s	0.5	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
76	Chem - Dual Spacer Surfactant B, Tote Tank	330 Gallons Plastic IBC with Metal cage	0.06s	0.06	LIQUID	Poly(oxy-1,2-ethandiyl), a-(nonylphenyl)-w-hydroxy (Percent w/w: 80 - 100%)	Causes skin irritation, Causes serious eye irritation, Toxic to aquatic life, Toxic to aquatic life with long lasting effects	Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 2 - H319 Acute Aquatic Toxicity Category 2 - H401 Chronic Aquatic Toxicity Category 2 - H411

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
77	Chem - Halad - 300L, 1 M3 IBC container (264gal)	264 Gallons Plastic IBC with Metal Cage	0.85s	0.85	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
78	CHEM - SEM - 7 - 55 GAL	55 Gallons Plastic Drum	0.073s	0.073	LIQUID	Poly(oxy-1,2-ethanediyl), alpha-sulfo-omega-(dodecyloxy)-, ammonium salt (Percent w/w: 30 - 60%), Poly(oxy-1,2-ethanediyl), alpha-sulfo-omega-(tetradecyloxy)-, ammonium salt (Percent w/w: 10 - 30%),	Flammable liquid and vapor, Harmful if swallowed, Causes skin irritation, Causes serious eye irritation, Toxic to aquatic life	Acute Oral Toxicity Category 4 - H302 Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H318 Acute Aquatic Toxicity Category 2 - H401 Flammable liquids. Category 3 - H226

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						Isopropanol (Percent w/w: 10 - 30%)		
79	CHEM, CLEANBORE A	330 Gallons Plastic IBC with Metal cage	0.036s	0.036	LIQUID	Glucopyranoside, C9-C11 alkyl oligomeric (Percent w/w: 30 - 60%)	Causes serious eye damage, Harmful to aquatic life	Serious Eye Damage/Irritation Category 1 - H318 Acute Aquatic Toxicity Category 3 - H402
80	CHEM, DeepFX - L, 330 gal tote	330 Gallons Plastic IBC with Metal cage	1s	1	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration)	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						of the composition has been withheld as proprietary.		
81	CHEM, Dual Spacer Surf. B, 5 gal	5 Gallons Plastic Can	0.006s	0.006	LIQUID	Poly(oxy-1,2-ethandiyl), a-(nonylphenyl)-w-hydroxy (Percent w/w: 80 - 100%)	Causes skin irritation, Causes serious eye irritation, Toxic to aquatic life, Toxic to aquatic life with long lasting effects	Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 2 - H319 Acute Aquatic Toxicity Category 2 - H401 Chronic Aquatic Toxicity Category 2 - H411
82	CHEM, Gascon 469, Tote Tank	265 Gallons Plastic IBC with Metal cage	2.03s	2.03	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
83	CHEM, GASSTOP	55 Gallons Metal Drum	1.32s	1.32	LIQUID	Paraffin based petroleum oil	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
	EXP, 55 GAL					(Percent w/w: 30 - 60%)		
84	CHEM, Halad - 413, 50 lb	50 Pounds Bag	0s	0	SOLID	Acrylic polymer (Percent w/w: 60 - 100%)	May form combustible dust concentrations in air	Combustible dust
85	CHEM, HALADVANCE 344, 330 GAL TOTE	330 Gallons Plastic IBC with Metal cage	0.32s	0.32	LIQUID	Hydrotreated distillate (Percent w/w: 10 - 30%)	Not Hazardous	Not classified
86	CHEM, HR - 25L, 5 GAL BUCKET	5 Gallons Plastic Can	0.009s	0.009	LIQUID	Tartaric acid (Percent w/w: 30 - 60%)	Causes serious eye damage, Harmful to aquatic life	Serious Eye Damage/Irritation Category 1 - H318 Acute Aquatic Toxicity Category 3 - H402
87	CHEM, MICROBLOCK 55 GAL DRUM	55 Gallons Metal Drum	0.34s	0.34	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						been withheld as proprietary.		
88	CHEM, SCR - 100L, 5 GAL	5 Gallons Plastic Can	0.69s	0.69	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
89	CHEM, SEM - 1265, 330 GAL TOTE	330 Gallons Plastic IBC with Metal cage	1.5s	1.5	LIQUID	Ethoxylated nonylphenol (Percent w/w: 30 - 60%), Ammonium Salt of Ethoxylated Alcohol Sulfate (Percent w/w: 10 - 30%), Isopropanol (Percent w/w: 1 - 5%)	Flammable liquid and vapor, Causes skin irritation, Causes serious eye damage, Toxic to aquatic life, Toxic to aquatic life with long lasting effects	Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H318 Acute Aquatic Toxicity Category 2 - H401 Chronic Aquatic Toxicity Category 2 - H411 Flammable liquids. Category 3 - H226

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
90	CHEM, Sodium Fluoresce in Green Dye,5 gal	5 Gallons Plastic Can	0.08s	0.08	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
91	CHEM, TUNED PRIME SPACER, 40 LB SACK	40 Pounds Bag	33.63s	33.63	SOLID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
92	CHEM, TUNED SPACER III, 40 LB SACK	40 Pounds Bag	5.57s	5.57	SOLID	Crystalline silica, quartz (Percent w/w: 60 - 100%), Crystalline silica, cristobalite (Percent w/w: 1 - 5%)	May cause cancer by inhalation, Causes damage to organs through prolonged or repeated exposure if inhaled	Carcinogenicity Category 1A - H350 Specific Target Organ Toxicity - (Repeated Exposure) Category 1 - H372
93	CHEM, CLEANBOR E B, 5 GAL	5 Gallons Plastic Can	0.01s	0.01	LIQUID	Alcohols, C9-11, ethoxylated (Percent w/w: 60 - 100%)	Harmful if swallowed, Causes skin irritation, Causes serious eye damage, Very toxic to aquatic life, Harmful to aquatic life with long lasting effects	Acute Oral Toxicity Category 4 - H302 Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H318 Acute Aquatic Toxicity Category 1 - H400 Chronic Aquatic Toxicity Category 3 - H412
94	CHEM, D - AIR 3000L, 55 GAL DRUM	55 Gallons Plastic Drum	0.75s	0.75	LIQUID	Alkenes, C15-C18 (Percent w/w: 60 - 100%)	Not Hazardous	Not classified
95	CHEM, SA - 640L, 5 GALLON PAIL	5 Gallons Plastic Can	0.37s	0.37	LIQUID	Paraffin based petroleum oil (Percent w/w: 60 - 100%)	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
96	Chem-Halad® 300L,51 gal	51 Gallons Plastic Drum	0.31s	0.31	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the composition has been withheld as proprietary.	Not Hazardous	Not classified
97	Chem-Injectrol A-54 GAL	54 Gallons Metal Drum	0.28s	0.28	LIQUID	Sodium silicate (Percent w/w: 30 - 60%)	Causes skin irritation, Causes serious eye damage	Skin Corrosion / Irritation Category 2 - H315 Serious Eye Damage/Irritation Category 1 - H319
98	HALAD - 413L, 265 GALLON IBC	265 Gallons Plastic IBC with Metal cage	5.99s	5.99	LIQUID	Contains no hazardous substances in concentrations above cut-off values according to the competent authority. The exact percentage (concentration) of the	Not Hazardous	Not classified

No .	Name of Chemical	Type of Storage Container	Estimated Quantity Per Month (Tons)	Estimated Quantity Per Month (Tons)	Physical Characteristics/ State	Chemical Composition/ Ingredients	Hazardous Characteristics	GHS Rating- (Health Hazard, Physical Hazard, Environmental Hazard)
						composition has been withheld as proprietary.		
99	CHEM-CT-ARMOR - 5 GAL	5 Gallons Plastic Can	0.006s	0.006	LIQUID	Highly refined mineral oil (Percent w/w: 60 - 100%), Hydrotreated heavy naphthenic distillate (Percent w/w: 10 - 30%), Sulfonic acids, petroleum, sodium salts (Percent w/w: 5 - 10%), Mineral grease (Percent w/w: 1 - 5%)	May be fatal if swallowed and enters airways, Causes serious eye damage, May cause cancer, Suspected of damaging fertility or the unborn child, Causes damage to organs through prolonged or repeated exposure, May cause long lasting harmful effects to aquatic life	Aspiration Toxicity Category 1 - H304 Serious Eye Damage/Irritation Category 1 - H318 Carcinogenicity Category 1A - H350 Reproductive Toxicity Category 2 - H361 Specific Target Organ Toxicity - (Repeated Exposure) Category 1 - H372 Chronic Aquatic Toxicity Category 4 - H413

Taking the GHS rating into consideration, Table 2-4 provides the estimated quantities of chemicals to be stored at the facility according to the GHS categories which highlights the health hazard, physical hazard and environmental hazard. Based on this list, only an estimated 47 tonnes of liquid chemicals will contain ingredients that are flammable under the physical hazard group, while an estimated 11 tonnes are hazardous to the aquatic environment (acute and chronic) under the environmental hazard group. A majority of the chemicals to be stored falls mainly under the health hazard group.

Table 2-4: Estimated Quantities of Chemicals to be Stored at the Facility According to GHS Categories

GLOBALLY HARMONIZED SYSTEM (GHS) CATEGORIES		ESTIMATED QUANTITY (TONS)
PHYSICAL HAZARD GROUP	Explosives	0
	Flammable gases	0
	Aerosols	0
	Oxidizing gases.	0
	Gases under pressure.	0
	Flammable liquids.	47
	Flammable solids.	0
	Self-reactive substances and mixtures.	0
	Pyrophoric liquids.	0
	Pyrophoric solids.	0
	Self-heating substances and mixtures.	0
	Substances and mixtures which, in contact with water, emit flammable gases.	0
	Oxidizing liquids.	0
	Oxidizing solids.	0
	Organic peroxides.	0
Corrosive to metals.	1	
HEALTH HAZARD GROUP	Acute toxicity.	128
	Skin corrosion/irritation.	166
	Serious eye damage/eye irritation.	411
	Respiratory or skin sensitization.	71
	Germ cell mutagenicity.	4
	Carcinogenicity.	1478
	Reproductive toxicity.	2
	Specific target organ toxicity - single exposure.	153
	Specific target organ toxicity - repeated exposure.	1440
	Aspiration hazard.	26
ENVIRONMENTAL HAZARD GROUP	Hazardous to the aquatic environment (acute and chronic).	11
	Hazardous to the ozone layer.	0

As noted all classes of chemical will be received at the facility in specialized containment tanks and containers which include:

- ISO Tanks constructed from 316 stainless steel; quantity per tank: 5,000 gallons;
- Plastic tanks constructed of HDPE; quantity per tank: 275 gallons; and
- Steel drum constructed from carbon steel either lined or unlined: quantity per drum – 55 gallon.

2.10.1.2 Labeling

Product labels are applied to all containers and will include the following information:

- The manufacturer's name and trademark
- The name of the product and its brand
- The batch number, date of manufacture
- Shipper's address
- Gross and net weight
- Designation of the normative document (product made to the Standard of Organization)
- Danger symbols

National Fire Protection Association (NFPA) diamond liable will be used to warn firefighters and other emergency responders of the hazards they would be exposed to in a fire or chemical spill situation. In addition, the operation will comply with the UN Package and Performance-Oriented Packaging (POP) standards so as to ensure safety and regulatory adherence to laws and regulations. This performance-oriented methods, whereby a package is required to pass a series of tests to determine its suitability to package certain materials was developed based on the United Nations (UN) recommendations on the shipment of hazardous materials. Packaging for hazardous materials is therefore dependent on the hazard classification of a product and its physical attributes. The "UN" marking on the package indicates the level to which the package is tested and passed.

Information Required for Packaging Hazardous Materials

To determine proper packaging used for shipment of hazardous materials, certain information about the product being shipped is required. Minimum product information required would be the product's UN number (according to the hazardous materials table, CFR 49 part 172.101), its proper shipping name, its hazard classification, the packing group to which it belongs, the product density and vapor pressure (for liquids), or the maximum gross weight of the container with lading, in kilograms (for solids).

Hazard Classifications and Packing Groups

Materials are grouped as to the specific hazard they present. The groups are: Explosives, Gases, Flammable Liquids, Flammable Solids, Oxidizers, Poisonous Materials, Corrosive Materials, and Miscellaneous.

Within each hazard classification there are three packing groups (I, II, & III). Packing Group I presents the greatest risk (the most regulated), Packing Group II presents a moderate risk (moderately regulated), and Packing Group III presents the least risk (the least regulated). In the marking of packaging with a "UN number", Group I corresponds to a marking of "X", Group II to a marking of "Y", and Group III to a marking of "Z".

How to Read a UN Number or Marking

The marking that is applied to a UN certified package indicates the type of package and the levels to which the packaging has been approved. The following describes the sequence of numbers and letters that appear in a UN marking and what they designate.

Contents of UN Markings

The markings associated with performance criteria indicate the type of package and the levels to which the package has been approved. Each set of information is separated by a slash mark (/). The following explains each set of numbers and letters in the sequence:

- UN Indication - The package must be marked with a UN Symbol, or just the letters UN are required on embossed metal containers.
- Packaging Identification Code - This code identifies the type of packaging, the material of construction, and a category within the type when applicable.

Hazard Classifications and Packing Groups

Materials are grouped as to the specific hazard they present. The groups are: Explosives, Gases, Flammable Liquids, Flammable Solids, Oxidizers, Poisonous Materials, Corrosive Materials, and Miscellaneous. Some products may present multiple hazards. In those cases there are established guidelines to determine which hazard takes precedence.

Packaging Identification

The packaging identification detail is presented in Table 2-5.

Table 2-5: Packaging Identification Detail

Type of Package	Material	Category
1 – Drums	A – Steel	<u>A, B, or H Drums-Jerricans</u> 1 - Closed Head
2 – Barrels	B – Aluminum	2 - Open Head
3 – Jerricans	C - Natural Wood	<u>A or B Boxes</u> 1 - Ordinary A or B
4 – Boxes	D – Plywood	2 - A or B w/inner lining or coating
5 – Bags	F - Reconstituted Wood	<u>C Boxes</u> 1 - Ordinary
6 - Composite Packaging	G – Fiberboard	2 - w/sift proof walls
	H – Plastic	<u>H Boxes</u> 1 - Expanded Plastic
	L – Textile	2 - Solid Plastic
	M - Paper, Multiwall	

	N - Metal other than Steel or Aluminum	<u>L Bags</u> 2 - Sift proof 3 - Water Resistant
	P - Glass, Porcelain or Stoneware	<u>M Bags</u> 2 - Multi-wall, Water Resistant

2.10.1.3 Inventory and Stock Management

AGHI estimates that 1,000,000 gallons of specialty & commodity chemicals will be stored on each Block of the site. AGHI warehouse safety management process is taken seriously and has a high level of focus. All containers shipped to and within Guyana are properly labelled as described in the above section, to identify the material, define safety protocols for handling and storage, meet "Right to Know" regulations, communicate UN shipping descriptions and meet Guyana requirements. AGHI has identified the materials which require import licenses required by Guyana law and is putting in place procedures to ensure import licenses are applied for prior to the goods leaving the manufacturing plant.

2.10.1.4 Stacking

Stacking of containers will be done under best practices recommended by the container manufacturer along with corporate guidelines to determine how many containers can be stored in a stock. Figure 2-4 show the recommended stack heights based upon the specific gravity of the product.

Static load:

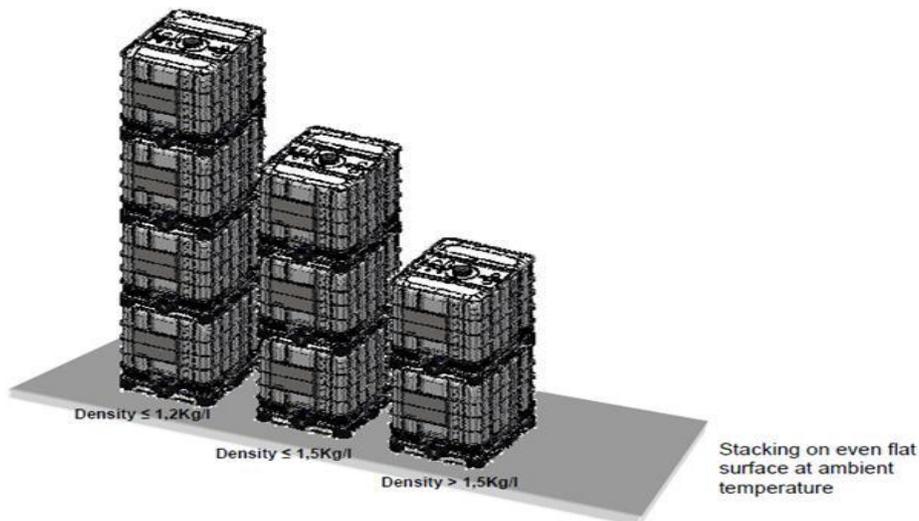
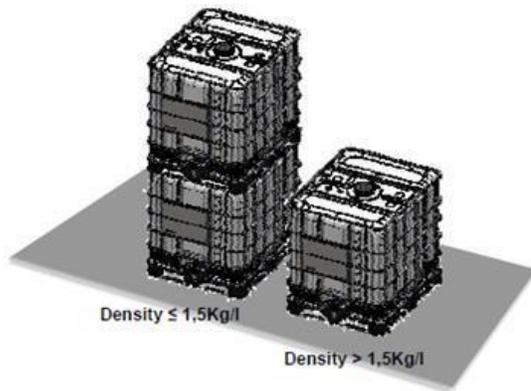


Figure 2-4: Recommended Stack Heights for Static Loads

Stacking height for dynamic loads (loads exposed to motion) will not exceed 2 high and will be secured for transport as seen in Figure 2-5.

Dynamic load:



The IBC's need to be secured during transport.

Never stack high weight filled IBC on low weight filled IBC.

Figure 2-5: Recommended Stack Heights for Dynamic Loads

Under ideal conditions plastic drums on pallets can be stacked four high. However, other factors will impact the decision on drums stack height such as temperature, partially filled drums, exposure to direct sunlight, drums fitted with pressure relieving vents, density of the product. When taking these safety factors into consideration along with the weight of each drum, the limits to drum stacks at the facility will be 2 to 3 pallets per drum stack. International Standards Organisation (ISO) tanks and offshore tanks will be stacked 2 high. ISO tanks are considered portable tanks under the UN performance packaging standards and are built to meet either T7 or T11 specifications². Company products can ship and store in either T7 or T11 specification ISO tanks.

2.10.1.5 Chemical Compatibility

Very often, warehousing facilities are used to store a variety of different types of chemicals. Management of how and where these chemicals are stored in relation to one another is critical from a Health, Safety and Environmental (HSE) perspective. To ensure that non-compatible chemicals are segregated in an appropriate manner, a chemical segregation plan is used which identifies exactly where specific generic types of chemicals should be stored to minimize any risk. For example, acids should be segregated from basic type products. Chemical segregation plans are built around the UN/IMDG guidelines. The dangerous goods and combustible liquid segregation chart shown in Figure 2-6 will be used as a guide for this aspect of the operation.

² The T-Code system specifies the test pressure of each type of tank container, its shell thickness, the pressure relief set-up and the bottom and top outlet arrangement, and identifies the type of cargoes each container is designed to carry.

DANGEROUS GOODS AND COMBUSTIBLE LIQUIDS SEGREGATION CHART

Class or Subsidiary Risk																		
		Flammable Gas	Suitable to store together	0m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m
		Non-Toxic Non-Flammable Gases	0m	0m	0m	0m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m
		Toxic	3 m	0m	May Not be compatible check SDS & notes	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m
		Oxidizing Gas	3 m	0m	3 m	0m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m
		Flammable Liquids	3 m	3 m	3 m	3 m	0 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m
		Flammable Solids	3 m	3 m	3 m	3 m	3 m	0 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	May Not be compatible check SDS & notes
		Spontaneously Combust	3 m	3 m	3 m	3 m	3 m	3 m	0 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m
		Dangerous When Wet	3 m	3 m	3 m	3 m	3 m	3 m	3 m	0 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m
		Oxidizing Agent	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	3 m	3 m
		Organic Peroxide	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	0 m	Isolate
		Toxic Substance	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	Isolate	0 m	3 m
		Corrosive	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m	3 m

GUIDELINES

- In all cases the manufacturers SDS should be consulted.
- Combustible liquids shall be segregated in the same manner as Class 3 flammables.
- Do not store "Dangerous when wet" chemicals in areas with water suppression systems i.e. sprinklers.

Contact with flammables or combustible substance causes vigorous oxidation reactions resulting in spontaneous heat production and possible fire/explosion.

ISOLATE

This requirement refers to organic peroxides, for which dedicated stores or storage cabinets are recommended. Adequate separation from other laboratories/buildings/boundaries is required.

★ May not be compatible with its own class. Refer to manufacturers SDS.

SEGREGATE

A distance of >3-5m is required between chemical storage cabinets where the aggregate capacity is <250kg or L.

If the aggregate capacity is >250kg or L cabinets must be 10m apart or have a fire rated wall in between them.

For other Dangerous goods external to cabinets, the distance is measured from the edge of the spill catchment area. Consult SDS from specifications.

Figure 2-6: Dangerous Goods and Combustible Liquid Segregation Chart

2.10.1.6 Safety Features

There are specific safety features which are required to be in place. Figure 2-7 presents some of the safety features that are usually found on the container tanks.



Figure 2-7: Safety Features Found on Container Tanks

2.10.2 Loading and Offloading

All chemical storage facilities are designed with spaces for loading and offloading since these exercises must be done within contained areas under strict conditions and guidelines. Trucks delivering or removing chemicals to and from the site will be parked within the containment areas of the storage area.

Lifting devices such as forklifts, will be utilized to remove containers containing chemicals from the trucks delivering, to the identified storage area. The same method will apply when chemicals are being loaded onto trucks for distribution to the offshore oil and gas operations. During these processes, it is expected that the client will have their own internal procedures to avoid damages to containers which can result in spills and leakages.

2.10.3 Utility and Services

As noted, Potable water supply to the project site is expected to be provided by GWI. This will be complimented by a 5,000-gallon potable water tank elevated for providing water pressure. This will be supported by several other tanks so as to provide a regular supply of water to critical components of the facility.

Both energy and telecommunication services within this area is fair to good. Power for the area and its immediate surroundings is being supplied from the national grid by the Guyana Power and Light Inc. (GPL). The area is equipped with land line services which are being provided by the Guyana Telephone and

Telegraph Company (GTT). This area is also adequately served with cellular services from both Digicel and GTT.

2.10.4 Waste

AGHI will utilize third party companies, contracted private disposal companies, to collect waste generated. Waste collected by private companies, such as Puran Brothers Disposal Inc. will be taken to the Haags Bosch Facility for final disposal. Other companies such as Tiger Rentals Guyana Inc. will be considered for chemical and hazardous waste disposal.

2.10.5 Decommissioning

If environmental damage is determined to be the fault of AGHI, then the company will make every effort to investigate and cleanup. The nature of this project's activities, as a temporary use of land, should not impose any permanent constraints on any future beneficial use of the area, nor have any permanent effects on the local water resources, biodiversity, overall landscape quality and associated socio-economic development. The principal objectives of closure and decommissioning would be to:

1. Identify suitable best practice measures that are appropriate and can meet the requirements of the regulatory agencies, while satisfying international benchmarks and standards for the sector.
2. Contribute to the effective management of environmental and social issues as a means of facilitating effective closure.
3. Return the land as close as possible to pre-project conditions.
4. Minimize the potential for any negative post-closure impacts and liabilities.
5. Minimize the requirements for active management of the post-closure environment.
6. Maximize the potential for post-closure environmental and social benefits.
7. In addressing the principal closure and decommissioning issues, a Closure Plan will be developed.

The Closure Plan is envisaged to include the following actions:

- a. Removal of all machinery/equipment from the site.
- b. All project components and facilities will be demolished and removed.
- c. All waste will be removed from the site.
- d. Any contaminated area will be cleaned up.
- e. The relevant Government Authorities and the employees/workers will be informed at least three months in advance.
- f. NIS and PAYE contributions for staff will be discontinued.
- g. Severance pay for employees/workers will be paid, along with all other monetary resources due to them, as required by Guyana's Labour Act and the Termination and Severance Payment Act.
- h. All other obligations of the Company, required by the Laws of Guyana, will be settled.

3.0 EXISTING ENVIRONMENTAL AND SOCIO-ECONOMIC SETTING

This chapter presents a description of the environmental and socio-economic baseline conditions of the Project's Area of Influence (AOI), prior to the commencement of the Project. The baseline assessment provides a basis to estimate potential impacts of the Project and information that is critical to decision-making, regarding Project construction and operation mitigation measures and monitoring programs. Baseline conditions of the AOI were therefore examined under three categories which are:

1. Physical Setting
2. Biological Setting
3. Socio-economic Setting

Information pertaining to baseline conditions at the AGHI project site in Land of Canaan was obtained primarily through field observation, interviews, and literature review. Several site visits were conducted throughout the duration of the study.

A one-day site visit was conducted by team members on August 12, 2022 in order to initiate the field assessment. The main purposes of this site visit were to perform a walkover for familiarization and to collect site specific data, and identify the exact locations for water quality sampling, and air and noise measurement points. Drone footages and pictures were also captured during this visit. A preliminary survey of the environmental baseline conditions across the site and within the area of potential influence was performed.

A second visit to the site was conducted on August 24, 2022. Activities conducted during this site visit included a terrestrial survey, water quality sampling and analysis, noise level measurements and air quality measurements for ambient air quality. In addition, public consultation meetings commenced with surrounding residents and commercial entities, which continued for several weeks based on stakeholders' availability and willingness to participate. Baseline studies conducted include:

- Water Quality Analyses;
- Noise Level Measurements;
- Air Quality Testing;
- Biological Assessment; and
- Socio-economic Assessment.

3.1 Physical Settings

Geographically, the project sits within the landscape of Land of Canaan, which is situated along the East Bank of the Demerara River of the East Demerara section of the Coastal Plain. The site comprises approximately 9.825 Acres (3.976 hectares) of land, which is bounded to the north by a drainage canal, which separates it from the Baker Hughes Guyana Supercenter, to the east, by the East Bank Public Road, to the south by Tripple D's Inc. and to the west by the Demerara River. Figure 3-1 provides an aerial view of the current physical environment of the project area and its surroundings.

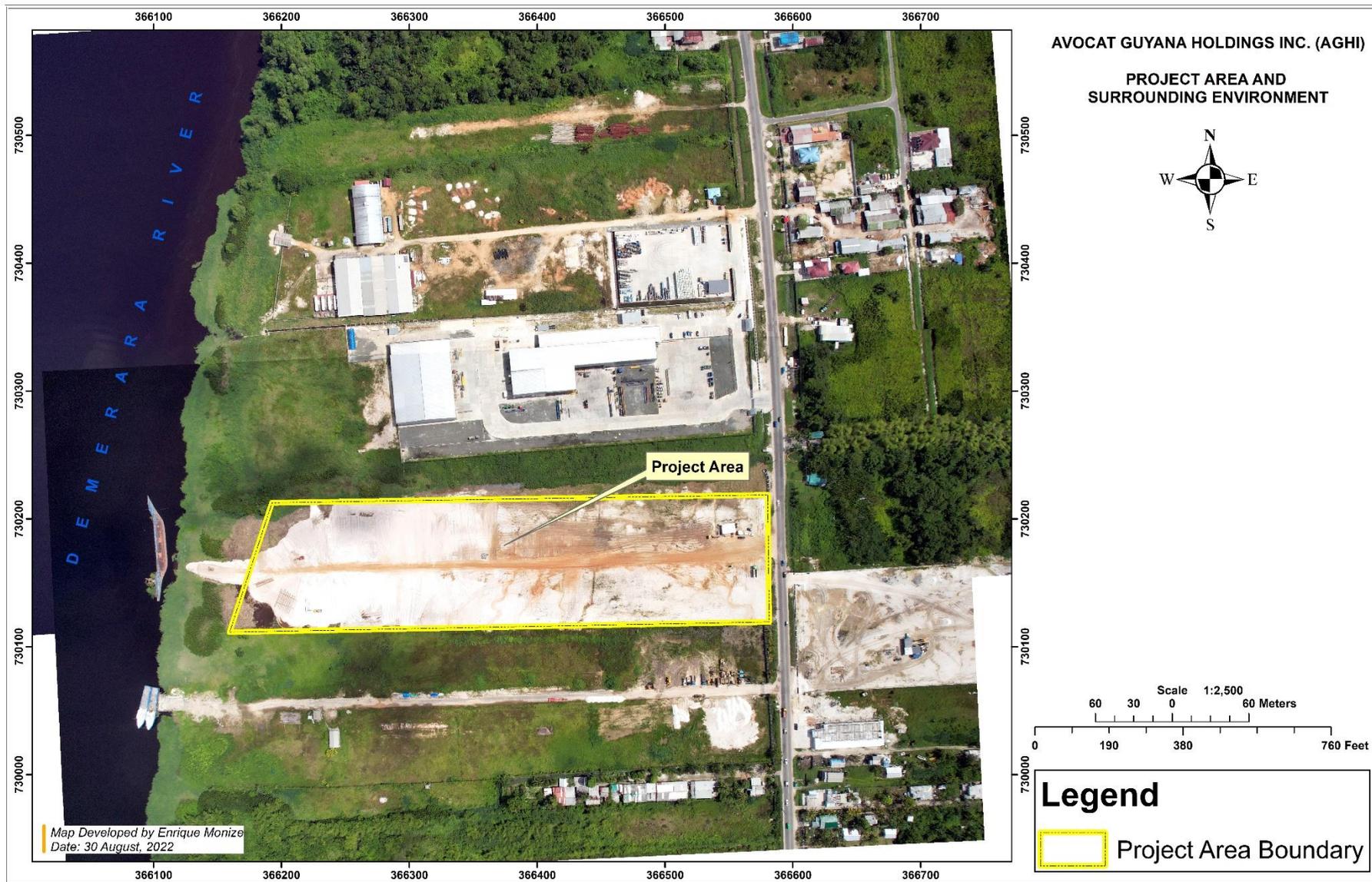


Figure 3-1: Aerial View of the Current Physical Environment of the Project Area and its Surroundings

3.1.1 Water Resources

3.1.1.1 Fluvial Geomorphology

The Demerara River flows west of the project site. On average, the Demerara River navigable channel width decreases in the vicinity of Land of Canaan but is sufficient to facilitate passage and moorage of river vessels. The flow of the river is unidirectional, being north, north-west towards the Atlantic Ocean. On a more localized scale some more oblique currents may obtain resulting in bank erosion and/or deposition. The river appears to transport large volumes of sediment and minor erosion may be expected when the river is in spate. The right bank on which the project site is located, appears to be stable, and not prone to active erosion as there is the presence of stabilising vegetation along with deposition along this bank.

3.1.1.2 Hydrology and Drainage

Except for the coastal backlands, the coastal plain is characterized by large to enormous quantities of brackish to saline water available throughout the year from tidal influenced rivers, streams, coastal marshes, mangrove swamps, and tidal lowlands. Generally, drainage along the East Bank of Demerara in the project area is by canals regulated by sluices that empty into the Demerara River.

The hydrology of the site is largely controlled by its situation in the lower floodplain of the Demerara. The soils within the general area are likely to be clay rich, with poor internal drainage. Much of the drainage in the general area of the East Bank Demerara is done by canals which empty into the Demerara River and is regulated by sluices. The pattern of settlement along East Bank Demerara resulted in the construction of numerous drainage ditches which lead into these main canals.

At the project site, a solid concrete drain, as can be observed in Figure 3-2, was constructed along the eastern front of the property, connecting directly to a silted canal which runs along the northern boundary of the property (Figure 3-3). This canal is controlled via a sluice (Figure 3-3). The Neighbourhood Democratic Council (NDC) and THE Regional Democratic Council (RDC) share responsibility for the operation and maintenance of the canal and sluice.

The drainage system within and around the property is shown in Figure 3-4.



Figure 3-2: Concrete Drain at the Eastern Front of the Project Area



Figure 3-3: Silted Canal along the Northern Boundary of the Project Area and Sluice used to Control Discharge from the Canal

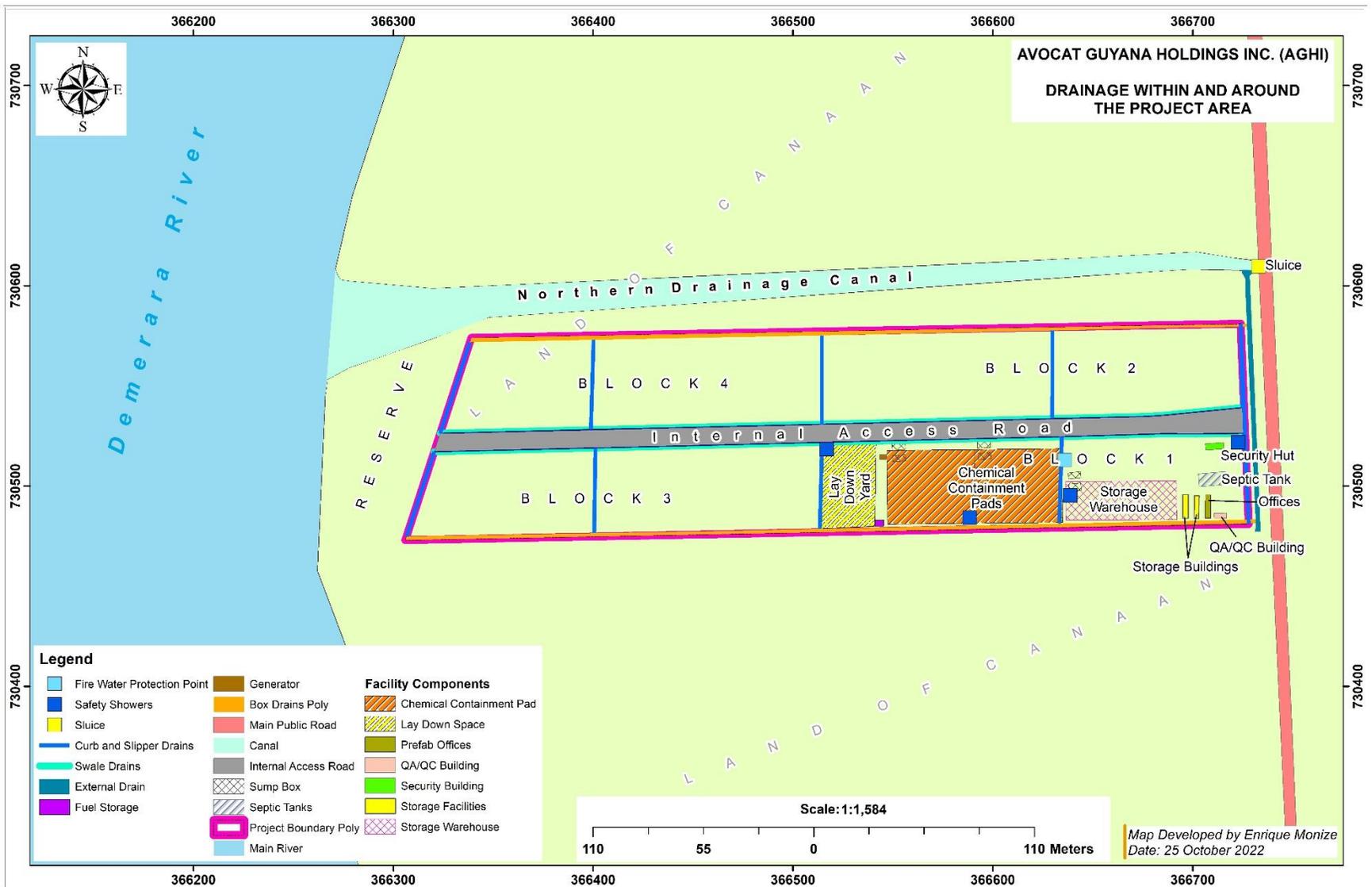


Figure 3-4: Drainage System within and around the Project Site

3.1.1.3 Ground Water

According to the Water Resources Assessment of Guyana, conducted in 1998, large quantities of fresh water are available from the coastal aquifer system which occupies a subsurface area of about 20,000 square kilometers, extending about 250 kilometers along the Atlantic Coast and 40 to 150 kilometers inland. Sediments reach a thickness of 1,800 meters onshore and become progressively thicker offshore and toward the east. The coastal aquifer system is composed of three connected but hydrogeologically distinct aquifers. Overlying layers of clays confine the lower two aquifers, protecting them from contamination by overlying sources. The three aquifers are named, from upper to lower, the Upper Sands, the A Sands, and the B Sands, with each capable of yielding large amounts of water. These layers trend downwards from east to west. The A Sands occur at a depth of 152 m (500 feet), and the B Sands at a depth of 244 m (800 feet).

The untreated water is slightly acidic with a pH range of 6.5 to 8.5. The water contains a low chloride content, low alkalinity and hardness, but high levels of iron. Water from the B Sands has a higher temperature and chloride content, it also contains hydrogen sulphide.

It is common for shallow aquifers along Guyana's coast to be contaminated through both biological and chemical means. Improper disposal of animal and human wastes causes pathogenic contamination, while chemical contamination is primarily related to the use of fertilizers in the sugarcane and rice fields of the coastal lowlands. The Upper Sands aquifer, which is not normally used for water supply, is therefore highly susceptible to both biological and chemical contamination, particularly in the Georgetown area and the now highly populated East Bank Demerara area.

The water is generally brackish to saline. Overuse of aquifers in coastal areas may result in saltwater intrusion. The Upper Sands and A Sands aquifers have elevated iron contents, and the B Sands has elevated temperatures and a hydrogen sulfide odor. While data concerning the deeper A and B Sand aquifers indicate that they are confined, contamination is still possible from recharge areas or improperly constructed wells. Contamination plumes generally follow the flow direction and slope of the ground water, making areas downslope of the populated sites susceptible. Fracture systems typically transport contamination in a variety of directions very quickly and not necessarily downslope.

The average shallow groundwater depth is between 1 m to 2 m of the ground surface.

3.1.1.4 Surface Water Quality

Water quality analysis was conducted on the surface water surrounding the project Area so as to determine the existing surface water quality, while establishing baseline data for future comparisons.

Methodology

Sampling locations were predetermined based on the initial site visit to the project site. The main focus areas for sampling were the immediate surrounding drain and canal, which include the eastern roadside front drain and the northern canal, which separates the project area from the Baker Hughes Supercenter, since both water bodies will eventually form the basis for draining the property of storm water.

Surface water quality was therefore assessed at three sampling locations, where two sets sample were collected for both in-situ testing and laboratory testing. These locations include upstream (southern end)

of eastern roadside front drain; downstream (northern end) of eastern roadside front drain, which intersected upstream of the northern canal; and downstream of the northern drain near the Demerara River.

Water samples were collected using a plastic container that was pre-cleaned prior to collecting each sample. Samples collection is shown in Figure 3-5. *In-situ* water quality analysis for Temperature, pH, Dissolved Oxygen (DO) and Total Dissolved Solids (TDS) was conducted using a multitude of handheld meters. *In-situ* water quality analysis is shown in Figure 3-6. Samples for laboratory testing were placed in amber glass bottles, appropriately labelled and preserved. The samples were later in the day delivered in an ice cooler to the laboratory to be analyzed for other parameters within the recommended holding time for each parameter. Samples were analyzed locally by the Institute of Applied Science and Technology (IAST) laboratory. Parameters analysed included Biological Oxygen Demand (BOD), Oil and Grease and Total Suspended Solids (TSS). Details on the water quality samples collection are presented in Table 3-5 and the sample locations are shown in Figure 3-7. The instruments used to conduct the *in-situ* water quality tests were:

- **pH** – pH tests were conducted using a portable handheld pen meter.
- **Turbidity** – A TN400 Portable Turbidity Meter by APERA Instruments was used to conduct all turbidity analysis on samples collected. This meter operates on the nephelometric principles of turbidity measurement and is designed to meet the criteria specified in ISO7027 and DIN 27027 standards. The TN400 allows for the measurement of turbidity of an aqueous sample both in laboratory and in the field.
- **DO** – A 84030 hand held Dissolved Oxygen Meter by AZ Instrument Corp. was used to conduct the DO analysis.
- **TDS** – A portable E-1 TDS & EC Meter was used to conduct TDS analysis. This meter is a high performance, pen-type design, fast numerical stability and accurate result.

Tables 3-1 to 3-4 provide the technical specifications of each meter.

Table 3-1: Technical Specification of pH Meter

Measure Range	0.000-14.00pH
Resolution	0.01pH
Accuracy	+/-0.01pH
Calibration	Three points automatic calibration (only 6.86 point calibration: the accuracy is 0.1pH)

Table 3-2: Technical Parameters for Turbidity Meter

Measuring Method	ISO 7027 compliant nephelometric method (90°)
Measuring Range	0~1000 NTU, automatic range selection: 0.01~19.99 NTU 20.0~99.9 NTU 100~1000 NTU
Resolution	0.01/0.1/1 NTU
Reading Error	≤ +2 % of reading + stray light
Repeatability	≤ +1 % of reading or 0.02 NTU, the greater of the two

Table 3-3: Technical Specification of the DO Meter

D.O %	0.0-199.9%
RES.	0.1%
Accuracy	$\pm 1.5\%$ of F.S
D.O ppm	0.00-19.99ppm
RES.	0.01ppm
Accuracy	$\pm 1.5\%$ of F.S

Table 3-4: Technical Specification of the TDS Meter

Measure Range	0---9999ppm
Accuracy	$\pm 2\%$



Figure 3-5: Water Sample Collection from Eastern Roadside Drain (Left) and the Northern Canal (Right)



Figure 3-6: *In-situ* Water Quality Analyses being Conducted

Table 3-5: Water Quality Sampling Details

Sample ID	Location	GPS Coordinates	Time (hrs)	Date	Weather Condition
SW1	Upstream of Eastern Roadside Drain	21 N 0366738 UTM 0730480	12:48	24/08/2022	Overcast
SW2	Downstream of Eastern Roadside Drain	21 N 0366721 UTM 0730607	13:14	24/08/2022	Sunny
SW3	Downstream of northern canal near Demerara River	21 N 0366318 UTM 0730574	15:35	24/08/2022	Overcast

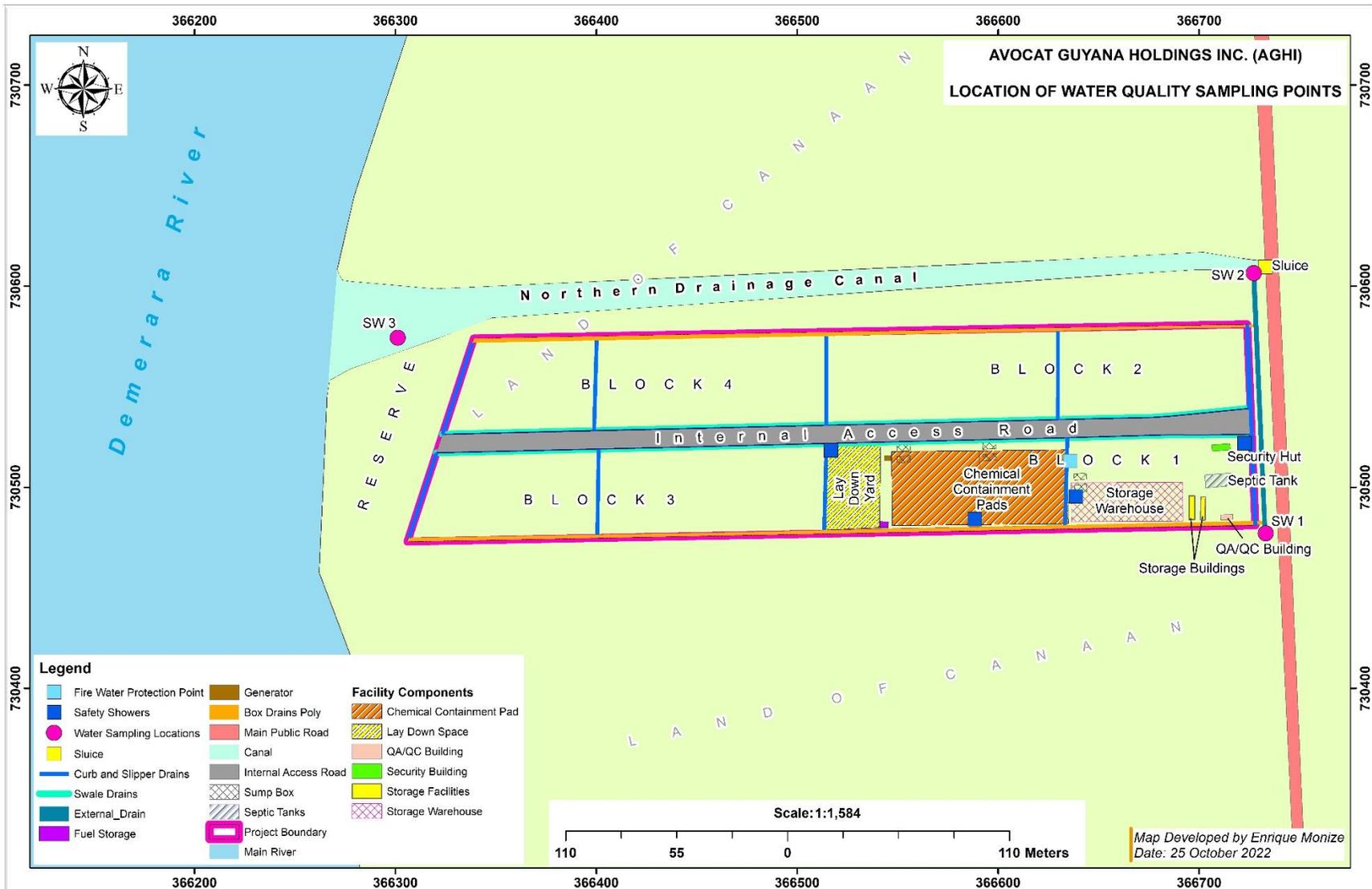


Figure 3-7: Location of Water Quality Sampling Points

Surface Water Quality Analysis Results

As noted in the methodology section, two sets of surface water samples were collected and analysed for various parameters at three locations. Analyses were conducted both *in-situ* and by the IAST laboratory. The results from the analyses are presented in Table 3-6. Appendix E presents the analysis report from the IAST laboratory.

Table 3-6: Results of Water Quality Analyses

Sample Locations	Parameters							
	Temp.	pH 5.0–9.0	DO (mg/L) >5	Turbidity (NTU) <50	TDS (mg/L) <200	BOD (mg/L) <50	Oil and Grease (mg/L) <20	TSS (mg/L) <100
SW 1	31.3	8.70	5.89	68.6	76	1.20	0.08	40.00
SW 2	30.5	8.14	3.89	55.8	62	ND	0.05	20.00
SW 3	35.2	7.50	6.95	171	65	ND	0.06	60.00

Key

Temp. – Temperature; *DO* – Dissolved Oxygen; *TSS* - Total Suspended Solids; *TDS* – Total Dissolved Solids, *BOD* – Biological Oxygen Demand; *ND* - Not Detected

Although this was a baseline assessment, the results of the analyses presented in in Table 3-6, were compared to the acceptable limits prescribed by the GNBS Interim Guidelines for Industrial Effluent Discharge into the Environment to gain a better understanding of the water quality. The results suggest that most of the parameters tested for each of the sampling locations were well within the prescribed ranges. The results also show that for each location sampled, the Turbidity levels were way above the acceptable limit. It should be noted that the acceptable turbidity limits were denoted from the Mining (Amendment) Regulation 2005. There were also no detection of BOD for SW 2 and 3.

3.1.2 Air Quality and Climate

3.1.2.1 Climate and Meteorology

Just near the equator from about 5° North and 5° South, the north-east trade winds and the south-east trade winds converge in a low-pressure zone known as the Inter Tropical Convergence Zone (ITCZ). Guyana is uniquely positioned within this zone of convergence and, as such, the country’s weather and climatic conditions are heavily influenced by the seasonal shifts of this zone. The movement of the ITCZ over Guyana’s coast, where the project area is located, brings with it heavy rainfall that coincides with the rainy seasons generally occurring between May to August and November to January. Meanwhile, when the ITCZ lies outside of Guyana’s borders from February to April; and August to October much lower levels of precipitation are experienced, which coincide, with the two dry seasons. Annual rainfall is approximately 2000-2500 mm. The intensity of rainfall at the project area varies throughout the year with an average annual rainfall of 2000 mm. February to April and September to November are the driest periods of the year. Rainfall data for the past fourteen years was obtained from the Hydrometeorological Department for

the Land of Canaan Weather Station, which is within close proximity to the project site. The rainfall data is presented in Table 3-7 and the rainfall pattern can be observed in Figure 3-8.

Table 3-7: Monthly Rainfall Data (mm) for Land of Canaan for the Period of Jan. 2008 to Dec. 2021³

Years	Months											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
2008	224.3	428.2	249.3	178.6	413.3	397.6	323.4	244.3	76.4	157	229.8	707.7
2009	332.6	115.3	90.5	340	165.3	369.7	257.2	181.3	114.6	251.2	40	268.7
2010	56.9	58.4	16.8	283.6	426.9	-	443.3	258.9	-	128.8	-	346.5
2011	222.4	461.3	549.7	54.8	288.6	282.7	281.9	120.3	144.6	262.4	204.9	376.7
2012	636.4	352.8	94.2	238.9	620.5	304.5	333	150.4	140.1	19.1	245	257.7
2013	100.4	151.1	18.9	249	379.7	368	308	234.1	154.7	184.3	195.6	391.1
2014	232.2	110.5	90.7	61.8	298.6	482.6	237.2	262.5	75.1	195.7	271.1	264.5
2015	181.9	119.4	128	127.3	529.3	387.4	398.3	133.6	113.4	35.5	120	153.6
2016	38.6	92.7	110.6	296.2	418.5	341.2	319.4	233.2	275.5	149.8	155	527.9
2017	318.9	209.8	182.7	169.5	292.2	477.8	373.4	194.2	175.1	83.9	236.5	491.9
2018	211.1	270.9	52.9	314.8	416.7	317.5	329.1	362	177	104.6	211.5	126.6
2019	167.5	144.6	61.2	133.6	340.7	339.6	485.3	488.7	115.6	137.7	227.1	293.7
2020	80	54.2	152.8	92.4	367.8	440.2	448.7	170.8	183.6	122.2	561.8	479.7
2021	208.6	104.6	260.1	508.4	637.3	685.6	363.3	322.8	193.5	369	312.9	589.2

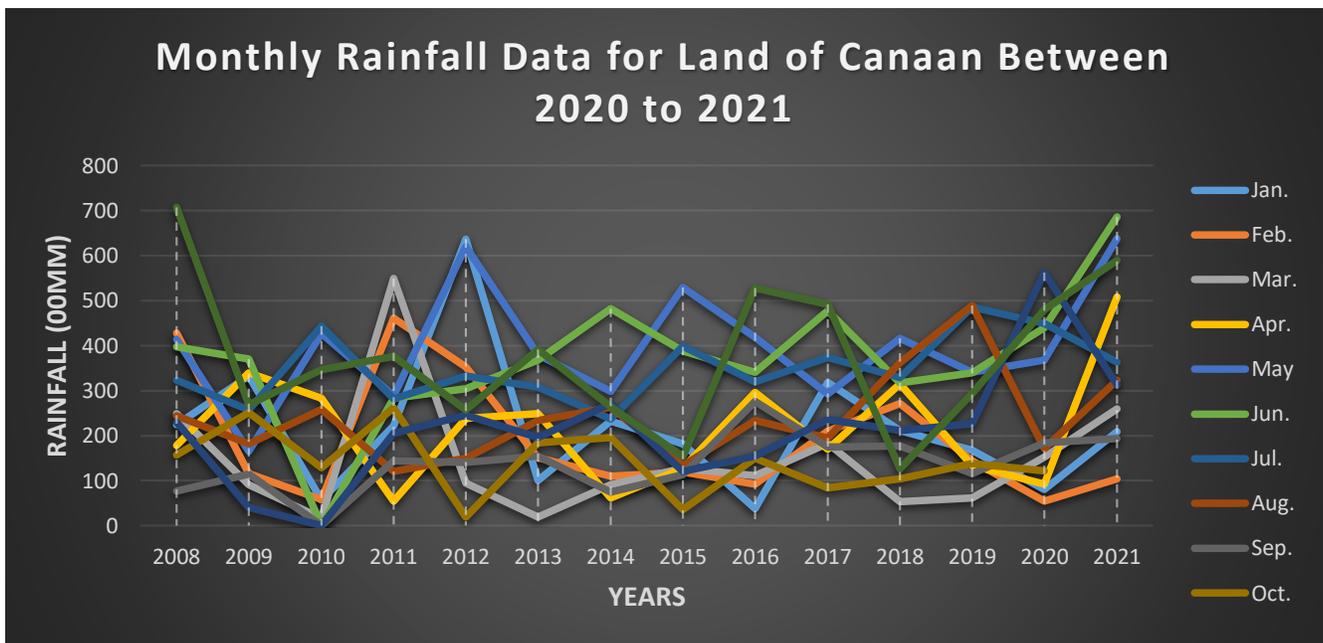


Figure 3-8: Monthly Rainfall (mm) for Land of Canaan between 2008 to 2021

³ Hydrometeorological Department

Wind speed is generally 1.5 to 2.5 mph in east to northeast direction. On the coast, daily maximum temperatures average 29.6 °C, while daily minimum temperatures average 24.0 °C. Guyana’s coast is subject to the north-easterly trade winds with speeds of about 6 meters per second. Even though the coast is situated in the trade winds, tropical storms or cyclones do not occur along Guyana’s coast. Winds and offshore wave directions are remarkably consistent with nearly sixty percent (60%) coming from the 45° north-east sector with an average velocity at sea of 6 m/s. Wind and waves are strongest during the months of December to June and weakest during the period July to November. The mean sea level within the area is approximately 15.52 m above Georgetown Datum⁴ (GD).

3.1.2.2 Air Quality

Baseline data for the ambient air quality was measured at two locations within the project site. Parameters measured included gases such as Volatile Organic Compounds (VOCs), Nitrogen Dioxide (NO₂) and Carbon Monoxide (CO), and particles including Particulate Matter (PM_{2.5} and PM₁₀).

Methodology

Baseline data for the ambient air quality was measured at two locations within the project site, upwind and downwind of the proposed operational area. The locations and description for each air quality measurement is provided in Table 3-8, while Figure 3-9 provides a map showing the actual locations of air quality measurements conducted at the project site. The duration for which measurements were conducted for each parameter is provided in Table 3-9.

Table 3-8: Air Quality Assessment Locations and Weather Conditions

Location ID	Locations	Coordinates	Date	Weather Condition
AQ1	North-eastern corner of Block 1 (Upwind)	21 N 0366731 UTM 0730581	24/08/2022	Overcast with intermittent showers
AQ2	South-western corner of Block 1 (Downwind)	21 N 0366363 UTM 0730483	24/08/2022	Sunny

Table 3-9: Duration of Air Quality Measurement for each Parameter

Location	Date	Parameters	Measurement Duration
AQ 1	24/08/2022	Volatile Organic Compounds (VOCs)	15 Minutes
		Nitrogen Dioxide (NO ₂)	15 Minutes
		Carbon Monoxide (CO)	15 Minutes
		Particulate Matter (PM _{2.5} , PM ₁₀)	1 hour
AQ 2	24/08/2022	Volatile Organic Compounds (VOCs)	15 Minutes
		Nitrogen Dioxide (NO ₂)	15 Minutes
		Carbon Monoxide (CO)	15 Minutes
		Particulate Matter (PM _{2.5} , PM ₁₀)	1 Hour

⁴ The Georgetown Datum is set to 56 feet below Mean Sea Level

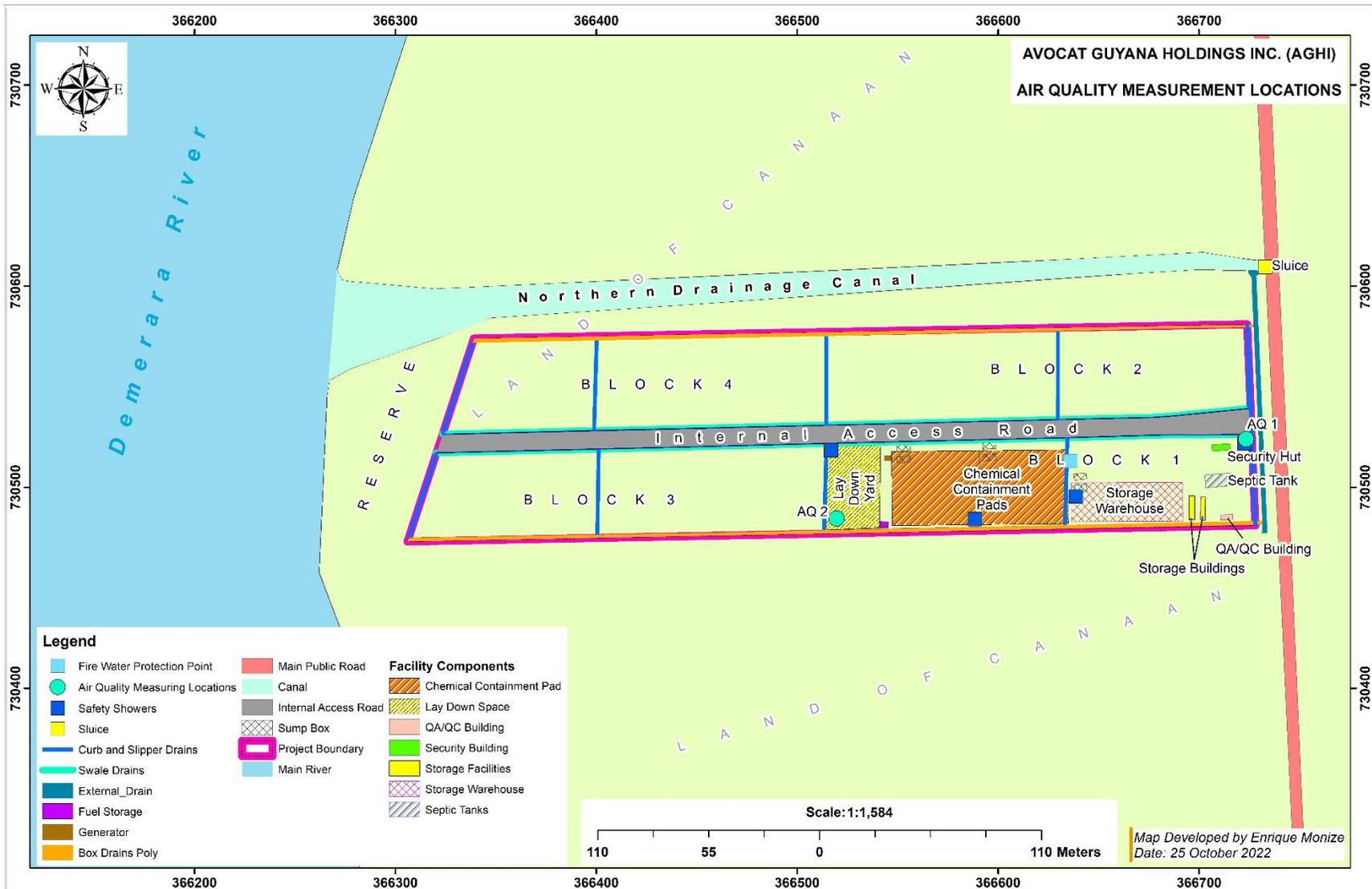


Figure 3-9: Air Quality Measurement Locations

Again, the measurement locations were selected prior to site visit. The first location was selected upwind at the northeastern corner of Block 1 due to the wind direction at the site. A second location was selected downwind at the south-western end of Block 1. This was done to effectively measure the baseline and current influence of activities at the site.

The air quality meter was placed 3-4 feet above the ground on a table in a position that the wind did not impede in anyway. The meter was also well away from obstacles that may have influenced the wind direction and restrict airflow. Figure 3-10 shows air quality measurements being conducted at the two locations within the project site.

Measurements were taken for a duration of over 15 minutes for 3 gases of which include VOCs, NO₂ and CO, while measurements for PM_{2.5} and PM₁₀ were taken over a duration of 1 hour. All measurements were taken using an Aeroqual Series 500 Portable Air Quality Monitor, which has been calibrated to a standard deviation of ± 0.05 part per million. The device has a ± 0.2 % degree of accuracy with real-time logging of data which can be downloaded into MS Excel for further analysis. Each parameter measured was done using separate specialized sensor heads. Data was recorded with the maximum, minimum and average readings. The data was also logged and utilized to graph results for better analysis.



Figure 3-10: Ambient Air Quality being Measured at Northeastern Boundary (Left) and Southwestern Boundary (Right)

Air Quality Results

Gases

Table 3-10 presents the results for the three gases measured at the two locations within the project site, while figures 3-11 to 3-16 show the results pattern of each of the gases measured. Generally, the levels detected were relatively low and well within the World Health Organization (WHO) recommended limits, particularly for VOCs and NO₂. Values recorded for NO₂ and VOCs were lower at the downwind location. CO was not detected at any of the locations.

Table 3-10: Air Quality Results for Gases Measured

Location ID	Parameters	Start Time (hrs)	End Time (hrs)	Weather Condition	Concentrations (ppm)	WHO Acceptable Limit (ppm)
AQ 1	VOCs	13:06	13:19	Overcast with intermittent showers	0.23	100
	NO ₂	12:12	12:26	Overcast with intermittent showers	0.53	0.1
	CO	13:25	13:40	Overcast with intermittent showers	0.0	9
AQ 2	VOCs	14:35	14:50	Sunny	0.017	100
	NO ₂	14:11	14:25	Sunny	0.03	0.1
	CO	14:56	15:10	Sunny	0.0	9

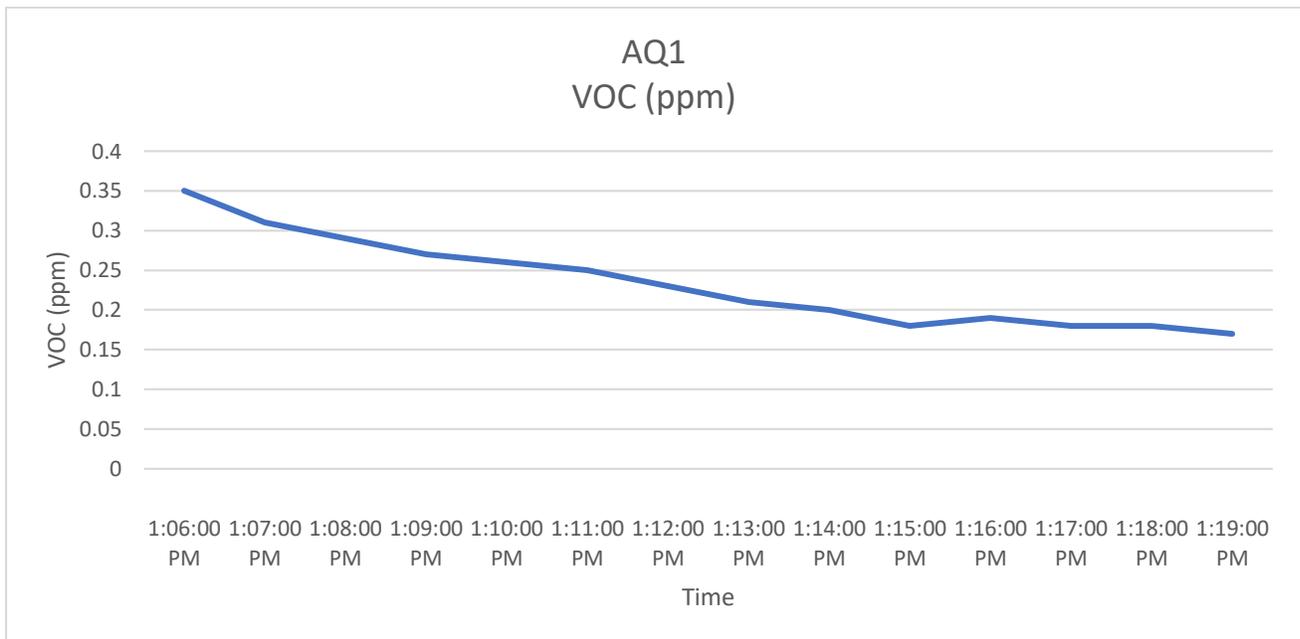


Figure 3-11 – Results Pattern of VOCs Monitored over a 15 Minute Period at Location AQ 1

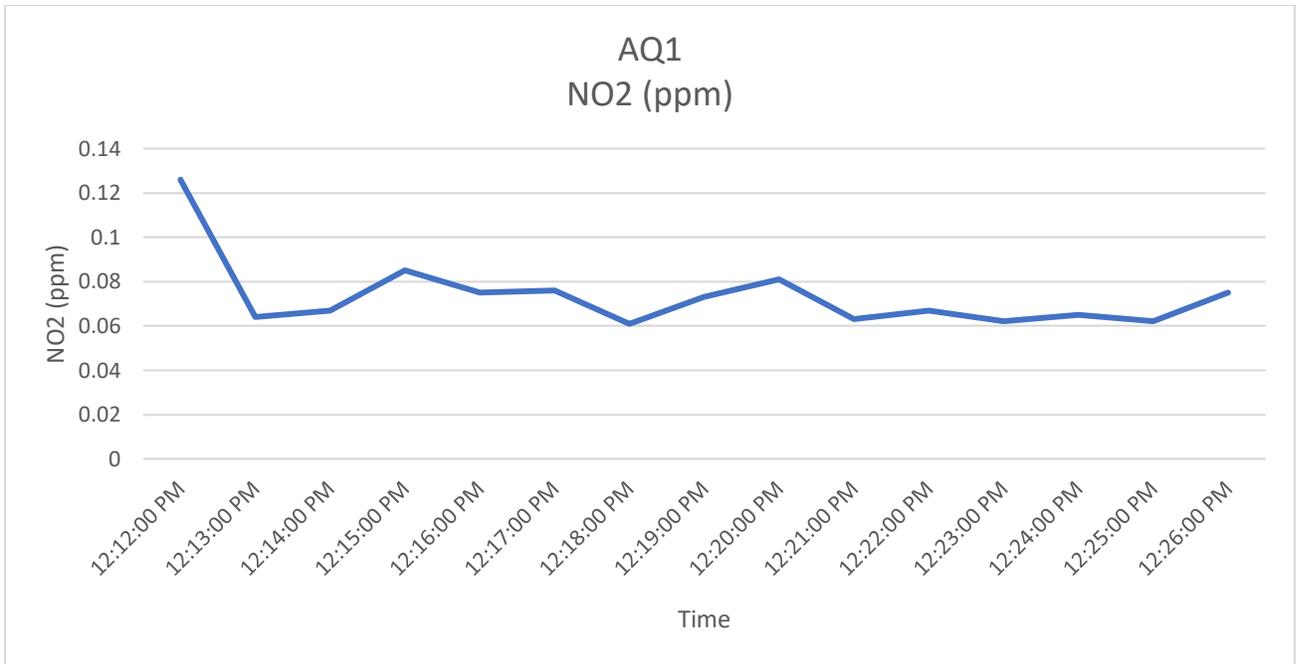


Figure 3-12 – Results Pattern of NO₂ Monitored over a 15 Minute Period at Location AQ 1

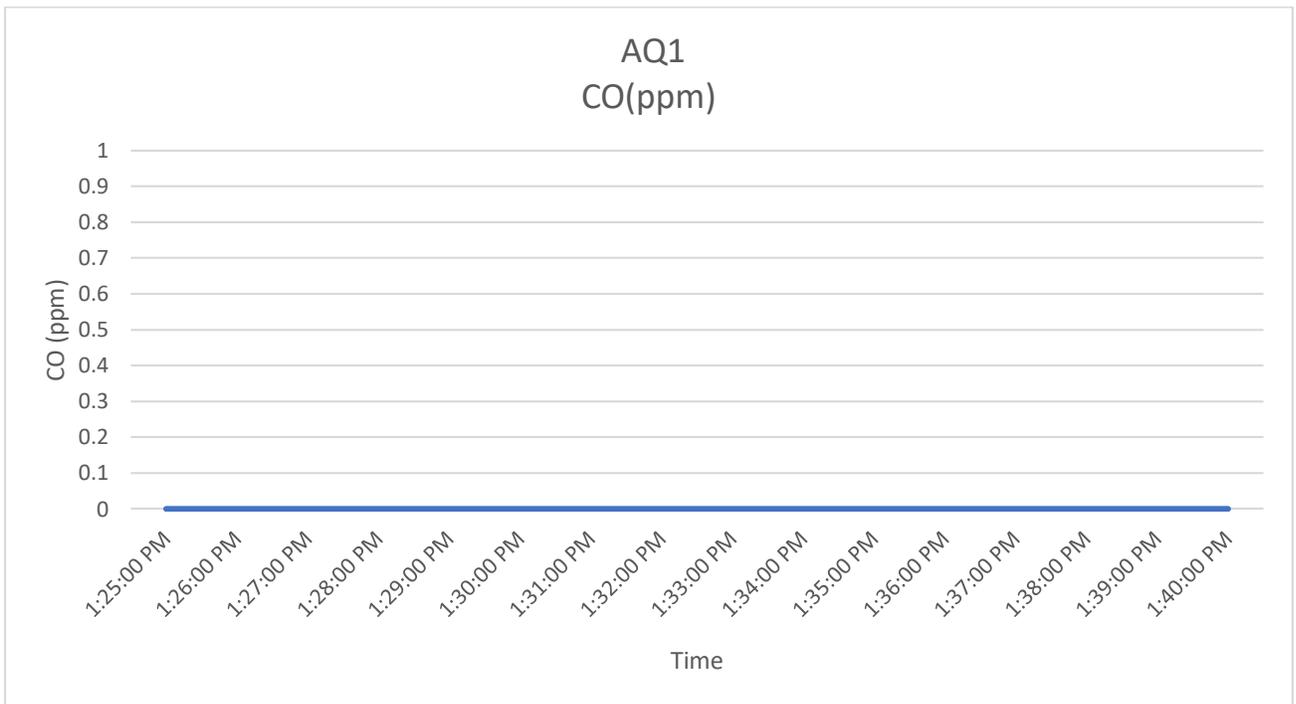


Figure 3-13 – Results Pattern of CO Monitored over a 15 Minute Period at Location AQ 1

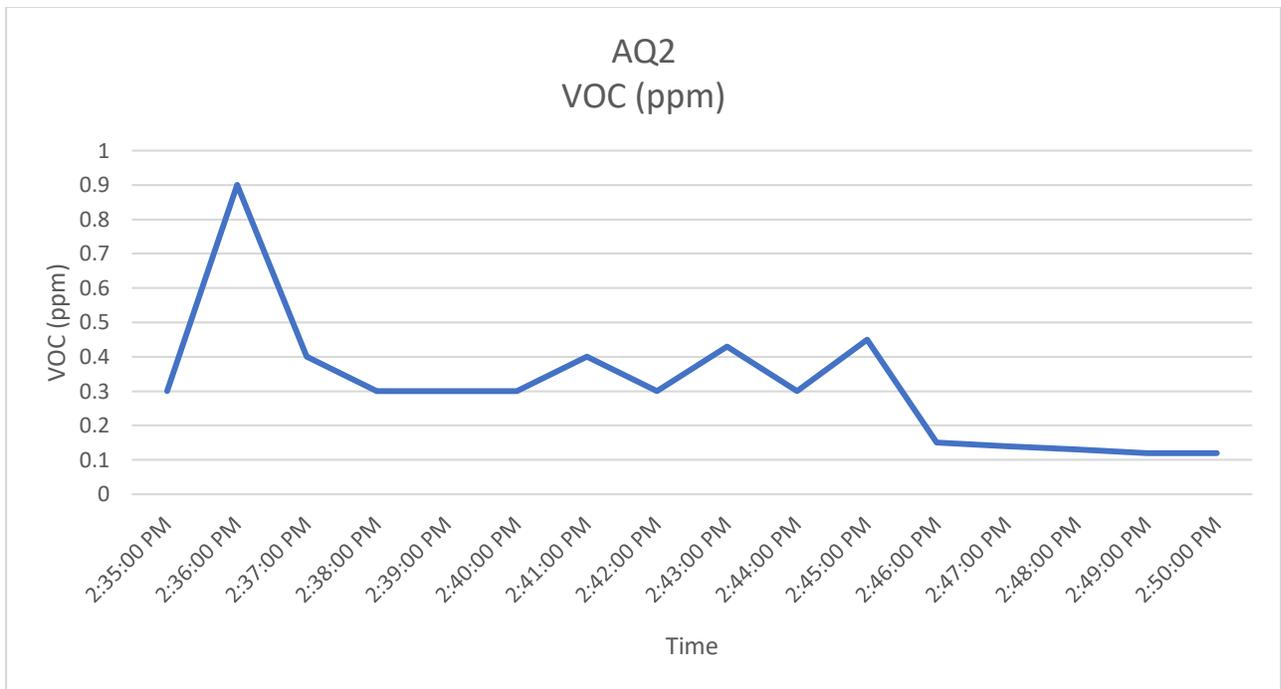


Figure 3-14 – Results Pattern of VOCs Monitored over a 15 Minute Period at Location AQ 2

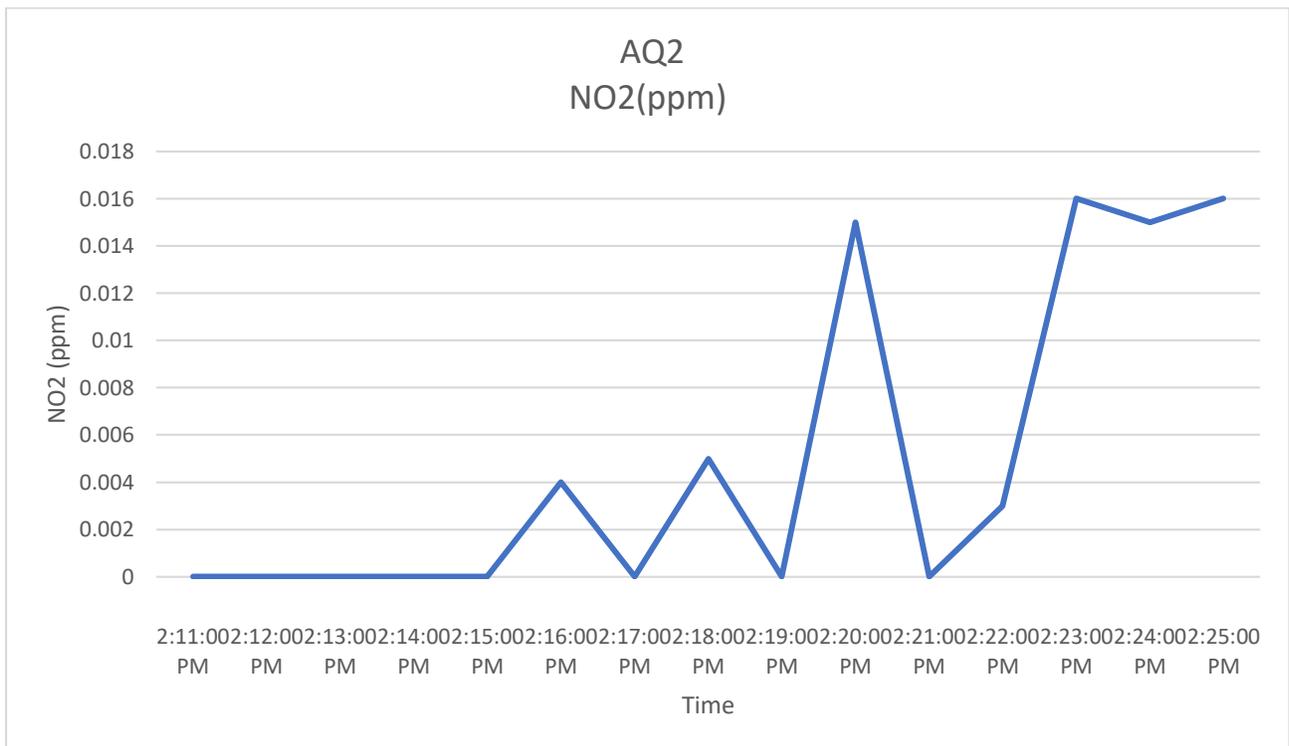


Figure 3-15 – Results Pattern of NO₂ Monitored over a 15 Minute Period at Location AQ 2

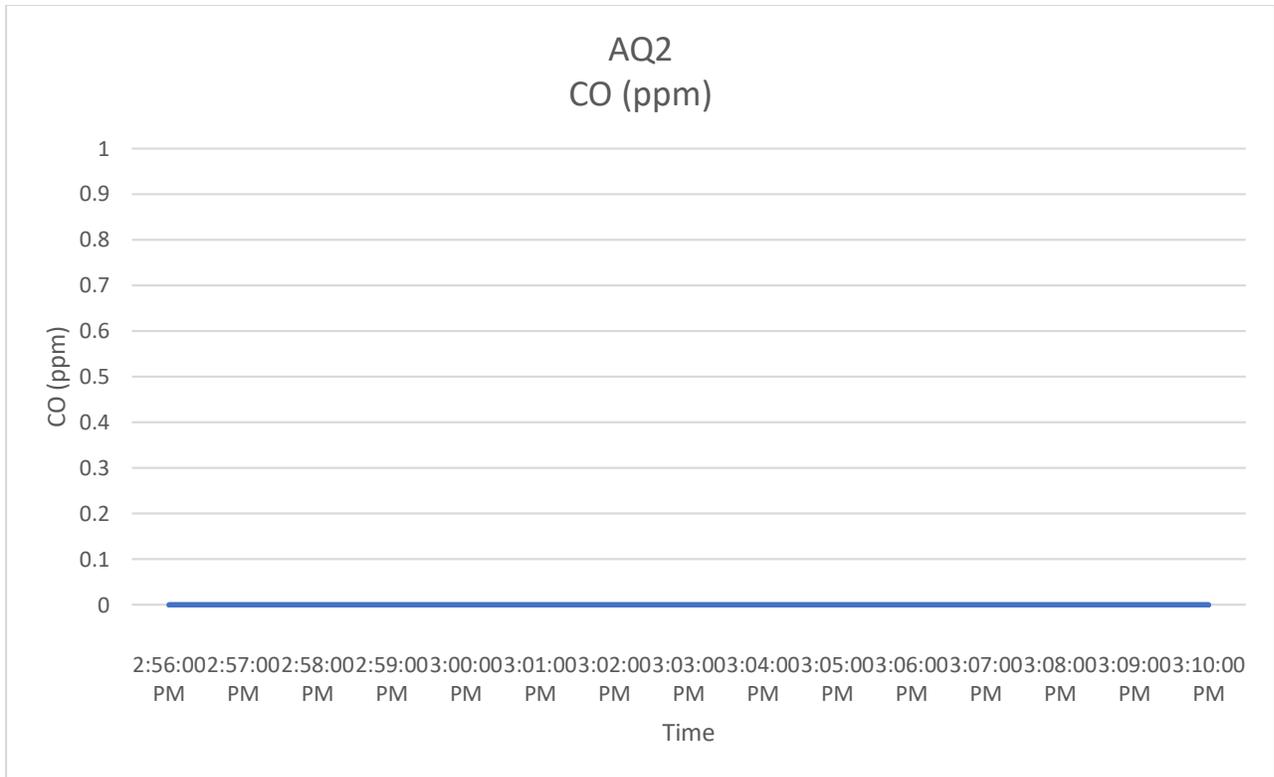


Figure 3-16 – Results Pattern of CO Monitored over a 15 Minute Period at Location AQ 2

Particulate Matter

Table 3-11 presents the of PM_{2.5} and PM₁₀ measurement at the two locations within the project site, while Figures 3-17 and 3-18 show the results patterns of both PM_{2.5} and PM₁₀ measured. The results recorded show significantly low levels of PM_{2.5} and PM₁₀ at the project site, even though the landfilling activities were ongoing. The levels recorded are well below the WHO acceptable limits.

Table 3-11: Results for Particulate Matter Measured

Location ID	Start Time (hrs)	End Time (hrs)	1-Hour Mean (µg/m ³)	
			PM _{2.5}	PM ₁₀
AQ 1	12:31	13:35	0.0006	0.0009
AQ 2	13:40	14:48	0.0003	0.0006
WHO Acceptable Limits			25	50

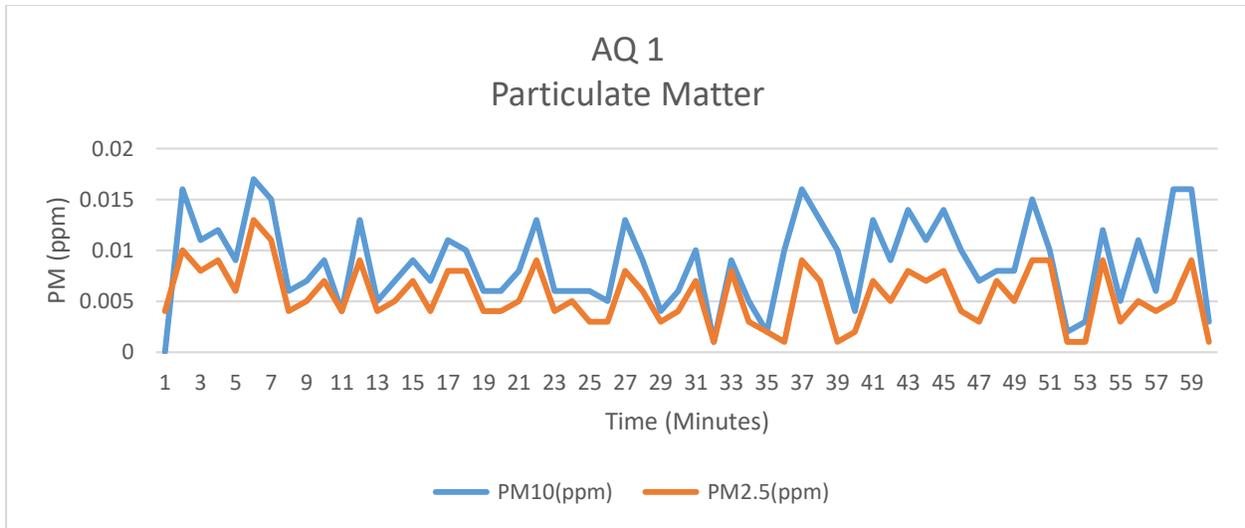


Figure 3-17 – Result Patterns of PM_{2.5} and PM₁₀ Monitored at Location AQ 1

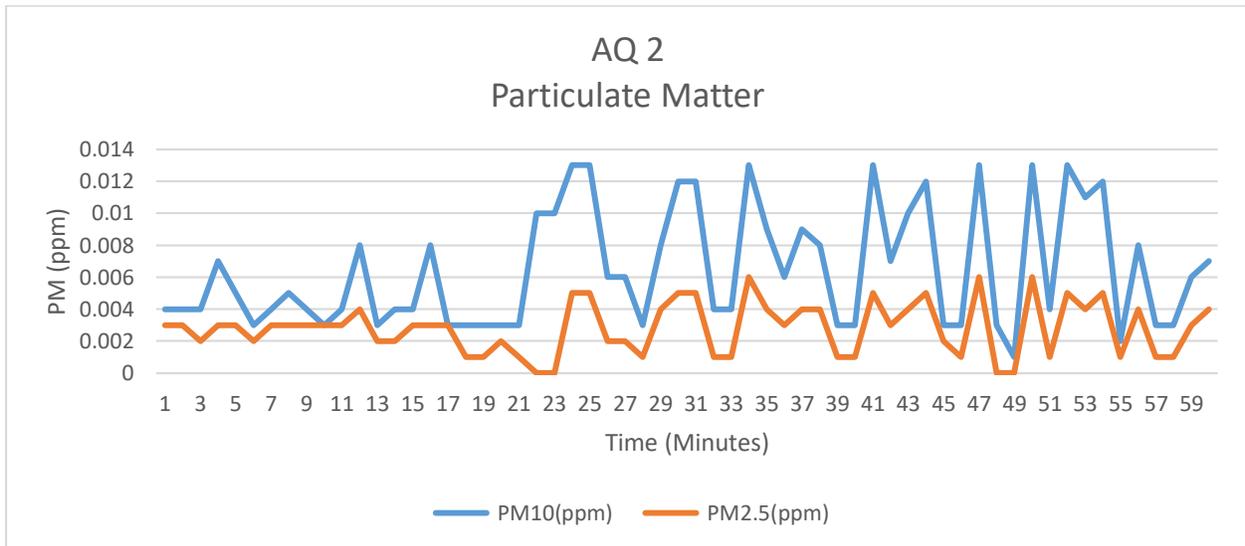


Figure 3-18 – Result Patterns of PM_{2.5} and PM₁₀ Monitored at Location AQ 2

3.1.2.3 Noise

Baseline data for noise levels at the project site was established through the conduct of a noise measurement exercise which recorded the decibel levels over a duration of 15 minutes at each corner of the property.

Methodology

Noise measurement locations were selected prior to site visit and comprised of the four corners of the property (southeast, northeast, southwest and northwest corners). Table 3-12 provides information

pertaining the noise measurement locations, while Figure 3-19 shows the locations of the noise measurement points.

Table 3-12: Noise Level Measurement Locations

Location ID	Locations Description	Co-ordinates
N1	South-eastern boundary of Block 1	21 N 0366732 UTM 0730481
N2	North-eastern corner of Block 1	21 N 0366731 UTM 0730581
N3	North-western corner of Block 1	21 N 0366341 UTM 0730572
N4	South-western corner of Block 1	21 N 0366341 UTM 0730483

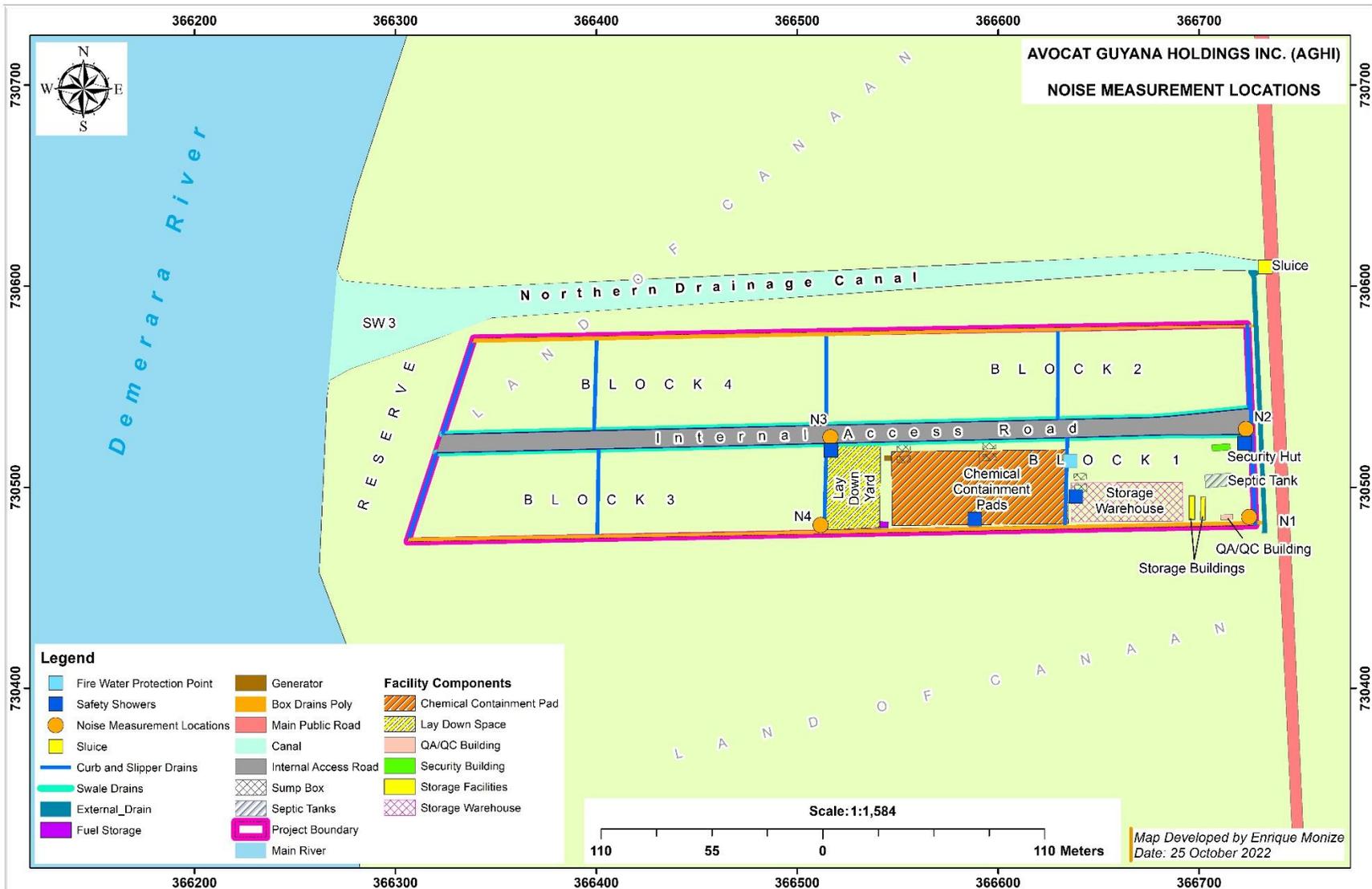


Figure 3-19: Noise Measurement Locations

Noise measurements were recorded at each location over a 15 minute period using a Reed R8080 meter which was mounted approximately 3-4 feet from the ground on a tripod (refer to Figure 3-19). The Reed R8080 is a high accuracy meter with a standard deviation of ± 1.4 dB meeting the required type 2 standards. Data was recorded by the meter at 2 seconds intervals. The maximum and minimum values were also documented at the end of the sampling.



Figure 3-20: Noise Levels Measurement at the Southeastern Boundary of the Property

Results

Table 3-13 presents the results of the ambient noise level measurements for the four sampling locations. Potential influencers of ambient noise readings were also documented so as to make conclusions as to sources of peaks in the noise at all sites. Relatively high levels were recorded at the eastern boundary where noise levels were at their maximum values of 93.1 and 95.8 dB. This was directly as a result of background traffic noise such as horns from trucks and the noise from engines as vehicles passed-by on the East Bank Demerara thoroughfare. Lower values for maximum noise levels were recorded at the western boundaries even though heavy duty equipment were operating within the property. Figures 3-21 to 3-22 provide graphic representations of how the noise levels fluctuated at the project site during the 15 minutes measurement period.

Table 3-13: Results of Noise Level Measurements

Location ID	Description	Date	Time (hrs)		Reading (dB)		Comments and Observations
			Start	End	Max.	Min.	
N1	South-eastern boundary	24/08/2022	13:13	13:28	93.1	57.1	Road traffic noise and excavators nearby
N2	North-eastern boundary	24/08/2022	12:08	12:32	95.8	49.5	Road traffic noise and excavators nearby
N3	North-western boundary	24/08/2022	14:15	14:30	83.7	62.7	Excavators, bulldozers and trucks compacting sand
N4	South-western boundary	24/08/2022	14:01	14:16	82.0	49.2	Excavators, bulldozers and trucks compacting sand

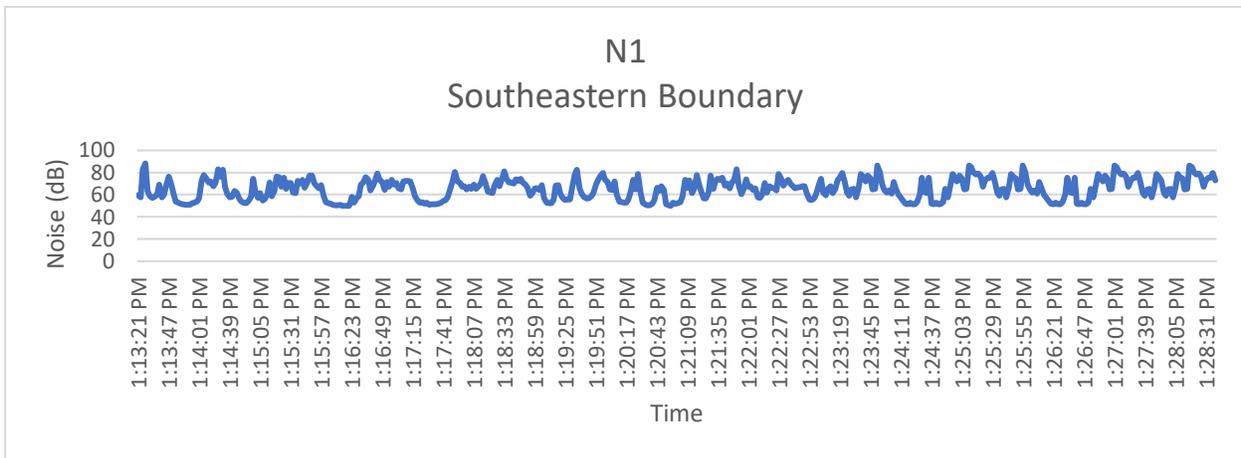


Figure 3-21: Fluctuation of Noise Level at Location N1 during the Measuring Period

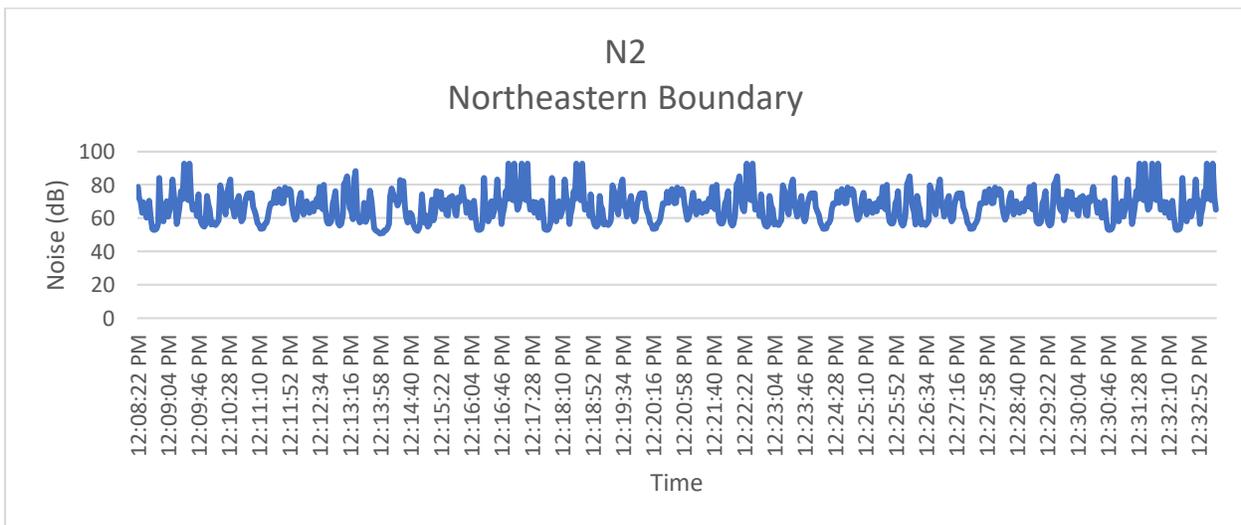


Figure 3-22: Fluctuation of Noise Level at Location N2 during the Measuring Period

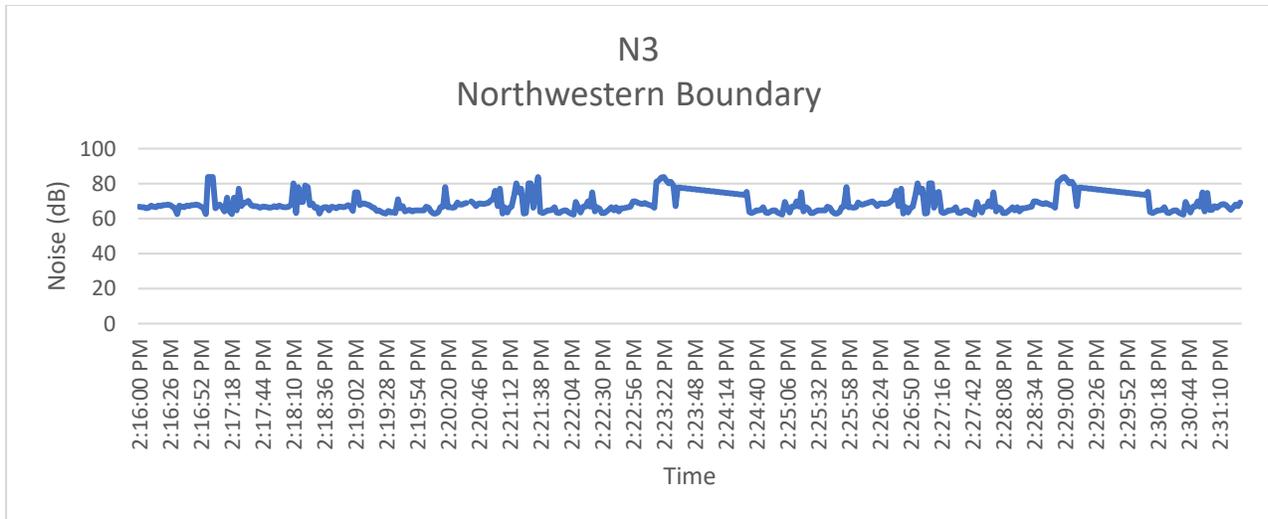


Figure 3-23: Fluctuation of Noise Level at Location N3 during the Measuring Period

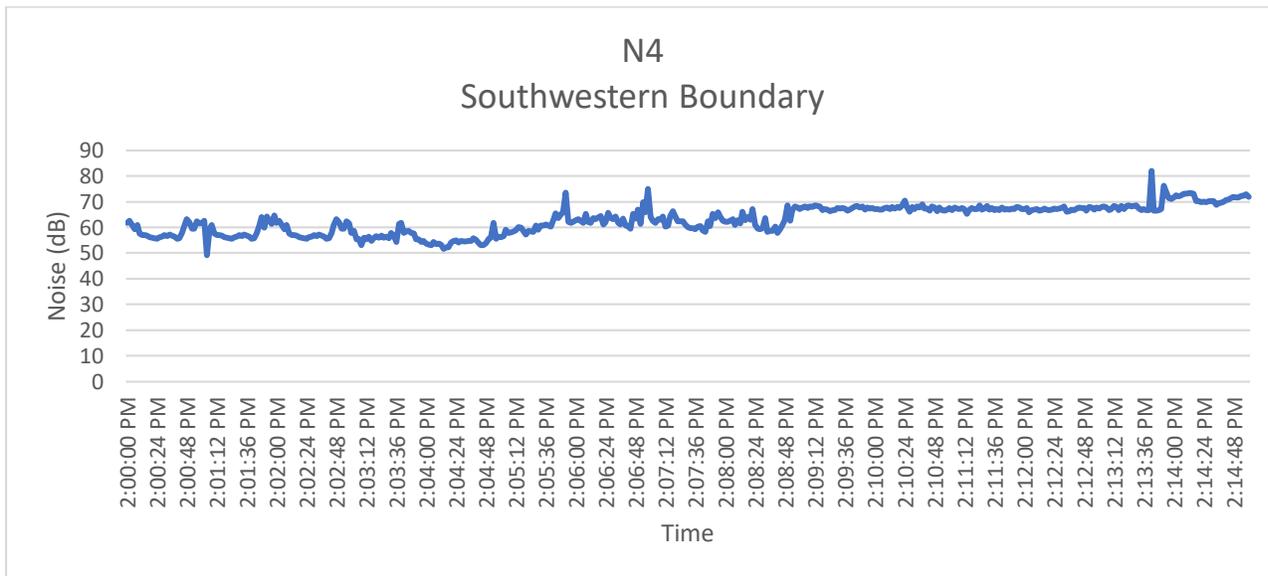


Figure 3-24: Fluctuation of Noise Level at Location N4 during the Measuring Period

3.1.3 Land

3.1.3.1 Geology

According to the Guyana’s National Land Use Plan (NLUP), 2013, Guyana is usually considered to consist of four (4) main natural regions; Coastal Plain, Hilly Sand and Clay Region, Interior Savannahs and Forested Highlands. The project site is located within the coastal plain of Guyana. The coastal plain is a narrow belt (ranging between 8 and 65 km in width with a length of 440 km) stretching from the Corentyne River in the east to Waini Point in the west. Studies by Bleackley (1956) on the stratigraphy of the coastal plain have resulted in the identification of four formations: The Demerara Clay, Coropina Formation, White Sand Series, and Berbice Formation. These four formations are essentially comprised of a sequence of

unconsolidated sediments considered to be of Plio-Pleistocene to recent age overlying a Precambrian age basement complex of metamorphic, magmatic and volcanic rocks of the Guiana Shield. According to Bleackley (1956) datum, the stratigraphy of the coastal plain is of the following:

1. The Demerara Clay and Coropina Formations – The average thickness is 45 m and are commonly known as the uppermost clay, overlying the White Sand Series. The Coropina Formation or old coastal plain is a reddish-yellowish compact clay overlain by the recent grey-brown Demerara Clay, which extends seaward ~ 15 km. The area covered by the above clays is poorly drained and marshes and coastal lagoons are developed on it. The clays, which contain brackish water, confine the upper part of the White Sand complex.
2. The White Sand Series Formation - This series consists of up to 1500 m of a clastic sequence that extends from the Essequibo River in the west to the Corentyne River in the southeast, through Suriname. Laterally, the formations develop into the following bearing units:
 - a) The Upper Sand Series of loose angular quartz sand 15—55 m thick. It is known also as the uppermost confined coastal aquifer, is usually of brackish water close to the coast and along the river channels, and is subject to tidal effects;
 - b) Intermediate Clay and Sand Series, a predominantly argillaceous unit ~ 90 m thick underlying the Upper Sand. Although locally water can be tapped from its sandy intervals, it is considered as an aquitard between the Upper Sand and deeper aquifers;
 - c) Lower Sand Series (Bleackley's A sands) consists of a 12--30 m thick unit of quartz sand and gravels and forms the major coastal aquifer. Although it is only found at 90 m depth in the perimeter (Essequibo), it is 220 m deep in Georgetown and more than 300 m in the central part of the basin. Its drop-in depth is accompanied by a thickening of the unit from 12 to 30 m.
 - d) The Alternating Sand and Clay Beds, a sequence of 65—130 m of sand and clay underlying the Lower Sand; and
 - e) The B Sands - This unit consists of alternating cemented sand and hard shale. In Georgetown, it is 12--22 m thick and becomes less identifiable in the central part of the coastal plain. Water quality is excellent, and the temperature higher than that of the A Sands.
3. The Berbice Formation - This formation constitutes some 375 m of Cretaceous indurated conglomerate and sandstone with shale intercalations overlying the basement complex.
4. The Basement Complex – Metamorphic, magmatic and volcanic rocks of Precambrian age form the basement complex of the Guiana Shield. The exposed contacts between the basement and the White Sand Series delineate the boundary of the coastal artesian basin.

Specifically, the project area is underlain by migmatites (younger granites). The granite bedrock is overlain by quaternary marine clays. Modern fluvial deposits associated with the Demerara overlie these deposits. This alluvium appears to have high clay content.

3.1.3.2 Soils and Topography

According to the NLUP (2013), the coastal plain is part of the flat, low-lying coastal lands that extend along the coast of South America from the Amazon River in Brazil to the Orinoco River in Venezuela. The coastal plain is composed of a great variety of soils developed from a variety of parent materials such as marine

and fluvio-marine deposits with back-swamp organic soils. In general, the soils closer to the shore and along rivers are more fertile than the soils behind which can have very low fertility and toxicity in some instances.

Soils mapped within the landscape of the project site are described as low humic gleys of high base status, marine phase "frontland clay" (Hydraquents with Sulfaquents, Fluvaquents). In Guyana, this mapping unit occurs mainly on the coastal plain of eastern Guyana from the Essequibo to the Corentyne River stretching some 32 km 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. In much of the coastal plain, these soils have a land use of rice and sugar cultivation along with coconuts on the sandy reefs. As classified in the Land Capability Classification Map of North-eastern British Guiana (FAO, 1964), the natural occurring soils of the landscape of the project site are classified as Class I-II, that is, good to moderate agriculture land of soils with naturally poor drainage, deep, mainly clays with silty soil often associated with rivers, and sandy soils in intermittent strips paralleling the coast. Fertility is relatively high but with small, scattered, elevated inland areas with low fertility. During the preparation of the EAMP, the naturally occurring soils within the project site were being covered with white sand and loam, as part of a landfilling exercise to raise the elevation of the land.

The landscape of the coastal plain is flat. Typical ground level is 1 m below mean sea level at the coast rising gradually inland to approximately 8 m above sea level at the junction of the White Sand Formation immediately south of the Coastal Plain.

The average natural land elevation of the site is 16:00 GD (Georgetown Datum), being 1.2 m below the elevation of the main East Bank Demerara Road. The site elevation data indicate the land elevation is below the recorded flood elevation of 16.429 GD. As such, there is the need for extensive land filling, drainage and retainment of the landfill for the entire site.

3.2 Ecology and Biodiversity

3.2.1 Overview

Guyana is divided into three major biogeographical provinces (Guyana/UNEP, 1992) namely: the coastal biogeographical province, the savannah biogeographical province and the forest biogeographical. The project area is located within the Coastal Province which stretches along the low coastal plain.

Generally, the natural landscape of the coastal plain is characterized by cultivated fields and secondary (degraded) vegetation (Huber et al., 1995). Historic and current human activities have substantially modified the primary ecological functions and species composition of the coastal plain, resulting in the fragmentation and loss of natural habitats through urbanization, agricultural and industrial activities. Species present within the human-modified coastal habitats, inclusive of the project area, are those that easily adapt and thrive successfully in continuously changing environments.

The project landscape at Land of Canaan is situated within the East Bank of the Demerara River of the East Demerara Coastal Plain. The East Demerara Coastal Plain consists of habitats that include urban areas and the extensive landscape east and south-east of the project site which were previously used for sugar cane cultivation, and now developed for urban housing and industrial uses. Habitats typical of the East Bank of the Demerara River include: mangroves (protected habitats); salt/brackish marsh lands; mudflats;

cultivated/abandon sugar cane fields; pasture and secondary forest lands; urban areas; and drainage canals and sluices.

It should be noted that at the time the study was conducted, the actual project site was completely cleared of all vegetation and sand filled. This was also the case with neighbouring properties, some of which were already developed for industrial uses. The species accounts of the project landscape therefore took into consideration the wider area and were obtained mainly from observation and informal interviews with residents during site visits. References from studies of areas that share similar habitat characteristics was also instrumental in generating the species checklists. These studies include: the WWF-Guianas – Wetlands of Guyana (2012) study, which characterized 23 wetlands sites within Guyana including the East Demerara Water Conservancy and the Ministry of Public Works and Communication ESIA for the East Bank Four Lane Rehabilitation Project, 2010.

The fact that the project area has been constantly subjected to anthropogenic activities over the past decades, suggests a shift from its original classification. As such, these areas are now considered to be classified as grasslands. In fact, prior to the land clearing and sand filling activities, the project site would have been characterized by successional grass vegetation and broad-leaved sedges intermixed with common woody shrubs. Aquatic vegetation characteristic of the project landscape includes dominant succulents like the Spike rush (*Bisi Bisi - Eleocharis sp.*), the floating-leaved water snowflakes (*Nymphoides indica*), the fragrant water lily (*Nymphaea ordata*) and the Antelope grass (*Echinochola holubii*).

Terrestrial vegetation includes introduced species as bamboo, and Jamun (*Syzygium cumini*); common broad leaved sedges such as the Heliconia (*Heliconia psittacorum*), wild eddo (*Caladium bicolor*), moko moko (*Montrichardia sp.*), bracken-fern (*Pteridium aquilinum*), giant shame bush (*Neptunia prostrate*); grass species such as Bahama grass (*Cynodon dactylon*), Nut grass (*Cyperus rotundus*), Carpet grass (*Axonopus compressus*), Para grass (*Brachiaria mutica*), Burr grass (*Cenchrus echinatus*) Jew grass (*Imperata brasiliensis*), Sour grass (*Paspalum conjugatum*), Razor grass (*Paspalum virgatum*), Iron grass (*Sporobolus jacquemonti*); woody perennial shrubs like the Black sage (*Cordia macrostachya*), and Antidesma (*Antidesma ghaesambilla*).

Faunal species typical of the landscape are predominantly species that adapt easily to human disturb habitats. Birds known to occur in the landscape of the project site include the Kiskadee (*Pitambus sulphuratus*), Cattle egret (*Bubukui ibis*), Blue sackie (*Thraupis episcopus*), Wattled Jacana (*Jacana jacana*), Yellow Plantain (*Icterus nigrogularis*), Herons, and the Dove (*Columbigallina passerina*).

Common fish species include chiclids such as the Patwa (*Cichlosoma bimaculata*), and Sunfish (*Grenicichla alata*), the freshwater barracudas or Houri (*Hoplias malabaricus*).

Herpetofaunal species such as the Crapaud (*Bufo marinus*), gecko (*Thecadactylus rapicauda*), salipenta (*Tupinambus tebuixin*), and the common frog (*Hyla minuta*) were also observed. Domesticated animals such as sheep and cattle were also noted

These are mainly species that adapt and thrive successfully owing to their ability to adapt well to rapidly changing environments.

3.2.2 Method of Assessment

An assessment of the biological environment was conducted using a three-phase method which is outlined in Figure 3-25 and is further described below.

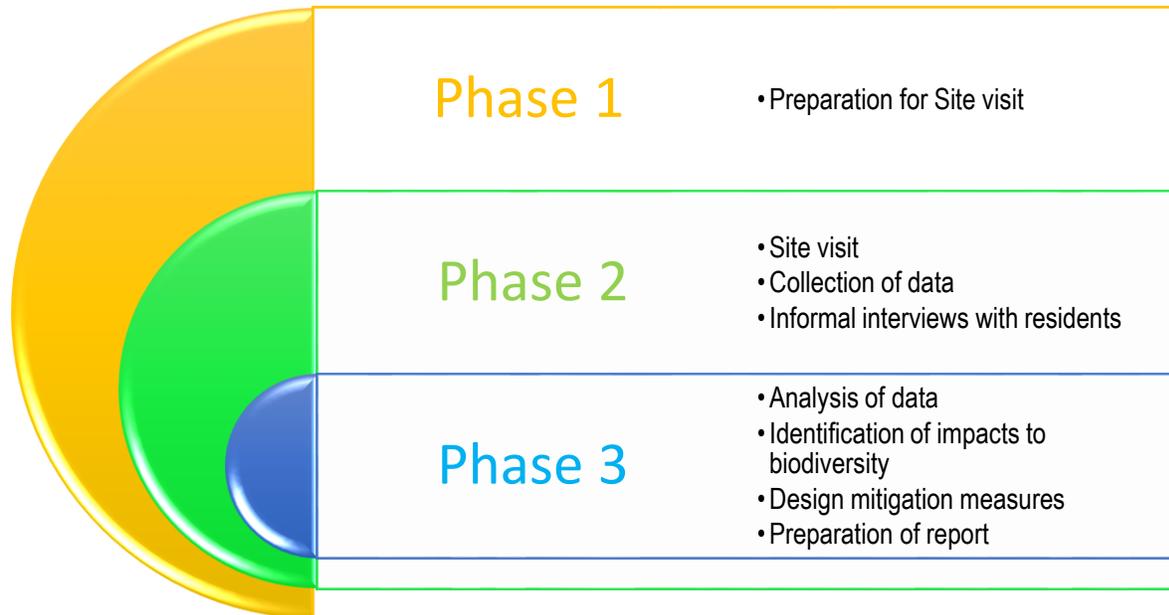


Figure 3-25: Three-Phase Method Used in the Assessment of the Biological Environment

Phase 1 – Preparation for site visit - Prior to the site visit, literature was reviewed so as to develop a list of potentially known species, both flora and fauna, that are common to the project area and areas similar in nature. This also helped in enhancing the list of species compiled during the site visit, since the project site is completely cleared of vegetation.

Phase 2 – Site visit and collection of data - The assessment of the biodiversity within the project area was mainly conducted through informal interviews with persons from the area and visual encountered surveys. Interviews were conducted to determine the domesticated flora and fauna within the area, whereas visual encountered surveys were done mainly to identify the wildlife species (primarily birds, mammals and insects).

Phase 3- Data analysis, identification of impacts, mitigation measures and preparation of final report - Data obtained from the literature reviewed and the site visit was compiled to establish baseline lists of species for both flora and fauna that are commonly found within the extent of the project area. Possible impacts to the biological environment were also assessed and mitigation measures were designed.

3.2.3 Species Checklists

3.2.3.1 Flora

The project site itself was utilized previously for agriculture purposes. This is evident in the surrounding areas whereby fruit trees can still be seen (as listed in table below). Over the years, the development of

lands within the project area has resulted in secondary vegetative growth, which mainly includes shrubs and a variety of grass species. These species are resilient and can withstand the impacts of human daily activities. There are a few species that have establish dominance within the project area. These include *Cassia alata* (Carrion crown bush), *Cynodon dactylon* (Bahama grass), patches of *Axonopus compressus* (Carpet grass), *Chloris gayana* (Rhodes grass) and *Digitaria eriantha* (digit grass). All of these species are very adaptive, resilient and used mainly for cattle grazing. Table 3-14 below provides a list of some of the common flora species that can be found in the wider project area, while Figures 3-26 and 3-27 show common flora species found within the wider project area.

Table 3-14: Some of the Common Flora Species that can be found in the Wider Project Area

Neighbouring Flora Species				
COMMON NAME	FAMILY	GENUS	SPECIES	FREQUENCY/ COMMENTS
Mango	ANACARDIACEAE	<i>Mangifera</i>	<i>indica</i>	Common
Coconut	ARECACEAE	<i>Cocos</i>	<i>nucifera</i>	Common
Lime	RUTACEAE	<i>Citrus</i>	<i>latifolia</i>	Common
Dongs	RHAMNACEAE	<i>Ziziphus</i>	<i>jujube</i>	Common
Papaya	CARICACEAE	<i>Carica</i>	<i>papaya</i>	Common
Flora Species within Project Area				
COMMON NAME	FAMILY	GENUS	SPECIES	FREQUENCY/ COMMENTS
Burr grass	POACEAE	<i>Cechrus</i>	<i>echinatus</i>	Very common
Carpet grass	POACEAE	<i>Axonopus</i>	<i>compressus</i>	Very common
Bahama grass	POACEAE	<i>Cynodon</i>	<i>dactylon</i>	Very common
Bird seed grass	POACEAE	<i>Echinochloa</i>	<i>colonum</i>	Very common
Rhodes grass	POACEAE	<i>Chloris</i>	<i>gayana</i>	Very common
Digit grass	POACEAE	<i>Digitaria</i>	<i>eriantha</i>	Very common
Razor grass	POACEAE	<i>Paspalum</i>	<i>Virgatum</i>	Common
Para grass	POACEAE	<i>Brachiaria</i>	<i>Mutica</i>	Common
Jew grass	POACEAE	<i>imperata</i>	<i>brasiliensis</i>	Common
Sour grass	POACEAE	<i>Paspalum</i>	<i>conjugatum</i>	Common
Iron Grass	POACEAE	<i>Sporobolus</i>	<i>jacquemontii</i>	Common
Carrion crow bush	CAESALPINIACEAE	<i>Cassia</i>	<i>alata</i>	Very common
Money bush	CAESALPINIACEAE	<i>Cassia</i>	<i>obtusifolia</i>	Very common
Wild coffee	CAESALPINIACEAE	<i>Cassia</i>	<i>occidentalis</i>	Common
Shak-Shak	FABACEAE	<i>Crotalaria</i>	<i>incana</i>	Common
Sweet heart/Watch man	FABACEAE	<i>Desmodium</i>	<i>frutescens</i>	Common
Water hyacinth	PONTEDERIACEAE	<i>Eichhornia</i>	<i>crassipes</i>	Common
Bracken Fern	DENNSTAEDTIACEAE	<i>Pteridium</i>	<i>aquilinum</i>	Common
Giant shame bush	MIMOSACEAE	<i>Mimosa</i>	<i>pigra</i>	Common
Alligator eye	SALVINIACEAE	<i>Salvinia</i>	<i>auriculata</i>	Common
Moko Moko	ARACEAE	<i>Montricardia</i>	<i>arborescens</i>	Common
Soap bush	ARACEAE	<i>Sphenoclea</i>	<i>zeylancia</i>	Common
Wild Eddo	ARACEAE	<i>Caladium</i>	<i>bicolor</i>	Common
Conga pump	CECROPIACEAE	<i>Cecropia sp.</i>		Common

Aunty Desmond	CECROPIACEAE	<i>Antidesma</i>	<i>bunius</i>	Common
Common Lantana	VERBENACEAE	<i>Lantana</i>	<i>camara</i>	Common
Soda Apple	SOLANACEAE	<i>Solanum</i>	<i>viarum</i>	Common
Sand box tree	EUPHORBIACEAE	<i>Hura</i>	<i>crepitans</i>	Common
Parrot beak	<u>HELICONIACEAE</u>	<i>Heliconia</i>	<i>psittacorum</i>	Common
Jamun	<u>MYRTACEAE</u>	<i>Syzygium</i>	<i>cumini</i>	Common
Nut Grass	CYPERACEAE	<i>Cyperus</i>	<i>rotundus</i>	Common
Black sage	LAMIACEAE	<i>Salvia</i>	<i>mellifera</i>	
Clammy Cherry	BORAGINAAECEAE	<i>Cordia</i>	<i>tetranda</i>	Common



Figure 3-26: Common Flora Species found within the Wider Project Area (A- Razor Grass (*Paspalum virgatum*), B – Moko Moko Fruit (*Montrichardia arborescens*), C - Moko Moko Tree (*Montrichardia arborescens*), D – Lemon Grass (*Cymbopogon Spp.*) and E - Eddoe Plant (*Colocasia antiquorum*))



Figure 3-27: Common Flora Species found within the Wider Project Area (A- Giant Shame Bush (*Mimosa Pigra*), B – Carrion Crow Bush (*Cassia alata*), C – Congo Pump Tree (*Cecropia obtusa*) D – Moko Moko – (*Montricardia arborescens*))

3.2.3.2 Fauna

The diversity of fauna within the surrounding area was not as expected, in fact, few species were observed during the site visit, which may have been attributed to the general area currently being influenced heavily by land development activities. Nevertheless, a few species of butterflies, wasps, beetles, birds such as the kiskadee, dove, yellow plantain, etc. were sited. Domesticated animals such as cows, sheep, goats, etc. also exist within neighboring communities. The area is reported to have fishes such as hassar, houri, and sunfish all common in fresh and brackish water systems. The area also contains reptiles and amphibians including snakes, lizards, and crapauds, none of which are considered threatened or endangered. The large variety of grass gave rise to a diverse list of common insects which includes follow-me (*Polybia occidentalis*), honey bee (*Apis mellifera*), crickets (*Gryllus spp.*), butterflies such as the monarch or simply monarch (*Danaus plexippus*), passion fruit butterfly (*Dione vanillae*) etc., wasps, dragon flies, flies, and beetles. Table 3-15 below provides a list of some of the common fauna species that can be found in the wider project area, while Figure 3-28 provides photographs taken of common faunal species found within the wider project area.

Table 3-15: Some of the Common Fauna Species that can be found in the Wider Project Area

FAMILY/COMMON NAME	SPECIES NAME
VERTEBRATES	
BIRDS	
Columbinidae	
Dove	<i>Columbina passerine</i>
ARDEIDAE	
Great Egret	<i>Egretta alba</i>
Icteridae	
Yellow Plantain	<i>Icterus nigrogularis</i>
Carib Grackle	<i>Quiscalus lugubris</i>
Trochilidae	
Spectacled Humming bird	<i>Schistos geofforyi</i>
Tudidae	
Cocoa Thrush	<i>Turdus fumigatus</i>
Tyrannidae	
Kiskadee	<i>Pitambus sulphuratus</i>
JACANIDAE	
Spurwing	<i>Jacana jacana</i>
THRAUPIDAE	
Peezing	<i>Volatinia jacarina</i>
TURDIDAE	
Cocoa Thrush	<i>Turdus fumigatus</i>
LARIDAE	
Seagull lesser black backed	<i>Larcus fuscus</i>
MAMMALS	
Herpestidae	
Mongoose	<i>Herpestes auropunctatus</i>
FISHES	

Cichlidae	
Patwa	<i>Cichlosoma bimaculata</i>
Sunfish	<i>Grenicichla alata</i>
Erythrinidae	
Huri	<i>Hoplias malabaricus</i>
Pimelodinae	
Kasi	<i>Rhamdia quelen</i>
Simoridae	
Hassar	<i>Hoplosternum littorale</i>
Silverbait	<i>Astanyax sp</i>
AMPHIBIANS	
Bufo	
Crapaud	<i>Bufo marinus</i>
Hylidae	
Water frog	<i>Hyla sp.</i>
REPTILES	
Teiidae	
Salipenta	<i>Tupinambus tebuixin</i>
Tropiduridae	
Lizard	<i>Trapidorus hisperus</i>
Viperidae	
Labaria Snake	<i>Bothrops atrox</i>
INVERTEBRATES	
Formicidae	
Ants	<i>Pheidole sp.</i>
<u>Scarabaeoidea</u>	
Black beetle	<i>Deltochilum icarus</i>
Libellulidae	
Dragon fly	<i>Erythrodiplax sp</i>
Pieridae	
Yellow butterfly	<i>Phoebis argante argante</i>
Nymphalidae	
Monarch	<i>Danaus plexippus</i>
Passion Fruit butterfly	<i>Dione vanillae</i>
White lace butterfly	<i>Anartia jatrophae</i>
Pieridae	
Yellow butterfly	<i>Aprnissa statira statira</i>
Vespidae	
Follow-me	<i>Polybia occidentalis</i>
Apidae	
Black bee	<i>Xylocopa latipes</i>
Honey bee	<i>Apis mellifera</i>
Gryllidea	
Cricket	<i>Gryllus Sp.</i>
Acrididae	
Grasshopper	<i>Melanoplus ponderosus</i>



Figure 3-28: Common Fauna Species within the Wider Project Area (A- Black Bee (*Xylocopa latipes*), B- Tadpoles, C- Seagull (*Larus fuscus*), D- Grass Hopper (*Melanoplus ponderosus*))

3.2.3.3 Aquatic Biodiversity

The main water bodies within the project area are the Demerara River and a network of drainage canals. The proximity of the project site in relation to the mouth of the Demerara River suggests that the river flow is tidal and there will be some degree of salinity, thus making the water brackish. As a result, the aquatic species within the River within the vicinity of the project site will be limited to those which are tolerable to a more saline environment. However, typical flora that is affiliated with rivers and river banks can be observed. This includes mainly, moko moko (*Montrichardia arborescence*), alligator eye (*Salvinia auriculata*) and water lettuce (*Pistia stratiotes*).

3.2.4 Special Status Species

The latest update of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species shows that globally 17,291 species out of the 47,677 assessed species are threatened with extinction. Twenty-one percent of mammals, 30 percent of amphibians, 12 percent of birds, and 28 percent of reptiles, 37 percent of freshwater fishes, 70 percent of plants, and 35 percent of invertebrates assessed so far are under threat. This data represents global abundance, and therefore does not imply that because a particular species is on the list means that it is threatened in all areas. Many species require particular habitats and resources and where such needs are met, some of these species are present in healthy numbers, even in the absence of conservation measures. Further, the IUCN Red List of Threatened Species was examined to assess whether there are critically endangered or endangered species existing within the landscape of the project site.

As previously explained, the project landscape is largely modified, human disturbed coastal habitats and is not known to contain and critically endangered species. Perusal of species data compiled for the Demerara Coastline revealed three IUCN Red List species are known to occur within the coastal landscape of the project area. All three species are associated with the wetlands of the EDWC, which is located far from the influence of the project site. The Red List species include the giant river otter (*Pteronura brasiliensis*) listed as Endangered, the blue-cheeked parrot (*Amazona dufresniana*) listed as Near Threatened and the Brazilian tapir (*Tapirus terrestris*) listed as Vulnerable.

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments, whose aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. As a result, CITES created three appendices according to the degree of protection they need. In the list of fauna diversity presented in Table 3-15, none of the species were recorded as CITES.

3.2.5 Areas of Conservation Interest

The landscape of the project area has not been identified by the Government of Guyana (GoG) as a priority for conservation interest. The conservation initiatives in Guyana are largely focused on the larger forested landscapes of central and southern Guyana or in the Rupununi Savannas region.

The conservation priority sites identified by the GoG include the legally protected areas of the Kanuku Mountains, the Shell Beach Protected Area, the Kaieteur National Park, the Iwokrama Rainforest Reserve, and the Community Owned Conservation Area at Konashen, and other areas of biological interest not legally protected including the Guyana Forestry Commission Moraballi and Mabura Reserves, the Orinduik Falls, the Roraima Mountains, and the Urban Parks (the Botanical Gardens, and National Park in Georgetown and the Joe Viera Park on the West Bank of Demerara). None of the legally protected areas and other areas of biological interest are located within the area of influence of the project.

There are no recognized areas of global importance to biodiversity within the landscape of the project. There are no Zero Extinction Sites, listed Ramsar Wetland Sites within Guyana or officially designated areas in Guyana identified as Important Bird Areas (IBAs). The two current proposed Ramsar Sites in Guyana are Shell Beach and the Rupununi Wetlands, which are located well away from the project site. Birdlife International has proposed a total of 10 IBAs for Guyana. Table 3-16 identifies the proposed IBAs for Guyana. None of the IBAs proposed for Guyana are located near or within the landscape of the project

area. The locations of the protected areas, proposed Ramsar wetlands sites, and proposed IBAs in relation to the project site are shown in Figure 3-29.

Table 3-16: Birdlife International IBAs Proposed For Guyana

IBA NAME	ADM UNIT
Shell Beach	Barima-Waini
Karaw/Aruka	Barima-Waini
Ireng River	Upper Takatu-Upper Essequibo
North Rupununi-Karanambu Ranch	Upper Takatu-Upper Essequibo
Mapari-Kanuku Mountain	Upper Takatu-Upper Essequibo
South Central Rupununi	Upper Takatu-Upper Essequibo
Iwokrama	Potaro-Siparuni
Karasabai	Upper Takatu-Upper Essequibo
Northeast Coastline	Mahaica-Berbice
Pakaraima Mountains	Cuyuni Mazaruni

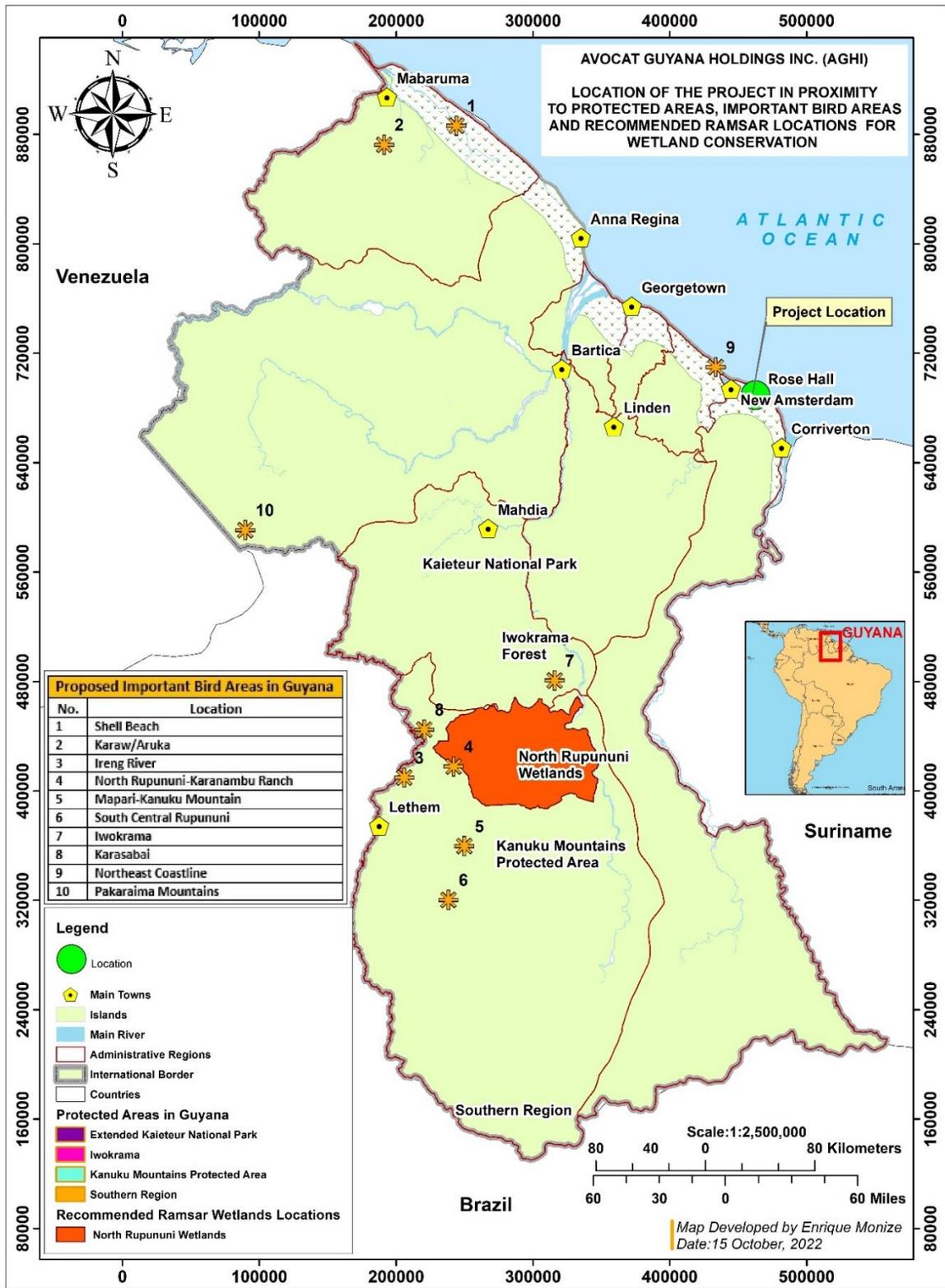


Figure 3-29: Location of the Project Site in Proximity to Protected Areas, Important Bird Areas and Recommended RAMSAR Locations for Wetland Conservation

3.3 Socio-economic Setting

This section describes the existing socioeconomic characteristics of the proposed project environment. It was developed based on secondary information contained in project-related materials; socio-economic reports and data obtained through government entities such as the Bureau of Statistics Guyana, Ministry of Housing and Water etc. It is also based on information obtained directly from ground truthing exercises (Reconnaissance Surveys, Drone Imaging, Rapid Assessments); and discussions with key project stakeholders. It is noted that although all efforts were made to locate recent data, in some cases, the available data are relatively dated (e.g., the most recent census was conducted in 2012).

3.3.1 Land Use

Land of Canaan is a community located on the right bank of the Demerara River, approximately 23 kilometres south of Georgetown. Land of Canaan is primarily accessible by road via the East Bank Demerara Public Road (Outridge, 2021). The proposed AGHI project site is located at Lot 'A' of Tract 'Y', Land of Canaan, East Bank Demerara, on 9.825 acres of land. The land designated for development under this project has never been used for commercial or residential purposes. The property is currently being developed by AGHI.

At present, Land of Canaan is one of the communities where there is significant industrial and commercial development (MoA 2015). In particular, there has been an increase in industrial and commercial activities within Land of Canaan due to the emerging oil and gas sector, and expanding building and infrastructure development sector. Principal amongst these activities are:

- Gafson's Industries Ltd (Gafsoors Manufacturing Complex).
- Baker Hughes Supercenter
- GuyGas Inc.
- Gulf Engineering Services
- Demerara Bakery
- Two Brothers Service Station
- Falls Gas Station
- Canaan Fisheries
- Goodwill Enterprises Inc. - Battery Factory

There are also a number of forestry related operations including sawmills, wood processing operations and lumberyards such as Eco-Woods, A. Mazarally and Sons Lumberyard, and A. Family and Sons Lumberyard (MoA 2015). Therefore, the main economic activities in Land of Canaan are from small, medium and large-scale businesses, and to some extent agriculture including poultry and cash crop farming. As such, many persons residing within and around Land of Canaan are employed at the aforesaid companies.

The immediate project area is bounded by industrial developments (oil and gas sector related developments) to the north and south, namely Baker Hughes Supercenter and Tripple D's Equipment Rental Ltd, respectively. The project site is also bordered by the East Bank Demerara Public Road to the east, the Demerara River to the west. The project site and the immediate surrounding land uses can be observed in Figure 3-30, including the distance away from each land use. Directly northeast of the public road (opposite the project site) is a flat concrete single family residential structure, and an elevated

wooden structure (Security Office) at the entrance of a property leading to Hyde Park Zoo Sanctuary and Tropical Gardens Inc. Beyond the immediate project area, further south (and directly after Tripple D's Ltd. property) is Tropicano Zoological Enterprise, which comprises a strip of land accommodating small-scale residential and commercial building structures (wooden and or concrete). Similarly, beyond the immediate project area, further southeast (directly after Tripple D's Ltd. property and east of the EBD public road) are several single-family residential structures (elevated and flat structures made of concrete and or timber), several commercial businesses such as a convenience store, a dress shop and a bird cage making shop. Some homeowners themselves operate these businesses out of residential lots. A private residential housing scheme (West Amazon Community Housing Scheme) is currently being constructed in the Land of Canaan area about 1.3 km north of the project site. The land use of the wider and immediate project area is shown in Figure 3-31. Pictures of current land uses and new developments can be seen in Figures 3-32 A and 3-33 B.

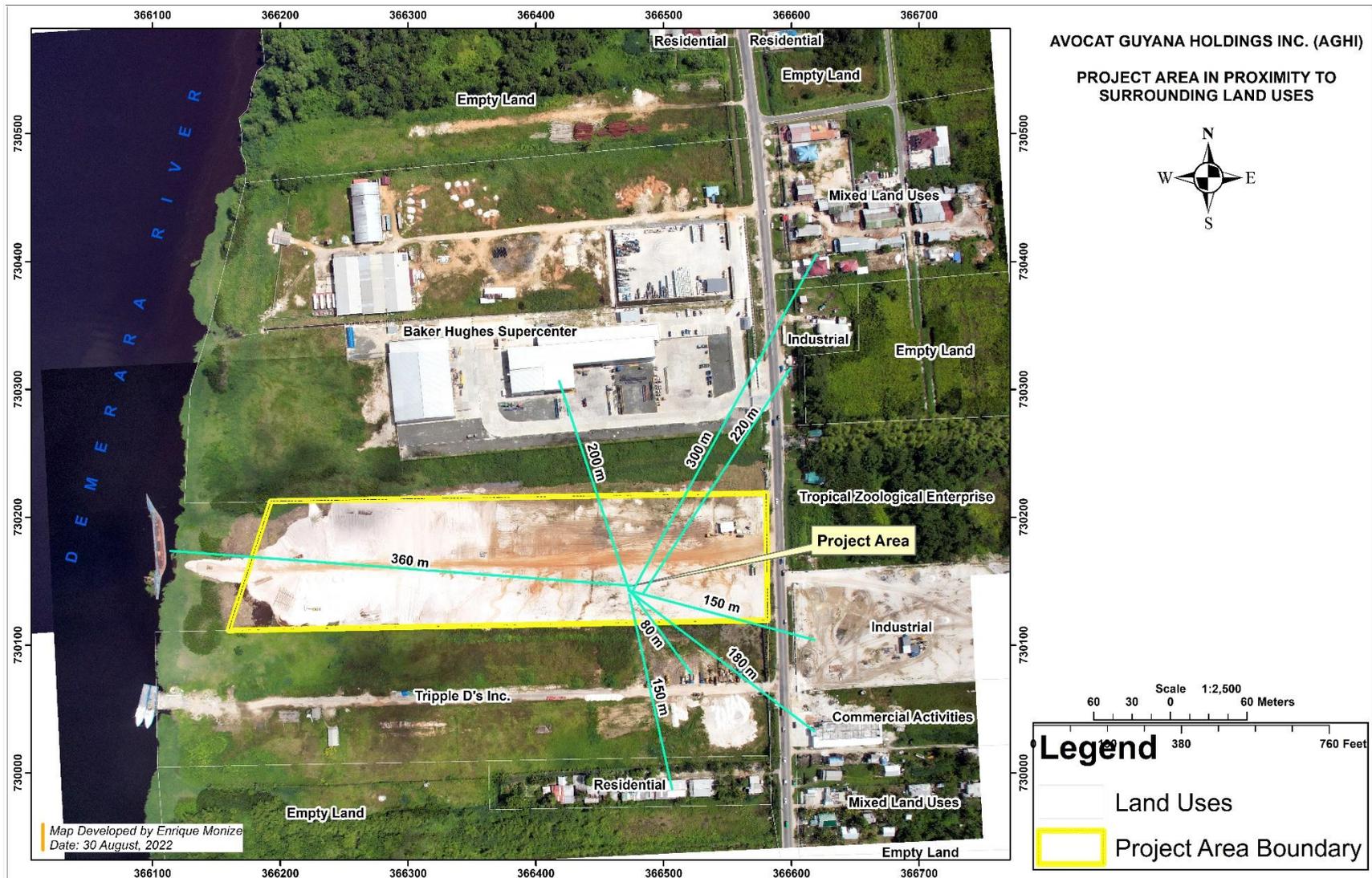


Figure 3-30: Surrounding Land Use and Proximity to AGHI's Project Area

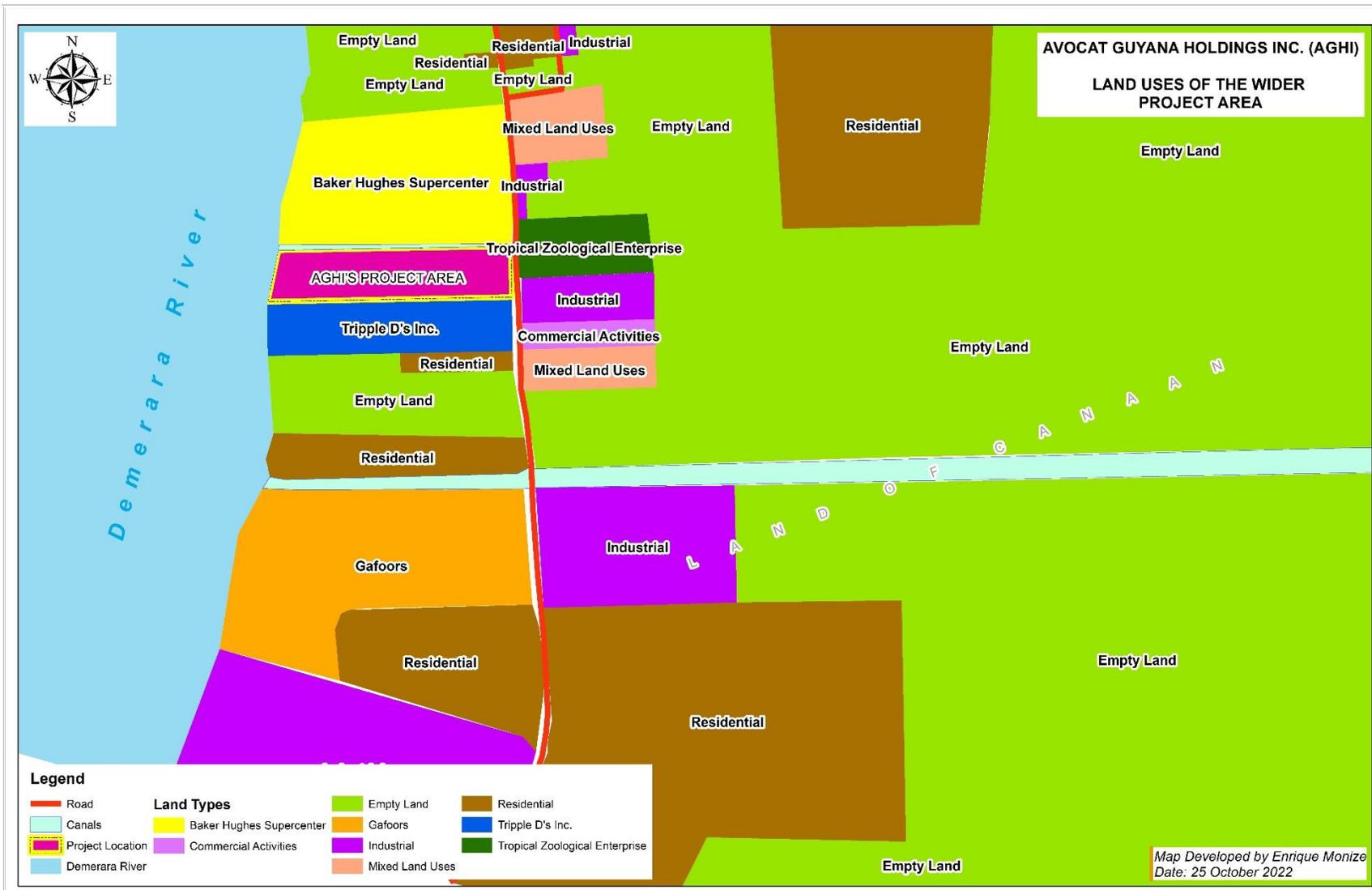


Figure 3-31: Surrounding Land Uses



Figure 3-32 A: Land Use Surrounding AGHI Project Site



Figure 3-32 B: Land Use Activities Surrounding AGHI Project Site

3.3.2 Local Governance

A Neighbourhood Democratic Council (NDC) covers a small geographic area within each region and is tasked with responsibility for the management and administration of the communities/villages within its boundaries. Thus, given its location in Land of Canaan, the project site falls within the jurisdiction of the Caledonia-Good Success NDC, which has a population of approximately 9,873 persons; 5,043 males and 4,830 females (BoS 2012) (see Table 3-17 for NDC Information). Specifically, the functions of this NDC are:

1. To provide efficient services for the residents as stated in the Laws. Services include sanitation, garbage disposal, road/dam maintenance, market facilities, burial grounds, abattoirs, drainage, etc.;
2. To maintain and protect public property;
3. To levy and collect rates.

Table 3-17: Information on Caledonia-Good Success NDC

Name of NDC	NDC Code	Address	Council Members	Statutory Meeting	Chairman	Telephone Number	Email Address
Caledonia – Good Success	414	Lot 401 School Street Craig, EBD	18	1 st Monday each month at 9:00 hrs	Dwarka Nauth	266-2239	cgsndc@gmail.com

Most of the villages within the Caledonia-Good Success jurisdiction were once plantation lands where agriculture and chicken farms were an important aspect of village livelihood. However, agricultural activity decreased with time as farmers migrated from the area. This has gradually changed the land uses in the broader area to mixed-use, including mainly residential, commercial and industrial. At present there are no existing zoning plans for villages within this NDC District, including Land of Canaan, to determine whether the village is principally residential, commercial, industrial or a combination of these. The present pattern of land use suggests a combination of the residential, commercial and industrial use. The Central Housing and Planning Authority, which has overall responsibilities for planning permission, has indicated that it is moving in the direction of preparing Rural Development Plans.

3.3.3 Demographics

The Population and Household Census of 2012 shows that Land of Canaan has a total population of 1,697 persons (within a total of 520 households), of which 877 were males and 820 were females (BoS 2012). The percentage of Land of Canaan population by sex can be observed in Figure 3-33. Land of Canaan was the most populated community when compared to all other villages within the Caledonia-Good Success NDC. However, it is expected that the current population of all villages within this NDC is much greater in the present day since the area is growing in terms of residential occupancy (due to increase demands for residential spaces), and where statistics are based on the 2012 Census.

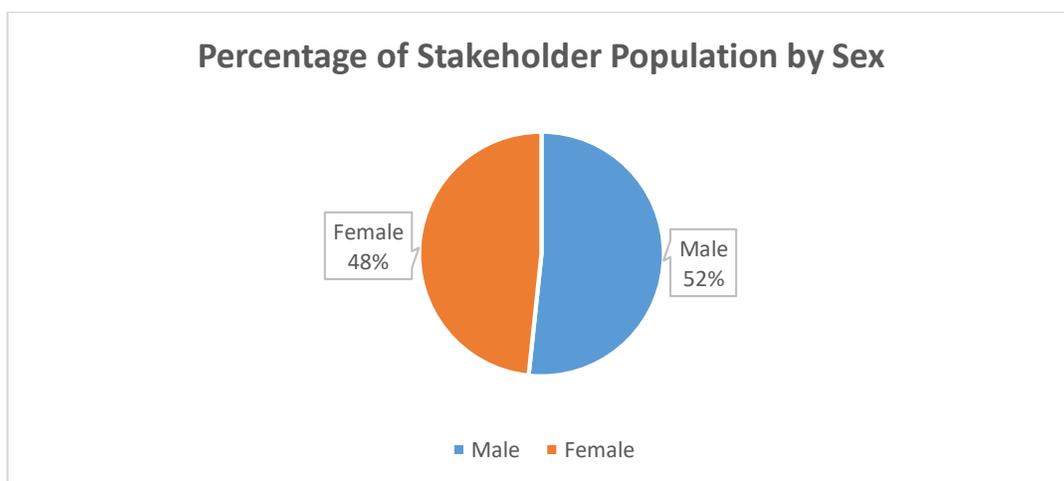


Figure 3-33 Percentage of Land of Canaan Population by Sex⁵

⁵ Source: Population and Household Census, 2012

According to the census figures, 36.2 percent of the population in Land of Canaan is of East Indian descent, 34.1 percent are mixed-race, and 24.7 percent are Africans, as seen in Figure 3-34. In addition, Land of Canaan is a multi-religious village with the Christian denominations representing 77.3% of the total population in the area, while, Muslim, and Hindu devotees represented 3.9% and 16.3%, respectively. The remainder (2.5%) comprises the Bahai, Rastafarian and Atheists.

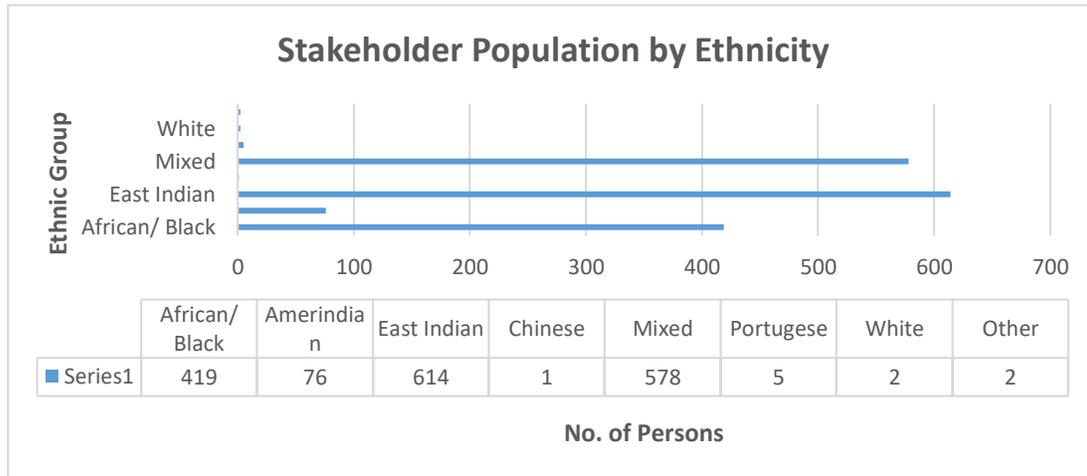


Figure 3-34: Land of Canaan Population by Ethnicity⁶

The population of Land of Canaan in 2012 did not follow the typical population pyramid. The adult average working age population (20 – 54) was 47.1% of the total, outstripping the youth population (0 – 19) which was 43.5%. The area has a low elderly population of age 55+ residents (9.4%), with the elderly not choosing to move into the project area (see Figure 3-35). This is probably due to the elderly not wanting to reside in an area that is filled with commercial activity and everyday commute via the congested EBD road corridor but rather preferring the peace and tranquility of much more quiet neighborhoods.

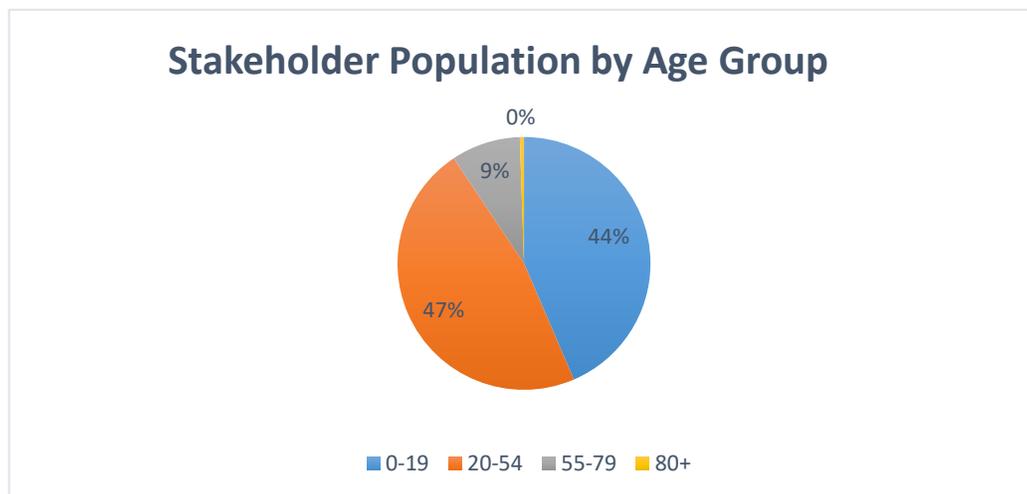


Figure 3-35: Land of Canaan Population by Age Group⁷

⁶ *Population and Household Census, 2012*

⁷ *Population and Household Census, 2012*

3.3.4 Livelihood

The population of working age averages (20 - 59) and represents 49.9% of the total population (i.e., 846 persons). Of this group, approximately 74% of persons (ca. 620 to 631 persons) were actively employed in 2012. Elementary occupation accounted for the largest share of workers followed by those in Service and Sales sector, which is consistent with peri-urban environment dynamics (see Figure 3-36). Although, there was a high percentage of employment as of 2012, present day employment (2022) may have been severely impacted by the COVID-19 pandemic thereby shifting the local community dynamics and increasing the vulnerability of the households.

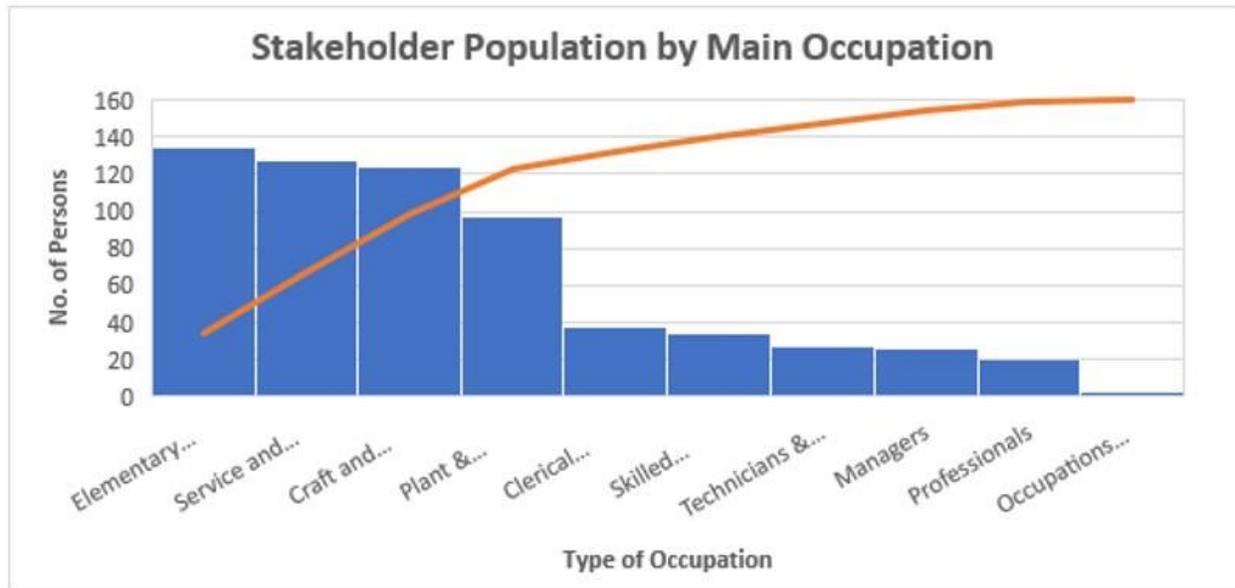


Figure 3-36: Land of Canaan Population by Occupation⁸

Of a total of 1,142 individuals with a source of income, 612 persons or 53.6% were employed in the formal or informal sectors receiving a regular income for work or services provided. The next main source of income for 33.3% of the population in the survey was from Parental/Spousal support whom they lived with or received direct support from whilst living somewhere else. It is noteworthy to state that among the survey were 80 pensioners (7%) and 6 persons (0.53%) on disability and public assistance. Table 3-18 provides a detailed breakdown of the main sources of income within each community.

Table 3-18: Main Source of Income for Land of Canaan for the year 2012

Employment / Own Account	Remittances (Overseas)	Support from Friend/ Relatives (Local)	Parental/ Spousal Support	Pension + Savings	Disability Benefits	Investment	Public Assistance	Other	Total
600	14	39	380	90	1	12	5	1	1,142

⁸ Population and Household Census, 2012

3.3.5 Utilities & Services

Land of Canaan is serviced by Guyana Water Inc. (GWI) with one main potable water well located in Caledonia. There is a water treatment plant located at Grove, East Bank Demerara that also services communities along this district. Approx. 74% of homeowners have GWI water piped to their place of dwelling, while another 5% source water from a public well. However, in order to obtain additional water in times when water wells may be insufficient (low water pressure or poor water quality), approx. 12.3% of residents harvest rainwater for domestic purposes including drinking. Freshwater is also available in the irrigation canals that is used for farming purposes and by nearby households and businesses to a lesser extent.

Approximately 74.8% of homeowners use electrical power that is provided by the Guyana Power and Light (GPL) through its interconnected electrical grid from power generated at the Power Producers and Distributors Incorporated (PPDI) 22MW power plant situated at Garden of Eden. The Plant is located approximately 4 km north of the project site. Electrical connections are available through application to GPL and for a service charge per Kwh of power consumed. Another 3.2% of homeowners utilize private electricity via solar panels mounted on their roofs and or generators as a support to the power they purchase from GPL (BoS 2012).

The Guyana Telephone & Telegraph Company (GTT) is the only landline-based telephone service provider in Land of Canaan. Approximately 46.3% of homeowners have access to landline telephone services. However, wireless mobile phone services provided by GTT and Digicel, inclusive of various internet plans, appear to be the preferred mode of communication as more than 79% of homeowners own a mobile/cellular phone. Still, GTT has provided its Blaze Internet Service to home and business owners within Land of Canaan that have the telephone service or associated utility infrastructure. Internet can also be accessed through private providers such as E-Networks, which operate in the area.

Water mains supplying potable water, landline telephone service with internet, and electrical distribution networks are found along the EBD Public Road and secondary roads connecting with homeowners throughout Land of Canaan.

3.3.6 Public Infrastructure

The project area is accessible via the EBD Public Road, which is of asphaltic concrete surface. This road infrastructure within the area was observed to be in good to excellent conditions. However, it is not properly accessorized with the necessary markings and signage. The area has an adequate amount of parking along the eastern side of the EBD public road. Traffic congestion on the East Bank of Demerara south of the Demerara Harbour Bridge (DHB) commences at Grove/Diamond junction at peak morning and evening hours. Traffic flows on the East Bank Demerara Public Road to and from the project site are not as significant. The project site location is therefore ideal since it allows for easy transport of petroleum products to markets, including to Georgetown which is approximately 23 km away and Cheddi Jagan International Airport, which is 14 km away. In addition, the site's positioning along the Demerara River will allow for ease of delivery of petroleum products.

Heavy vehicles are not permitted to travel north along the EBD Public Road between 06:00 hrs and 09:00 hrs. There may also be restrictions on the movement of heavy vehicles during other peak hours but only instituted when necessary to manage traffic congestion on the East Bank Demerara Public Road (Traffic Department 2021). Many different types of vehicles including cars, large commercial vehicles, especially

haulers and sand trucks, mini-buses, horse drawn carts, bicycles, mopeds, scooters, and motorcycles all share the same travel lanes. Driving behavior also contributes to poor and dangerous land transportation conditions. Speeding, aggressive driving, and driving under the influence of alcohol contribute to traffic accidents along the EBD Public Road. The main transport service providers to the project area are a network of privately owned minibuses and taxi services.

The NDC is responsible for repairing all internal streets and secondary roads in Land of Canaan, while the Ministry of Public Works (MoPW) is responsible for the EBD Public Road. Further, the NDC holds responsibility for maintaining parapets, drains, and outfall trenches in the area. Street lights are strategically placed throughout the NDC area and work for twelve hours each day. The NDC pay the bill for street lights situated only on internal roads and streets.

Spread along the roads within Land of Canaan are grocery stores, some roadside vendors, bottom house shops, eating houses, vehicle workshops, lumberyards, sawmills, bars, mandirs, mosques, churches, and private residences. In addition, there are large-scale manufacturing and processing industries within the area, including Gafoors Manufacturing Complex.

3.3.7 Security

Land of Canaan relies on the Guyana Fire Service (GFS) (Fire Stations No. 5 and 14) at Diamond, and Timehri, EBD. To the north of the site the nearest police station is the Diamond/Grove Police Station, while the nearest police station to the south of the project area is the Timehri Police Station, both of which frequently patrol nearby/surrounding communities (see Table 3-19 for GPF and GFS Information). Land of Canaan is a relatively safe village with a low crime rate. However, petty crimes such as theft are reported from time to time. Based on census data, armed robberies comprise 45.4% of all crimes (i.e., 5 occurrence), while simple larceny comprise another 45.4% (i.e., 5 No. occurrence). The remaining 9.2% was documented as domestic abuse. Ninety-one percent of all crimes were committed by males (i.e., 10 males). There are private armed and non-armed security firms operating in the area securing public buildings and some of the private businesses.

Table 3-19: Information on Relevant Fire and Police Stations

Type	Name of Station	Address	Telephone Number
GPF	Diamond/Grove Police Station	Great Diamond, EBD	216-0251
GPF	Timehri Police Station	Timehri, EBD	261-2222
GPF	CJIA Police Outpost	Timehri, EBD	261-2222
GPF	Grove Police Station	Grove, EBD	265-2233
GFS	Timehri Fire Station (No.5)	Timehri Aerodrome, Timehri, EBD	261-2211 or 261-2840
GFS	Diamond Fire Station (No.14)	Section 'A' Block 'X', Diamond Housing Scheme, EBD	216-2162

3.3.8 Solid Waste and Sewerage

Land of Canaan does not have a collective sanitary and sewer system. The main means of sewerage disposal for residents and business within Land of Canaan is via septic tank systems on their properties that is connected to the drainage system. Specifically, approximately 76% of homeowners utilize a flush toilet linked to a septic tank/soak-away. However, 24% use traditional and ventilated outdoor pit latrines, which are located on their properties. Waste water disposal is via open drains, which lead to drainage trenches, which outfall into the Demerara River.

Residents and businesses within communities in Land of Canaan rely mainly on the services of private waste disposal companies to collect and dispose their solid and liquid. In particular, refuse is collected once weekly by way of garbage trucks, and disposal at the approved sanitary landfill at Haags Bosch. Despite the availability of this organized solid waste collection and disposal system, a large percentage of residents (54%) still burn garbage, with burning reported as a nuisance to the community. A small percentage (2%) of residents bury, while some residents carry out open dumping on land and into the river (1%). The NDC carries out garbage collection and disposal work in the areas with its tractor and trailer for a 23% of residents (BoS 2012) (see Figure 3-37).

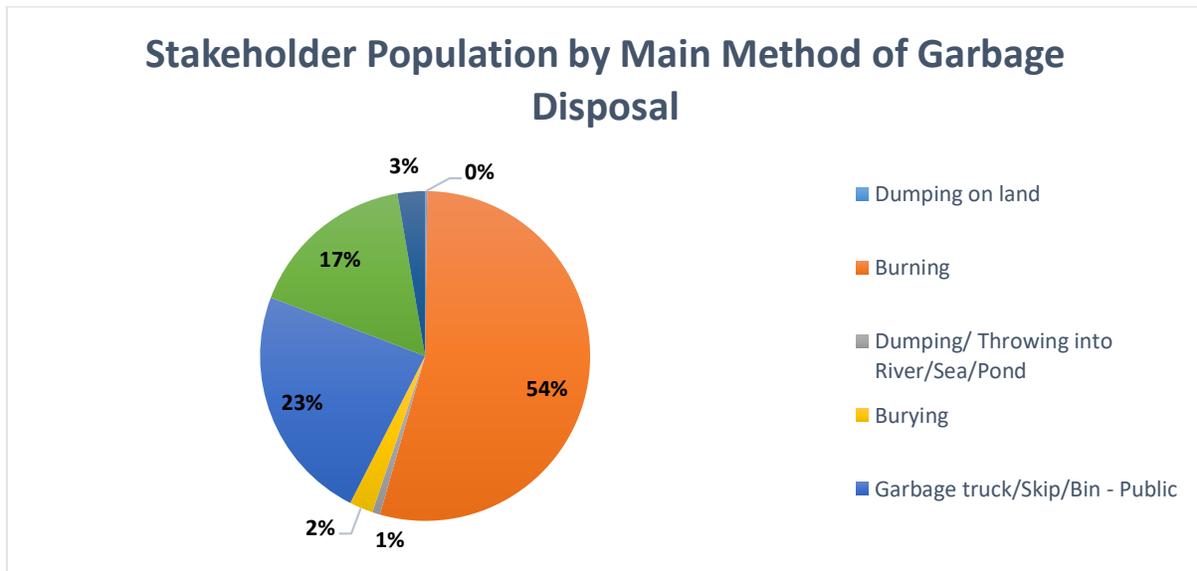


Figure 3-37: Land of Canaan Population by Main Method of Garbage Disposal

3.3.9 Key Cultural Heritage, Archaeological and Ecological Sites

There are numerous living heritage structures such as churches and mosques integrated into the urban landscape of Land of Canaan, and potentially built heritage structures that could have historic or aesthetic value to the local community. However, the project area and its immediate environs and area of influence have no known or documented archaeological nor heritage sites or indigenous assets. Further, there are no listed monuments in the project footprint, and the improvements will occur in industrial or high-density mixed-use areas where potential for undiscovered cultural heritage is expected to be low. Regardless, if any artifacts or assets are uncovered, AGHI will take measures to preserve them using a Chance Find Procedure, which will be developed. Finally, there are no areas of ecological value such as protected areas, national parks and mangrove areas, which are located within the project area.

3.3.10 Schools and Health Centers

Within Land of Canaan there are no health facilities. However, within the NDC District, Land of Canaan rely on health services provided by the Health Centers, which exist at Craig and Supply Villages. Still, many residents along the EBD rely heavily on hospitals located in Great Diamond, particularly the Diamond Diagnostic Center, and the Georgetown Public Hospital Corporation (GPHC). Health Centers are also located at Timehri and Grove, EBD. Within the NDC district, there are four nursery schools located in the villages of Supply, Pearl and Craig, while there is one Primary School in Supply, and another in Craig. Table 3-20 provides the contact information for neighboring public health facilities.

Table 3-20: Information on Relevant Health Centres

Area	Category	Contact Information
Supply	Health Centre	266-5550
Craig	Health Centre	266-4120
Timehri	Health Centre	261-4221
Grove	Health Centre	265-4575
Diamond	Diagnostic Centre	265-4681-5

4.0 POLICY, LEGAL, INSTITUTIONAL AND REGULATORY FRAMEWORK

The project involves the construction and operation of a chemical warehouse facility and laydown yard to support the emerging oil and gas sector. This section provides an overview of the relevant national policies, legislation and institutional framework related to the project.

4.1 Policies, Strategies and Plans

The key national environmental and developmental policies relating to the project are described in this section.

4.1.1 National Development Strategy

The National Development Strategy (NDS) 2001-2010⁹ prepared by the Government of Guyana (GoG) sets out the primary development policy framework for Guyana. It provides a framework for national planning and captures a number of cross-sectoral issues such as infrastructure, environment, forestry, agriculture, mining, tourism and fisheries, among others. The promotion of economic growth was central to the implementation of the Strategy.

Further, the NDS stipulates that environmental considerations should underpin all aspects of development, whether physical or social and further, that Guyana's development must not threaten the integrity of the environment. Development projects should therefore address issues of environmental, economic and social sustainability. Specifically, the NDS states that attention has to be given to monitoring and enforcement and actions to improve environmental management practices.

4.1.2 Guyana Low Carbon Development Strategy 2030

The Guyana Low Carbon Development Strategy (LCDS) 2030 seeks to create a low carbon economy by establishing incentives which value the world's eco-system services, and promote these as an essential component of a new model of global sustainable development. This new LCDS has recognized that the emergent oil and gas sector has transformed Guyana's development prospects and, in this context, the country will act strategically and responsibly to support global energy security while continuing to diversify and decarbonize its domestic economy and invest in priorities for improved health, education and low-carbon opportunities. In this regard, an Investment Programme is outlined in the LCDS 2030 to develop Guyana's human, financial and physical capital to achieve the goals of the Strategy. As part of these efforts, the LCDS promotes responsible management of the oil and gas sector for the benefit of all Guyanese so as to ensure that development aspirations are met while decarbonising the economy.

4.1.3 National Environmental Action Plan

The National Environmental Action Plan (NEAP) (1994) was one of the first efforts towards integrated environmental planning and outlines the focus of GoG as it relates to environmental management. The NEAP outlined several policy objectives. One of the policy objectives calls for the Government to ensure that environmental assessments of proposed development activities which may significantly affect the environment are undertaken. In keeping with this environmental policy objective, the Environmental Protection Act was introduced.

⁹ While the duration is from 2001 – 2010 currently it is still considered to be in use.

The NEAP was revised (2001-2005) and set out the “*environmental development strategy for Guyana for five years*” and “*a framework for integrating cross-sectoral environmental concerns in the broader context of the country’s economic and social development programme*”.

4.1.4 Local Content Policy for the Development of Guyana’s Petroleum Sector¹⁰

The GoG is implementing a Local Content Policy for the Development of Guyana’s Petroleum Sector. The Policy aims to maximise the level, quality and benefits of participation in the petroleum sector value chain by Guyanese. Guyana plans to be at the forefront of the global transition to cleaner and renewable sources of energy, as is outlined in the LCDS 2030 and, in this regard, the ultimate goal of the Local Content Policy is to provide a springboard for country’s sustainable development and transformation into a Low Carbon Economy.

The Policy applies to participation by Guyanese in all parts of the value chain, including the mid- and down-stream activities of the sector, and is underpinned by a pragmatic approach that promotes giving locals a fair and/or preferential chance at preparing for and providing goods and services as well as becoming employees in the sector, so as to allow them to learn and improve through experience. To ensure this, the GoG aims to enhance capabilities and capacities of Guyanese persons, firms and institutions to meet the standards required by the international oil and gas sector, increase the value retained in Guyana from local participation, add value through mid-and down-stream activities and transfer relevant technologies to other economic sectors. In addition, development of local capacities will be prioritized so as to benefit from backward linkages (using supply chains), forward linkages (using produced resources) and lateral linkages (for capacity development of a diverse range of sectors). In order to achieve these goals, the Policy outlines 20 objectives. An Implementation Plan will be developed separately and will identify specific initiatives, measures and targets to deliver each of the identified Policy Objectives. Companies operating in the sector will be required to comply with the requirements of the Local Content Policy.

4.2 Legislative Framework

Several laws exist in Guyana which are applicable to this project. The relevant pieces of legislation are discussed below:

4.2.1 Constitution on Guyana

The Constitution is the supreme law of Guyana and outlines, inter alia, the branches and powers of Government, the rights of Guyanese, and the principles for the political, economic and social systems. All other laws must be in keeping with the provisions of the Constitution. Specifically, Articles 2:25 and 2:36 of the Constitution provides the base for a national environmental policy and emphasizes these as key principles for the functioning of Guyana’s social and economic systems.

Article 2:25 of the Constitution states that “*every citizen has a duty to participate in activities to improve the environment and protect the health of the nation*”. And Article 2:36 states that “*in the interest of the present and future generations the state will protect rational use of its flora and fauna and will take all appropriate measures to conserve and improve the environment*”.

¹⁰ Government of Guyana. 2021. Local Content Policy for the Development of Guyana’s Petroleum Sector. Managing Guyana’s Petroleum Resources to Enhance the Local Workforce, Supply Chains and Business Environment for Employment and Transforming the Economy of Guyana and the Livelihoods of Guyanese. Pages 6 to 10, 17 to 18

4.2.2 Environmental Protection Act

Environmental protection and management is governed by the Environmental Protection Act 1996. The act is the first comprehensive environmental legislation in Guyana and established and detailed the functions of the EPA. The Act provides for *“the management, conservation, protection and improvement of the environment, the prevention and/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 connected therewith”*. Under the Act the EPA is mandated to coordinate environmental management and outlines the legal process for undertaking sustainable and effective management of the natural environment.

The Act is currently being implemented as a planning mechanism for the approval of new developments that may cause environmental impacts. It also provides the basic regulatory and administrative framework for pollution control. The Environmental Protection Act, No. 11 of 1996 outlines the Environmental Authorisation process for certain new or existing projects being modified. Part IV of the Act requires all developers of any project listed in the fourth schedule or other projects that may significantly affect the environment to apply to the EPA for an Environmental Authorisation. The application form, which must be accompanied by the prescribed fee, must include a description of the project as well as information regarding location, size, duration of the project, and potential environmental impacts. The EPA will review the application and assess whether or not the project should be exempted from the Environmental Impact Assessment process. Once a decision has been made, the EPA will publish a notice to the public in at least one daily newspaper informing them of EPA’s position, thereby allowing the public review of the decision.

Under the Environmental Protection Act, a project of this nature will require an Environmental Authorisation from the EPA for both the construction and operation phases. It is a requirement of the authorisation process that this EAMP is required to be prepared and submitted to the EPA.

4.2.3 Environmental Protection Regulations

Regulations on Hazardous Waste Management, Water Quality, Air Quality and Noise Management were established under the Environmental Protection Act in 2000. These pollution management regulations were developed to regulate and control the activities of developmental project during their construction and operation phases. The EPA has the responsibility to ensure the compliance of all new and existing activities with these Regulations by issuing the required authorizations and monitoring their operations. Standards establishing the permissible parameters under these regulations are being developed.

As it relates noise management, national standards were prepared which stipulates decibel level limits for various types of activities. For operations in industrial areas such as at Land of Canaan where the AGHI facility will be located the noise limits applicable are 100 dB during the day and 80 dB at nights.

For water quality interim national standards were developed relating to the discharge of effluents. Limits are set out for various parameters for which compliance is required. Parameters relating to this project for which limits are established are presented in Table 4-1.

Table 4-1: Relevant Parameters and Maximum Allowable Limits

Parameters	Maximum Allowable Limits
pH	5.0 to 9.0
Total Suspended Solids (TSS)	<100 mg/L
Oil and Grease	<20 mg/L
Total Dissolved Solids (TDS)	<200 mg/L
Turbidity ¹¹	<50 NTU
Dissolved Oxygen	>5

For air quality any operation that emits any air contaminant must apply to the EPA for an environmental authorization. The EPA is supposed to establish desirable air pollution limits. However, currently, there are no nationally determined or established air quality standards. The EPA is guided by and utilises air quality guidelines from the World Health Organisation (WHO), United States Environmental Protection Agency (USEPA) allowable limits and other reputable international organisations. The air quality parameters which are of concern to this project are presented in Table 4-2.

Table 4-2: WHO Air Quality Standards

Parameter	Averaging Period	Acceptable Limit
Particulate Matter (PM ₁₀)	24-hour	50 g/m ³
Particulate Matter (PM _{2.5})	24-hour	25 g/m ³
Total Suspended Particles (TSP)	24-hour	20 µg/m ³
Carbon Monoxide	1-hour	35 ppm
Nitrogen Dioxide	1-hour	200µg/m ³
Sulphur Dioxide	24-hour	20 µg/m ³

Regarding hazardous waste generation and management the operation is expected to generate small quantities of hazardous wastes which are expected to be managed in compliance with the Hazardous Waste Management Regulations. These Regulations outline the rules and procedures for transport, storage, treatment, and disposal of hazardous wastes and are intended to ensure, through the environmental authorization process, that all operations that generate, transport, treat, store, and dispose of hazardous wastes are managed in a manner that protects human health and the environment. Hazardous waste expected to be generated includes packaging material and empty containers, waste oil, etc. These are to be properly collected, stored, transported and disposed.

4.2.4 Environmental Protection (Litter Enforcement) Regulations

In 2013 the Environmental Protection (Litter Enforcement) Regulations was enacted. These Regulations provide for the enforcement against litter offences. It is an offence under these Regulations to place litter in a public place, permit or cause another person to litter a public place or have litter on private premises that pose a health risk. Under the Litter Prevention Regulations, the company will have to ensure that solid waste generated is managed and disposed of in an acceptable manner.

¹¹ In accordance with the Mining (Amendment) Regulations 2005 since the Interim Effluent Discharge Standards did not include a limit for turbidity.

4.2.5 Pesticides and Toxic Chemicals Control Act and Regulations

The Pesticides and Toxic Chemicals Control Act was promulgated in 2000 primarily to regulate the manufacture, importation, transportation, storage, sale, use and disposal of pesticides and toxic chemicals and to provide for the establishment of the Pesticides and Toxic Chemicals Control Board (PTCCB). The Board has a number of functions, one of which is to consider and determine applications made pursuant to the Act and to deal with all aspects of the importation, manufacture, transportation, storage, packaging, preparation for sale, sale, use and disposal of pesticides and toxic chemicals and to advise the Minister on all matters in relation thereto. The PTCCB is required to approve all imports of pesticide or toxic chemicals into Guyana. The premises where controlled products are stored is also to be registered and persons who manufacture or sell controlled products must be licenced to do so. Some of the chemicals which may be handled and stored at the AGHI facility can be considered to be toxic chemicals under this Act and, as such, the company will be required to obtain approval from the PTCCB. Under the Act controlled products are defined as *“any pesticide or toxic chemical”*. In addition, toxic chemicals are defined as *“any disinfectant or any other substance known to be poisonous, corrosive, irritating, sensitising or harmful to man or animal that is used in agriculture, that arts, commerce or industry, or for any domestic or other purpose, other than any antiseptic, drug or pesticide”*.

The Act is supported by the Pesticides and Toxic Chemicals Regulations which were passed in 2003. The Regulations deem pesticides or toxic chemicals as prohibited if they are in contravention of any known requirement of the laws of the country in which it was manufactured or produced or banned by the United Nations Food and Agriculture Organization or are listed as one that should be banned or severely restricted in the International Register of Potentially Toxic Chemicals, the United Nations Environment Programme or the WHO. As such, the Regulations expressly state that a prohibited pesticide or toxic chemical is prohibited from importation, manufacture, distribution, use, or sale in Guyana. After consultation with the Board, the Minister may also specify the prohibited pesticides which shall not be brought into or used in the country. For other pesticides and toxic chemicals, all importers must maintain appropriate records and inventories.

4.2.6 Labour Act

The Labour Act of 1942 specifies the conditions that an employer must observe in the contracting employees. For example, Part V specifies that the entire wages of the employee must be paid as money and not otherwise. However, in occupations where it is customary to make partial payment of allowances in the form of food, toiletries, housing etc. these are acceptable and not considered illegal, if both the employer and employee are agreed on such terms.

This Act ensures that the company employees are not mistreated and have proper representation to ensure that they are treated properly and paid adequately for their services.

4.2.7 Occupational Safety and Health Act

The Occupational Safety and Health Act 1997 defines the responsibilities of management and workers with respect to safety and health and applies to every workplace in Guyana. The Act makes provisions for the registration of industrial establishments, the establishment of an Occupational Safety and Health Authority, the establishment of a National Advisory Council on Occupational Safety and Health, the duties of employers, workers and other persons, treatments of accidents and occupational diseases, and

occupational safety and health regulations. The Act authorises Occupational Health and Safety inspectors to enter and inspect workplaces.

The employer, under Part III, Section 23 of the Act, has a responsibility to establish a joint workplace safety committee. When the workplace regularly employs 20 or more workers, the committee should consist of four persons of which at least half the numbers should be workers who do not exercise managerial functions and should be selected by the workers themselves. Employers also have duties of providing protective devices for workers, providing instructions and supervision to ensure the safety of workers, maintaining a medicine chest, and establishing an occupational health service for workers.

All industrial establishments, under Part II, Section 7 of the Act, are required to keep a general register containing the particulars of workers younger than the age of eighteen; particulars as to the washing, whitewashing, or odor washing; painting or varnishing of the workplace; and particulars on every accident and industrial disease. Specifically, with respect to the accident register, notice should be submitted using the form in the First Schedule of the Act within four days of the accident. If the accident results in death, a notice of death should be sent to the Authority, the Joint Workplace Safety and Health Committee, and trade unions if applicable as soon as the employer becomes knowledgeable of the death.

Importantly to AGHI operations, Part VI of the Act, under section 61 requires employers to maintain an inventory of hazardous chemicals and physical agents in the place of operation and requires the inventory to include information such as their toxic properties, along with their effect on the various human body parts. Their chemical and physical characteristics should also be stated, for instance, if they are flammable, explosive, oxidizing, and dangerously reactive properties; corrosive and irritant properties; allergenic and sensitizing effects; carcinogenic effects; teratogenic and mutagenic effects; and effects on the reproductive system. Further, number seven of section 61 indicates the employers shall keep readily accessible a floor plan, showing the names of all hazardous chemicals and their locations, and shall post a conspicuous notice of where the floor plan is kept. The Act also further details the responsibilities of employers in the identification of hazardous chemicals.

AGHI will have to comply with the provisions of this Act in relation to workers health and safety.

4.3 Institutional Framework

The key institutions which will have oversight during the construction and operation phases of the project are described in this section.

4.3.1 Environmental Protection Agency

The EPA oversees the effective management, conservation, protection and improvement of the environment and takes the necessary measures to ensure the prevention and control of pollution, assesses the impact of economic development on the environment and the sustainable use of natural resources. The Agency is governed by a Board of Directors and falls under the direct supervision of the Office of the President. The Agency was established in 1996 by the Environmental Protection Act and is responsible for the development and enforcement of national environmental legislation and advises the GoG on the development and implementation of environmental policies and standards. It also undertakes the inspection and enforcement of matters dealing with the environment, conservation and natural resources and administers the environmental permitting process in Guyana.

In Sec. 4 (1) (a), of the Act, the EPA is given the mandate 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”. In addition, the Agency is given the overall responsibility to ensure management of the natural environment to ensure conservation, protection and sustainable use of its natural resources; assess any developmental activity which may cause an adverse effect on the natural environment before such activity commences; and coordinate and maintain a programme for the conservation of biological diversity and its sustainable use. The EPA is mandated to ensure that any project that may have a significant impact on the environment must acquire environmental authorisation from the EPA. Projects are considered to have an environmental impact when they threaten the health, safety and natural life supporting systems of humans and other living things.

AGHI has approached the EPA for environmental authorisation of the construction and operation of the chemical warehouse and laydown yard. The EPA has decided that an EAMP for the project will have to be prepared by the company and submitted to the EPA prior to the issuance of an environmental authorisation. Once the environmental authorisation is issued it will outline measures to be implemented to ensure compliance with the environmental requirements, including monitoring of environmental parameters. The EPA is also expected to monitor the operations to ensure compliance, and may request the submission of environmental reports at least annually.

4.3.2 Pesticide and Toxic Chemicals Control Board (PTCCB)

The Pesticides and Toxic Chemicals Control Board was established for the management of pesticides and toxic chemicals in Guyana. The Board is tasked with the responsibility for licensing, registration, training, inspection, and enforcement and executes these activities intending to ensure sound chemicals management in Guyana, reducing human health and environmental risk, and food safety in agriculture production. AGHI may be required to be registered with the PTCCB and to seek the Board approval for the chemicals to be handled and stored.

4.3.3 Neighbourhood Democratic Councils (NDC)

A Neighbourhood Democratic Councils (NDCs) covers a small geographic area within each Administrative Region and is responsible for managing and administering these areas within its boundaries. The NDCs were established by an order under the Local Democratic Organs Act 12 of 1980 and implemented in 1994. It operates under the Local Government Act Chapter 28:02 and is led by elected councilors.

The NDCs receive an annual subvention from the Central Government every year to assist in the execution of developmental works within the boundaries of the NDC. Additionally, each NDC collects and retains rates and taxes from the established revenue base to provide effective and efficient services to the residents. The NDCs are responsible for sanitation, garbage disposal, road and dam maintenance, market facilities, burial grounds, abattoirs, and drainage, among other services. NDCs also maintain and protect public property. AGHI chemical warehouse and laydown yard falls within the boundaries of the Caledonia/Good Success NDC. The NDC will have to approve the building plans for the operation, and will have oversight of the operations, especially relating to the environmental health requirements.

5.0 STAKEHOLDER ENGAGEMENT

5.1 Engagement Approach

Stakeholder engagement is considered a critical element of the EAMP preparation process and the stakeholders relevant to the project were engaged during the process. It should be noted that AHGI will continue to engage with stakeholders throughout the life of the project to provide continuous information on the project, progress of works and to discuss any concerns or recommendations they may have regarding the project. Engaging with project stakeholders in a transparent, systematic, and non-discriminatory manner added several benefits to this project. These include but are not limited to:

- Enabled people to understand their rights and roles in relation to a project leading to greater transparency and involvement of stakeholders by enhancing their trust.
- Built the credibility and legitimacy of the company.
- Promoted project acceptance, and local ownership, which are key to project success and sustainability.
- Allowed for the successful identification and assessment of project impacts with a view of initiating corrective actions where necessary.
- Enabled brainstorming sessions to develop measures to mitigate impacts identified by stakeholders.

Stakeholder engagement allowed AGHI to familiarize local and central stakeholders of project's activities, the measures being undertaken to protect the environment, to provide a platform for concerns to be raised and to lay the foundation for a positive relationship between the project and the community. More specifically, the engagements provided a means to take the stakeholder's views into account as inputs to improved project design and implementation, thereby avoiding, or reducing adverse impacts, and enhancing benefits.

Stakeholders for the project were diverse and generally, comprise the local community (residents and business) and local government authorities including utility companies. The overall purpose of the stakeholder engagements was to build awareness of the project and provide a platform for stakeholders to share their feedback. The success of the public engagement with the project stakeholders was therefore rooted in honest, open, and meaningful dialogue throughout the course of the project. The following approach was adopted:

- Identifying and informing all stakeholders about project and planned project activities.
- Identifying priority issues with community members.
- Initiate open dialogue between the consultant and stakeholders to allow stakeholders to receive clarifications on the project, and to share their views, concerns, and expectations, and provide updated as the project progresses.
- Receive feedback from stakeholders on the main environmental and social concerns associated with the project for inclusion and consideration in site-specific mitigation plans.
- Create a mechanism through which feedback from stakeholder engagements are shared with the company to ensure that stakeholder engagements are meaningful and are considered in decision-making.

In addition, the approach included the following:

- The early engagement and meaningful integration of community members into the project’s purpose, need, and benefits, and provision of frequent updates as the project progresses.
- Meeting with project-affected persons in appropriate forums and using suitable methods to better understand local, context-specific issues and demonstrate a commitment to public involvement.
- Providing stakeholders with clear, accurate, and comprehensible information materials in advance of, and during engagement events.
- Providing adequate notice of all public meetings and other such public outreach efforts being sensitive to cultural norms of the diverse housing community that is Land of Canaan.
- Providing stakeholders with the appropriate grievance mechanism to seek remedy if the project causes harm to them or the environment.
- Gathering and documenting input from stakeholders, and considering this input throughout the duration of the overall project.

5.2 Stakeholder Identification and Characterization

A Stakeholder Register was developed for engagement with stakeholders as part of the EAMP preparation process. This register will continue to be utilised and updated for further engagement with stakeholders during project implementation. Stakeholders identified as relevant to the project were of the following categories:

- Public Administration (Government Institutions)
- Private Sector (Local Commercial Entities)
- Surrounding Residents

Both primary and secondary stakeholders were identified and engaged. With a multitude of options for categorization for stakeholders it was determined to maintain the objective of simplicity by not overly complicating a lower-risk project. Therefore, primary stakeholders consisted mainly of those at the local level (i.e., stakeholders within the surrounding area). The primary stakeholders identified and engaged are presented in Table 5-1.

Table 5-1: Primary Stakeholders

No.	Primary Stakeholders
1	Residents within the wider project area
2	Alibaba Supermarket
3	Donna’s Dress Shop
4	Bird-cage Shop
7	Tropicano Zoological Enterprise Residents + Workers
8	Baker Hughes Supercenter
9	Triple D’s Equipment Rental Service Ltd.
10	Hyde Park Zoo Sanctuary and Tropical Gardens

The secondary stakeholders consist of local, and national level institutions. These stakeholders are presented in Table 5-2.

Table 5-2: Secondary Stakeholders

No.	Secondary Stakeholder Entities
1	Caledonia-Good Success NDC
2	Pesticides and Toxic Chemical Control Board

5.3 Stakeholder Engagement Strategy and Methods

The consultant was expected to ensure that stakeholders within the project community are provided with timely and transparent information regarding the project, and provided an opportunity to voice potential issues of concern emerging from the project. The group of primary stakeholders stand to be mostly affected by the project mainly due to proximity in daily interactions with the project environment. As such, this group was engaged based on availability and willingness to participate in the engagements mostly on a one-on-one basis and also by telephone with strict observance for all public health guidelines. The residents to be consulted were selected based on their availability for face-to-face interviews, and based on their proximity relative to the project site. The consultant conducted a walkthrough of the area and randomly call on residents informing them of the request and respect their wish to accept/deny. Those willing to participate were asked to provide a suitable time for the interview inclusive of the present moment. Their contact numbers were requested and stored for future engagements or arrangements for the required engagement. Businesses were also selected systematically and the request for the interview was made. The stakeholders were asked to decide on the type of consultation (in-person, online or by telephone) and their request was respected given concerns relating to the COVID 19 pandemic. Their contact details were requested and stored for future engagements. Businesses included both formal and informal establishments located within the wider project area irrespective of legal or other status.

In terms of secondary stakeholders, representatives of relevant stakeholder institutions were requested to select their preferred way of engagement at their convenient time in keeping with public health guidelines. The consulting team proposed in-person, internet based, question and answer by email or telephone engagements, giving the stakeholder the option to choose their most comfortable method. In most instances, stakeholders were available for in-person discussions with the consultant. However, where stakeholders could not participate in person, engagement was done using telephone or internet-based communication tools.

The consultant began the engagements with a presentation containing an overview of the project, including the status of the project and the role of the engagement in developing the EAMP. The opportunity was then provided to stakeholders to ask questions, raise concerns, and provide feedback and recommendations. The schedule of the engagements conducted is presented in Table 5-3. Detailed notes were taken of the engagement events and images were requested from the stakeholder to serve as evidence of the event. Photographs of engagements being conducted with the primary stakeholders are shown in Figures 5-1 to 5-6.

Table 5-3: Schedule of One-on-One Engagements with Stakeholders

No.	Primary Stakeholder Entity	Contact Person	Contact Information	Date of Engagement
1	Residents within Project Area	Herbert Wilson	661-4433	August 27, 2022
2		Lancelot Wilson	689-1601	August 27, 2022
3		Winston Wilson		August 27, 2022
4		Carmelita Cornelius	618-9481	August 27, 2022
5		Genecia Cornelius		August 27, 2022
6	Alibaba Supermarket	Annessa Gordon	665-3359	August 27, 2022
7	Donna's Dress Shop	Shenella Bentick	634-4353	August 27, 2022
8	Bird-cage Shop	Ryan Narine	672-9233	August 27, 2022
9	Tropicano Zoological Enterprise Residents/Workers	Parbattie Sancharra	687-4417	August 27, 2022
10		Lilawattie Sancharra	667-5042	August 27, 2022
11	Tripple D's Equipment Rental	Verma Tiwari	687-2006	November 14, 2022
12	Baker Hughes Supercenter	Kumeshwar Ronie - Regional Strategic Sourcing Specialist for Caribbean and Latin America Operations	608-2865	November 22, 2022
13	Caledonia – Good Success NDC	Dwarka Nauth - Chairman	629-5418	November 14, 2022
14	Pesticides and Toxic Chemical Control Board	Suresh Amichand – Deputy Registrar	6714544/220-8880	November 16, 2022



Figure 5-1: Engagement with Mr. Wilson - Resident of Land of Canaan



Figure 5-2: Engagement with Mr. Narine - Resident of Land of Canaan and Owner of Bird-Cage Shop



Figure 5-3: Engagement with Ms. Bentick - Supervisor at Donna’s Dress Shop & Resident of Land of Canaan



Figure 5-4: Engagement with Ms. Cornelius - Resident of Land of Canaan
(Image blurred on request)



Figure 5-5: Engagement with Ms. Gordon - Supervisor at Alibaba Supermarket
(Participant not shown on Request)



Figure 5-6: Engagement with Ms. Sancharra – Worker at Tropicano Zoological & Resident of Land of Canaan

5.4 Stakeholder Feedback

The critical issues, concerns, and recommendations identified by stakeholders during the engagements such as potential benefits of the project, and socio-economic impacts, among others, were recorded in the following Stakeholder Feedback Matrix (see Table 5-4).

Table 5-4: Summary of Stakeholder Feedback

Themes and Issues	Stakeholder	Stakeholder Questions, Concerns and Recommendations
<p>Expected Benefits Project</p>	Herbert Wilson	<p>The Wilson brothers were unaware of the project. However, after a detailed discussion of the project by the consulting team, the brothers were looking forward to the job opportunities that it would bring.</p>
	Lancelot Wilson	
	Winston Wilson	<p>In particular, the brothers are interested in skilled and semi-skilled jobs during the construction phase, and therefore urges the AGHI to do a follow-up visit around the community to obtain local labor force for their project.</p> <p>The brothers expressed their support for the project as they believe that this would enable local development within the community, and by extension development of the country.</p>
	Ms. Shenella Bentick	<p>Ms. Bentick believes that too often projects of this nature are executed in villages on the EBD without proper awareness being done for the residents. As such, she welcomed the approach taken by AGHI to have engagements with the residents and businesses in Land of Canaan, especially since she was previously unaware of the Project.</p> <p>Ms. Bentick was particularly appreciative of the project overview provided by the consulting team, and was very much looking forward to job opportunities that can be provided to women during the facility’s operations phase. She looks forward to AGHI inviting locals, especially women in Land of Canaan to apply for jobs such as those related to sanitation and inventory.</p> <p>Further, she hopes that AGHI can provide jobs for persons that may not be academically qualified by offering pre-job training to those persons.</p>
	Ms. Lilawattie Sancharra & Parbattie Sancharra	<p>The Sancharra sisters was also appreciative of the project overview provided by the consulting team, and were very much looking forward to job opportunities that can be provided to women such as themselves during the facility’s operation and</p>

Themes and Issues	Stakeholder	Stakeholder Questions, Concerns and Recommendations
		<p>construction phases. They look forward to AGHI inviting locals, especially women in Land of Canaan to apply for jobs.</p>
	<p>Kumeshwar Ronie - Regional Strategic Sourcing Specialist for Caribbean and Latin America Operations – Baker Hughes Supercenter</p>	<p>Mr. Ronie expressed his satisfaction of being engaged by AGHI, especially since AGHI will be establishing a similar operations next door. He indicated that he is happy that another company of this nature is entering the market since this is great for local content, and since the demand for such services far exceeds the supply of such services. Given the proximity of the AGHI to Baker and Hughes, he is hopeful that both companies can form a great partnership in servicing the oil and gas sector</p>
<p>Health & Safety Concerns</p>	<p>Ms. Genecia Cornelius (on behalf of Ms. Carmelita Cornelius – Aunt)</p>	<p>Ms. Cornelius expressed her concerns over the potential for casualties during the construction and operation of the Chemical Warehouse and Laydown yard. However, after a brief overview of the project’s proposed HSE Management measures, she was satisfied that adequate safeguards are in place against occupational injuries and fatalities. Her concerns were largely based on a recent occupational accident occurring at a popular manufacturing complex in Land of Canaan.</p> <p>Still, she urged AGHI to ensure that the construction and operation of their facility is carried out safely with thorough monitoring during those phases.</p>
<p>Socio-Economic Matters</p>	<p>Ms. Annessa Gordon (on behalf of Ms. Lin, Chinese National, and Owner of Alibaba Supermarket)</p>	<p>Ms. Gordon was unaware of the project prior to the consulting team’s visit. However, after a clear project briefing, she welcomes the development in the area since she believes that it may bring increased sales and revenue to her Supermarket as the influx of workers patronize her business.</p>
<p>Stakeholder Engagement</p>	<p>Mr. Ryan Narine</p>	<p>Mr. Narine was unaware of the project by AGHI but has seen the preliminary land clearing works, which are in progress. He expressed his satisfaction for AGHI’s engagement with residents and businesses within the community and is hopeful that this can be continuous.</p>

Themes and Issues	Stakeholder	Stakeholder Questions, Concerns and Recommendations
		<p>Mr. Narine also looks forward to the provision of job opportunities for youths, which reach the age of employment.</p> <p>He also believes that such developments improve property value within Land of Canaan, and brings good business for local shops.</p>
	Mr. Verma Tiwari of Tripple D's Equipment Rental	Mr. Tiwari, whose operation will commence within the first half of 2023, welcomes the project and the approach to engage with stakeholders.
Traffic Management	Mr. Verma Tiwari of Tripple D's Equipment Rental	Indicated that the project activities should not hinder access to his property and operation.
Regulatory and Permitting	Dwarka Nauth – Chairman of the Caledonia – Good Success NDC	Mr. Dwarka was receptive of the project and expressed that the NDC does not have any immediate concerns regarding the project since it will be undertaken in a location with similar activities, and which were already approved by the NDC. He therefore looks forward to AGHI approaching the NDC for No Objection and approvals. Mr. Nauth expressed his appreciation for the inclusion and sharing of information with the NDC as part of AGHI's stakeholder engagement exercise during the conduct of the EAMP.
	Suresh Amichand – Deputy Registrar of the Pesticides and Toxic Chemical Control Board	Mr. Amichand posited that based on the nature of the project, it will be necessary for AGHI to apply for a Toxic Chemicals Establishment Permit in keeping with Part V of the Pesticide and Toxic Chemicals Control Regulations. He also indicated that it is imperative that AGHI registers all toxic chemicals to be imported in keeping with the Pesticides and Toxic Chemicals Control Act (2000) and it's associated Regulations (Subpart A). This is necessary for the application of Import License for the various chemicals to be imported for use in Guyana. He also highlighted that the above registrations and applications should be made in keeping with the Final Notices and Guidelines of the Board, which were provided.

6.0 ENVIRONMENTAL IMPACT ANALYSIS

6.1 Environmental Assessment Process

The description of the existing conditions in Chapter 3 provides a multidisciplinary analysis of the project environment, with regards to its location within proximity to the Demerara River. This baseline knowledge permits the identification of the main socio-environmental concerns that may be associated with the project activities within the Area of Influence (AoI). The interaction between the project activities and the environmental and social baseline conditions, therefore formed the basis of the assessment.

The effects on water, atmospheric environment, land, ecology and biodiversity, and human environment were assessed. The impact analysis forecasted changes (positive and negative) that may occur to the environment, and demands a baseline understanding of the natural driving forces at the project location. The early identification of impacts that may occur in the both the Primary Area of Influence (PAoI) and Secondary Area of Influence (SAoI) reduces the risk of future adverse environmental effects, and permits the proposal of mitigation guidelines to avoid, reduce or remedy significant adverse effects.

The impact analysis also acknowledges potential socio-economic impacts, which predicts the effect on people and communities occurring as a result of the development.

The key physical, biological and human components were selected from the baseline information. The impacts on each of these “Valued Ecosystem Components” (VECs) from the various project aspects were considered and evaluated using a significance ranking process.

6.1.1 Area of Influence

This impact analysis considers both the construction and operation phases of the project and focuses mainly on the key physical, biological and human VECs within the direct footprint of the project. VEC receptors within the direct footprint of the project are considered to be within the PAoI, and those within the 50 m radius are considered to be within the SAoI.

The PAoI for the project is defined as the footprint of the project, where the majority of the impacts from the project are expected to occur and/or be experienced most acutely due to the following activities within the project area:

- Land clearing;
- Construction of internal access road and pathways;
- Construction of chemical storage warehouse and the two chemical containment pads;
- Construction of drains, fuel storage area, generator room, security hut and perimeter fence;
- Preparation of a laydown yard; and
- Instillation of prefab container offices, QA/QC and storage units.

Within the SAoI of the project it is expected that some impacts such as traffic, dust, noise and vibration disturbance could occur, but generally with a lower level of intensity than in the PAoI.

The PAoI and SAoI can be seen in Figure 6-1

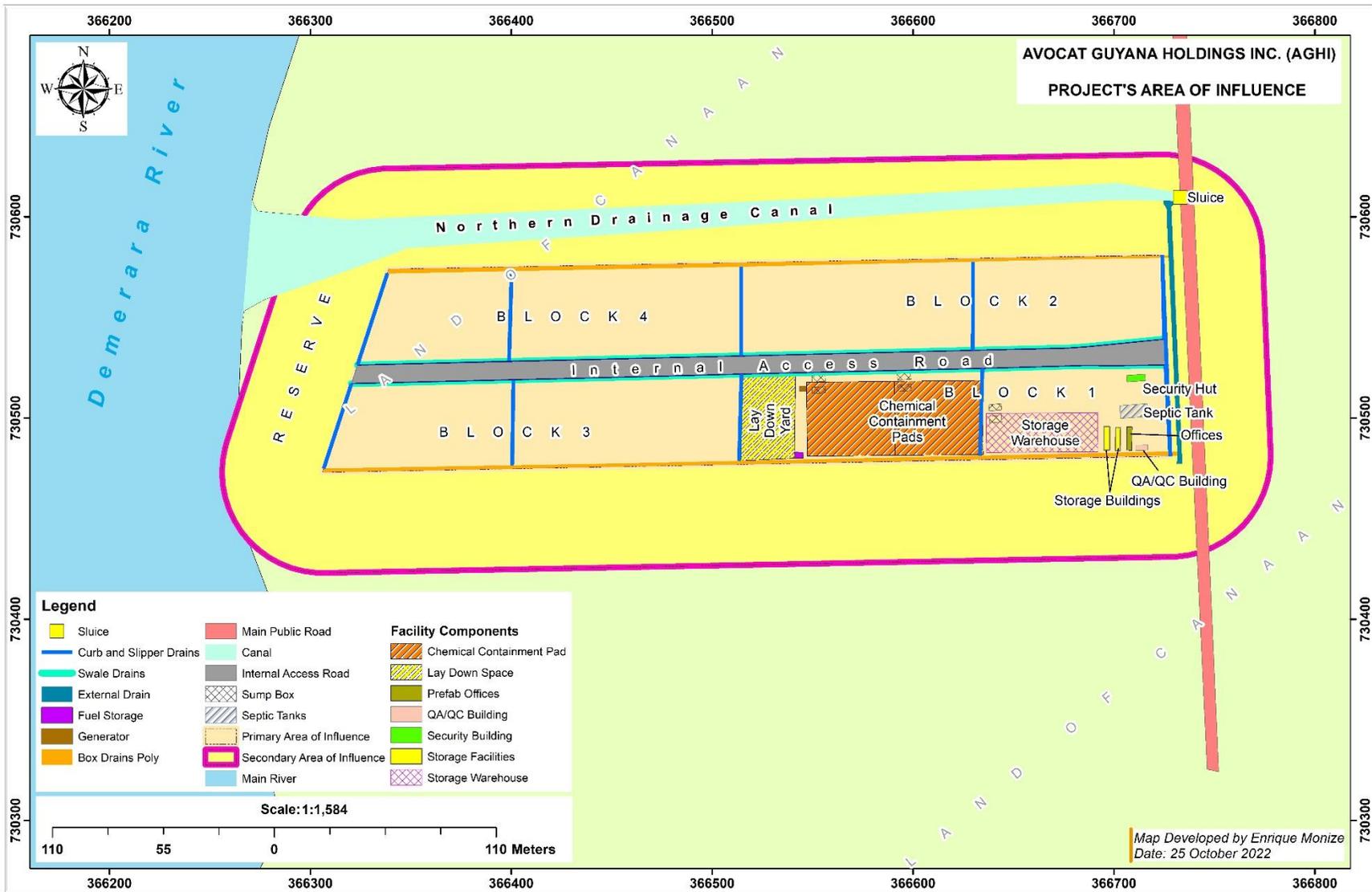


Figure 6-1: The Project Area of Influence

6.1.2 Valued Ecosystems Components (VECs)

VECs are, by definition, ecosystem components that are considered to be important or valuable and that merit detailed consideration in the Environmental Impact Assessment (EIA) process (Treweek, 1999). To aid in the EAMP, the concept of VECs has been used as a tool to highlight important receptors (individuals or groups) which could be affected (positively or negatively) by the key project aspects within the Aol.

The VECs have been selected following the identification of the pathways linking environmental components of concern with project activities, and are fundamental to the process of the EAMP. The VECs have also been selected based on the expertise of the project team. In order to establish a framework for analysis of impacts that may arise from this development, the project team formulated a list based on literature research, site assessments, Guyana’s environmental regulations/guidelines and VECs that could be affected.

Table 6-1 presents a list of the VECs that are deemed significant in terms of environmental and social importance. Each of these VECs were evaluated in terms of the construction and operational aspects of the project, and relevant mitigation measures were recommended to ensure that all negative impacts are reduced and/or avoided.

Table 6-1: Valued Ecosystems Components

Category	Sub-Category	VECs	Importance
Physical Environment	Water	Groundwater Quality	<ul style="list-style-type: none"> • Sustainability issues and local use
		Surface Water (Freshwater) Quality	<ul style="list-style-type: none"> • Sustainability issues, local use, and health • implications for all users
		Seawater Quality	<ul style="list-style-type: none"> • Sustainability issues and local use
	Air and Climate	Air Quality	<ul style="list-style-type: none"> • Implications for local residents • Contribution to global warming
	Land	Topography and Landscape	<ul style="list-style-type: none"> • Land form changes • Utilisation of non-renewable resources • Importance to local community • Use of unsustainable disposal methods
Biological Environment	Ecology and Biodiversity	Aquatic Ecology and Biodiversity	<ul style="list-style-type: none"> • Importance to biodiversity value (International, National and Regional) • Use to community
		Terrestrial Ecology and Biodiversity	<ul style="list-style-type: none"> • Importance to biodiversity value (International, National and Regional) • Use to community
Socio-economic	Human Environment	Socio-Economic Activities	<ul style="list-style-type: none"> • Employment opportunities (positive impact) • Community welfare (positive impact)
		Community Health and Safety	<ul style="list-style-type: none"> • Importance to local community as part of community safety
		Noise pollution	<ul style="list-style-type: none"> • Importance to local community
		Light pollution	<ul style="list-style-type: none"> • Importance to local community

6.1.3 Environmental Aspects

The environmental aspect is an element of an operation or facility’s activities, products, or services that can or does interact with the environment. The key environmental aspects associated with the project are presented in Table 6-2. Following the selection of the environmental aspects, the potential impacts resulting from the project can be predicted.¹²

Table 6-2: Environmental Aspects

Project Component	Environmental Aspect
Site Preparation	Transport and Equipment Use
	Purchasing of supplies and services
	Staffing
Construction Activities	Excavation and earthworks for construction of facility components
	Construction of facility components
	Transport and use of vehicles and site machinery
	Waste disposal
Operation Activities	Operation of Chemical Warehouse Storage Facility
	Operation of Loading and offloading
	Road operation
	Use of machinery and equipment
	Waste disposal
Accidental (Non-routine) Events	Vehicle collision / accidents
	Fire and Explosion
	Spills and leaks
	Inappropriate waste disposal

6.2 Physical Impacts

Environmental impacts are caused by environmental aspects and can have a direct impact on the environment, contribute indirectly to a larger environmental change, or be cumulative. This section reviews each of the VECs potentially affected within the PAoI and SAoI and discusses the predicted impacts that may result from the environmental and social aspects listed in Table 6-2 above.

6.2.1 Water Quality

6.2.1.1 Groundwater

Groundwater is a major VEC that needs to be preserved during the construction and operation phases of the facility, as it is the main source of freshwater along the Coastal Plain. The groundwater is in hydraulic connection with the Ocean, in addition to being a water resource that may be used by the community within which the project is situated and those throughout the coast.

¹² An environmental impact is a change to the environment and such change can be positive or negative.

Groundwater quality may be affected during construction activities and eventually during operation activities. It may also be affected by the occurrence of non-routine or unplanned events. Impacts could result from the following:

- Improper waste management during construction;
- Improper waste management during operation;
- Accidental (non-routine) events such as spills and leaks which may include seepage from improperly protected storage location, surface discharge of liquid wastes, fuel spillage, and spills and leaks from container vehicles.

Accidental event that may contribute to groundwater contamination is mainly attributed to seepage of contaminants from accumulation of solid wastes.

There is also a low probability of construction works causing damages to underground mains, within proximity, which provides potable water to residence within the community. In such cases, pipelines which becomes damaged or broken will create entry points for a host of contaminants which, during low pressure, could be fed back into the aquifers. This could therefore compromise the quality of groundwater within the area, hence creating negative long-term impacts that are specific to human health. Appropriate mitigation measures outlined in Chapter 7 are recommended for implementation.

Potential impacts to ground water are negative, direct, long-term, regional and of moderate significance. However, such events are unlikely to occur given the management and emergency response measures that will be in place. As such, the residual impact to ground water is minor.

6.2.1.2 Surface Water

The quality of surface water particularly that of the Demerara River may be affected during construction activities and eventually during operation activities. It may also be affected by the occurrence of non-routine events such as accidental events resulting in spills and leaks.

During the construction phase, it is highly probable that turbidity will increase within water bodies that are in close proximity. This will predominantly be due to land clearing and back filling. In certain cases, this may cause an increase in the BOD of the water column and an overall reduction in the dissolved oxygen concentration. Other contaminants that may be present in the sediment may also be released into the water column. The increase in turbidity should be short-lived and will last the duration of the land clearing and backfilling works.

During the construction and operation phases, the use of oils and fuel by vehicles, construction machinery, generators and the generation of waste oil from equipment maintenance have the potential to cause contamination of surface water resources, particularly in the event of accidental leaks or spills which are not properly contained or managed. Covering the site with pavement and buildings will generate increased rainwater runoff from the site and which could convey stray oils and other contaminants from site surfaces to adjacent waterways if not properly controlled.

Detrimental impacts to the surrounding water quality may also occur through the accidental spillage of chemicals to be stored at the location, as well as through spillage of infilling material, discharge of off-spec effluent through accidental discharges and/or leaks and also leaks or release of liquid chemicals

during the loading and offloading at the facility. Emergency preparedness and response measures will be in place to address these accidental events.

Potential impacts to surface water are negative, direct, short-term, localised and of major significance. However, such events are unlikely to occur given the management and emergency response measures that will be in place. With the mitigation measures to be implemented the residual impact to surface water quality is moderate.

6.2.2 Air Quality

Air quality may be affected during site preparation, construction, and operational activities. It may also be affected by the occurrence of non-routine events. Impacts could result from the following:

- Creation of internal access;
- Transport and use of vehicles and site machinery during all project phases;
- Stockpiling of construction materials;
- Excavation and earthworks for the construction of project components;
- Operation of the facility;
- Accidental (non-routine) events: collision/accidents;
- Accidental (non-routine) events: fire and explosion; and
- Accidental (non-routine) events: spills and leaks.

Dust and Particulates

During construction there may be a temporary reduction in air quality as a result of dust and generation of particulate matter but this is expected to be localized. It is considered to be the most significant, with the potential to affect workers on-site, and off-site receptors such as persons using the adjacent road, or working in the general area. Creation of internal access, excavation and earthworks for construction of project components may lead to the temporary air borne transport of particulates (increased dust). This increased particulate load can be prevented, and should be short-lived providing that recommended mitigation measures outlined in Chapter 7 are followed and enforced, such as the damping of roads.

Gaseous and Exhaust Emissions

During construction there may also be a temporary reduction in air quality as a result of emissions from site machinery and equipment, but this is also expected to be localized. Furthermore, heavy equipment such as bulldozers, excavators, forklifts, generators, etc. will produce exhaust emissions from diesel engines leading to temporary increases in SO_x, NO_x and CO₂. These gaseous emissions are of special concern during the operational phase of the facility as they may cause general disturbance to area and human health issues to local occupants/users. Furthermore, the general operation of the facility may cause increased air emissions from trucks, loading equipment and generator used.

Emissions may occur in the event of an emergency. Vehicular accidents, fire and explosion, and inappropriate waste disposal. Major impacts may arise in the event of accidental leakage or release of certain liquid chemicals (escape to air unless ignited) and open burning of solid waste.

The main gases of concern are sulphur dioxide - SO₂ and Nitrogen oxides - NO_x. The amount of SO₂ in exhaust gases is directly dependent on the sulphur content of the used fuel. Reducing SO₂ emissions from engines can be implemented by using low sulphur content fuel. NO_x emissions from contractor equipment/activities contribute to pollution in the form of acid rain, disturbances of the ozone layer and local health problems. Measures to reduce emissions include modification of machinery and energy carriers and use of newer and cleaner technologies.

The adverse impacts of environmental exposure to emissions from the operations are negative, direct, short-term, localised and, and of moderate significance during the construction phase and minor during the operation phase. These impacts are unlikely to occur given the measures to be put in place by the company. As such, these impacts are expected to be of minor significance after mitigation. The potential impacts of occupational exposure are negative, direct, short to long term, localised and are of major significance. These impacts should not occur given the measures to be put in place by the company. As such, the residual impact should be minor.

6.2.3 Land

Topographic changes and visual impact may occur during site preparation, construction, and operation activities. It may also be affected by the occurrence of non-routine events. Impacts could result from the following:

- Creation of internal access;
- Excavation and earthworks for the construction of project components;
- Waste disposal during construction and operation;
- Accidental (non-routine) events: spills and leaks during operation; and
- Accidental (non-routine) events: inappropriate waste disposal, particularly during operation.

The area designated for the implementation of the project in Land of Canaan is not considered as an area where geological features require protection. Excavation and earthworks are not regarded as sources of negative impact on local geology. As a means of recovery, surficial soils that will be excavated during construction may be used for levelling or backfill.

The site is within proximity to a similar development (the Baker Hughes Supercenter), which would have been given approvals for industrial developments. As such, it is unlikely that land take for the project will be a significant impact, or result in the loss of a resource.

During the construction activities, there will be a number of excavators, bulldozers, trucks and other such heavy duty equipment within the PAol. This activity will be short lived. Generally, the facility will have stacks of storage tanks containing various chemicals which may have a negative visual impact. However, existing companies of similar nature are operating and ongoing in the SAol, and thus, the proposed project is expected to add no significant adverse visual impacts on the area.

Solid waste generated during the construction and operation phases may negatively impact the site if handled inappropriately. Accidental events including contaminant from chemicals being handled and stored at the facility leaching to subsurface may eventually lead to a change in the surface soil type, chemical composition or fertility.

Impacts of erosion are negative, short term and localised but is of minor significance. Given the type of soil prevalent at the site and the nature of the operations, erosion impacts are of negligible significance and are unlikely to occur. Potential impacts of soils contamination are negative, direct, short-term, localised and of minor significance. In addition, such events are unlikely to occur given the management measures that are currently in place.

6.4.6 Noise

Noise pollution may be affected during site preparation, construction and operational activities. It may be affected by the occurrence of non-routine events. Impacts could result from the following environmental aspects:

- Creation of internal access road;
- Transport and equipment use;
- Excavation and earthworks for construction;
- Construction of project components;
- Operation of warehouse storage facility;
- Use of machinery and equipment; and
- Fire and explosion.

Noise emissions will result from the operation of heavy-duty and earthmoving machines during construction, and project related operation noise emission from particularly the back-up diesel-powered generator when operational. Operation of the facility may cause increased noise from equipment, loading offloading devices. Increased traffic may also result in increased noise levels.

Exposure to excessive noise levels can cause noise induced hearing loss, fatigue, tiredness, and decreased production levels of workers. Excessive noise and vibration may also affect birds within the area. It is expected that birds will move away from project works areas.

While these activities will increase the overall baseline noise load for the project area, it is expected to be short-lived and restricted to the construction period. Therefore, most noisy activity should be conducted during day time hours to meet the acceptable noise level standards of 100 dB during the day. Operational noise levels are expected to meet the established limit at the facility boundaries and at nearby receptors. Incidental noise will occur from warning and security alarms, etc. Accidental events such as explosion, collision warning alarms, etc. will surpass the acceptable limits; however, these high noise levels would be unlikely events and would not be sustained.

In this regard, adverse impacts of environmental exposure to increased ambient noise levels from operations are negative, direct, short-term, localized, and of moderate significance. However, these impacts are unlikely to occur whenever operation is conducted, given the mitigation measures to be implemented and as such this impact is of minor significance. In addition, adverse impacts of occupational exposure to ambient noise levels that exceed safe working limits are negative, direct, short-term, localised and of moderate significance. While these impacts may occur during operation they are unlikely to be experienced if PPEs are used as required. As such, these are of minor significance.

6.3 Ecology and Biodiversity Impacts

6.3.1. Aquatic Ecology and Biodiversity

The main water bodies within the project area are the Demerara River and a network of drainage canals. The proximity of the project site in relation to the mouth of the Demerara River suggests that the river flow is tidal and there will be some degree of salinity, thus making the water brackish. As a result, the aquatic species within the River within the vicinity of the project site will be limited to those which are tolerable to a more saline environment. However, typical flora that is affiliated with rivers and river banks can be observed. This includes mainly, moko moko (*Montrichardia arborescence*), alligator eye (*Salvinia auriculata*) and water lettuce (*Pistia stratiotes*). All of these species are common throughout the coast and can easily adapt to newer environment of similar characteristics.

Nevertheless, aquatic ecology and biodiversity may be affected during construction and operation activities. It may also be affected by the occurrence of non-routine events. Impacts could result from the following activities:

- Waste disposal during construction and operation activities;
- Accidental (non-routine) events: spills and leaks; and
- Accidental (non-routine) events: inappropriate waste disposal.

Under normal conditions, solid waste is not expected to reach or impact the aquatic environment. Accidental release of solid wastes from the operation (potentially contaminated paper, plastic, cardboard) may cause negative impacts to the aquatic environment in terms of visual impacts and to biotic VECs. The application of prevention measures, in addition to proper handling of hazardous materials packaging present a major tool for the protection of the aquatic environment from accidental contamination.

Accidental spillage of chemicals that are being stored and handled at the facility during the operation phase may lead to contamination, if not immediately contained. Floating contaminants would directly affect mammals and birds that swim or dive through the surface of the water. Accidental hydrocarbon and chemical spills may occur and impact a great number of VECs. If a wide variety of chemically active components are released into nearby water bodies, this may have damaging effects on aquatic life, leading to the degradation of this VEC. However, these impacts are deemed to be minimal based on their low probability and provided that best practice is followed. Contingency plans will be in place for accidental events.

Accidental exceedance of certain parameter concentrations in domestic wastewater may lead to release of nutrients. This may cause excessive growth of algae, known as eutrophication. As these species are opportunistic, their exceedance may exclude other forms of aquatic life. At high nutrient levels, accumulation of decomposing plant material typically leads to reduced oxygen conditions in which only bacteria thrive.

Adverse impacts of the project activities on aquatic biodiversity is of minor significance, given the highly disturbed nature of the project area, and the mitigation measures to be implemented. Any impact will be direct, short-term, localised and minor.

6.3.2 Terrestrial Ecology

The area of the proposed development can be described as the coastal zone and consists of low humic gleys of high base status, marine phase "frontland clay" (Hydraquents with Sulfaquents, Fluvaquents). No terrestrial sensitive receptors were observed within or around the site. Few mammal tracks as well as some bird tracks were sited in addition to low vegetation cover on site due to the fact that the site is highly disturbed. The surrounding areas are considered to have the same setting.

Terrestrial ecology and biodiversity may be affected during site preparation, and construction and operation. It may also be affected by the occurrence of non-routine events. Impacts could result from the following environmental aspects:

- Creation of internal access;
- Excavation and earthworks for the construction of project components;
- Accidental (non-routine) events: fire and explosion
- Accidental (non-routine) events: spills and leaks; and
- Accidental (non-routine) events: inappropriate waste disposal.

During the construction phases of the project, there will be an overall loss of terrestrial habitat, for example, loss of feeding areas, cover and nesting of fauna. At the time the study was being conducted, the naturally occurring soils within the project site were being covered with white sand and loam, as part of a landfilling exercise to raise the elevation of the land. Loss in terrestrial ecology is expected to be minor as the proposed location falls within a rapidly developing industrial zone that already has a low biodiversity value. The project site is within an already developed area and the site is degraded in terms of biodiversity value.

Additionally, during the operational phase, certain activities will lead to an increase in garbage, solid wastes and wastewater treatment sludge. Solid waste, generated by operational activities, may negatively impact a number of VECs.

Accidental events during the construction and operation of the project may include vehicle collision, fire, explosion, and spillage of fuel and various chemical materials, etc. This will have a significant impact on the fauna and flora in the vicinity of the site. Emergency response plans will be in place to mitigate any accidental event.

Adverse impacts of the project activities on terrestrial biodiversity is significant, given the highly disturbed nature of the project area, and the mitigation measures to be implemented. Any impact will be direct, short-term, localised and insignificant.

6.4 Socio-Economic Activities

6.4.1 Community Health and Safety

This section assesses potential health and safety impacts for the public during the project's construction and operations phases. During construction, the project area will generate activities that may cause heightened health and safety risks for populations adjacent to the project area.

A range of the impacts described in the section on impacts to the physical environment could have implications for the health and safety of the nearby community. In addition to the increase in traffic congestion, improper management of construction activities, including inadequate securing of equipment

and machinery, can lead to unforeseen incidents potentially causing injury or death. In particular, increased traffic levels may result in congestion from vehicles delivering construction materials and equipment and carrying personnel to and from the site. Also, during the operational phase increased traffic can occur due to hauler trucks and other vehicles collecting materials. As such, there is potential for injuries and fatalities to/of community members and staff, and overall harm to their health and safety from road accidents as a result of increased movement of heavy-duty machinery and vehicles within the project area, during both the construction and operation phases. However, given the medium-density character of the project environment, the impact to road traffic from this project during the construction phase is anticipated to be of moderate significance.

Similarly, accidents can result from people being struck by heavy and sharp objects; falling over in slippery conditions; and falling from heights. Expected impacts are injuries or deaths to persons passing by the site. Accidents can also occur during the operation phase, during maintenance and service of the facility and operational activities. The expected impact is anticipated to be adverse, but the risk will be negligible since the project site will be secured from members of the public.

Dust and associated impurities are injurious and irritating to people and animals. Dust emissions soak and contaminate clothes, property, and vegetation. The main impacts on air quality are expected to be temporary dust emissions during the construction phase. Indeed, the mobilization of equipment and machinery at the project site could generate dust emissions mostly during the construction phase as vehicles and machinery traverse the site. However, the project site is in a sparsely populated area with largely vacant zones being adjacent to the property in the south, east and west. Although the site is within reach of housing infrastructure, businesses, and other industrial activities, the likelihood of this level of impact is limited. During the operational phase the impact on air quality is likely to be due to air pollutants (such as SO_x, NO_x, VOCs, and CO) emitted from routine activities, such as running engines, painting, etc. However, such emissions are not anticipated to significantly impact local air quality beyond the PAoI of the project due to the scale and localized nature of the operation and the small number of heavy equipment. Indeed, combustion emissions will be minimal and will result in insignificant impacts. Further, during the operational phase, dust emissions would be minimal as driveways would have been paved at this point. As a result, the impact to public health and safety arising from air pollutants from activities associated with the construction and operation of the chemical warehouse and laydown yard are expected to be adverse and low risk.

Additional night-time sources of light, noise and vibration can impact human sleep patterns and result in adverse health impacts (such as stress). However, the PAoI and SAoI is largely surrounded by industrial or undeveloped areas, with only one residence, which is on the eastern side of the project area, and which is the nearest building (located at least 40m away). Lighting from the project is not likely to be visible from that residence as works are expected to be undertaken further west within the project area. Consequently, the impact of light from the project on public health and safety is anticipated to be of negligible significance.

The EBD public road is the most prominent source of noise currently. The main activities related to the proposed development during the construction, which are likely to give rise to noise emission and vibrations are the excavation and the construction of the actual premises. Sources of noise may also occur from trucks carrying construction materials to the site, and removing construction waste from the site. In addition, the use of construction machinery and equipment would generate noise. In conjunction with noise, vibrations are expected to arise from vehicles carrying construction machinery and materials to and from the site, from the operation of heavy construction machinery. Therefore, members of the

community may be exposed to construction-related noise and vibrations during this phase of operation. However, it is expected that construction activities will be limited to normal work-day hours. Further, the project is required to comply with the GNBS noise emission limits, which are 100 dB during the day and 80 dB at nights.

In the operational stage, noise will be generated from vehicle movements, traffic movement within the proposed site and equipment being operated on the site. Additionally, the main source of noise during the operation will include noise from the operation of the power generator, which will be equipped with sound attenuation measures. During operation of the warehouse and laydown yard, noise and vibration levels are not expected to exceed ambient levels given the proximity of receptors relative to the project's PAoI and SAoI. Consequently, the impact of noise and vibration on public health and safety from the project is anticipated to be of negligible significance.

It is assumed for the purposes of this assessment that the majority of project construction workers will be Guyanese nationals rather than imported labour. Still, the construction and operation of the project will likely see an increase flow of workers into the area and this congregation of persons at one place could lead to the transmission of COVID-19 amongst workers and community members. During the construction phase, most activities will take place in the open air but there still might be close contact between some of the workers since the activities could require workers to be in situations where they are not socially-distanced for large parts of each working day. The transmission of COVID-19 or other communicable diseases could lead to sickness and/or death of workers and other personnel, and could also result in delays in the implementation of the project. This potential impact will be reviewed at the beginning of each phase (construction and operation) as the situation of the COVID-19 pandemic continues to evolve (e.g.: the risk may lower as more people get vaccinated or the virus wane over time, or may increase if there are outbreaks of variants).

The potential impacts of project activities on the health and safety of the community are negative, direct, short-long-term localised and of moderate significance. However, in light of the management measures to be implemented and enforced, these impacts are unlikely to occur, and can be considered insignificant.

6.4.2 Health and Safety of Workers

Health and safety is always a key concern at any project site. Workers are usually exposed to situations which can result in serious accidents, some of which can be fatal, if established guidelines and practices are not properly communicated nor complied with. Risks can result from the use of heavy duty machines and equipment, continuous exposure to noisy machines/equipment, inhalation of fumes, improper use of equipment, etc. Given the nature of this particular project, the possible occurrence of such risks could be multiplied. The health and safety of workers are therefore major concerns during the construction period.

The following are therefore possible health and safety risks which are likely to occur during the construction and operation phases of the project:

- Sickness caused by the consumption of untreated water;
- Sickness caused by continuous exposure to excessive noise and vibrations from heavy duty equipment;
- Injuries or death caused by the toppling of heavy duty equipment;
- Injuries or death from vehicular collisions;

- Injuries from slips, trips and falls;
- Ill health caused by insect bites/ stings or from hostile fauna;
- Injuries or death caused by snake bites;
- Injuries or ill health caused by working under extremely hot conditions;
- Injuries or death caused by venomous insects;
- Injuries such as loss of limbs due to improper use of power tools
- Injury or death due to electric shock
- Sickness/death cause by COVID -19 infection;

It is expected that construction works will see the use of several types of equipment, heavy duty machinery and vehicles. While training and monitoring seeks to reduce the risk of any serious accidents, accidents can still occur. Risks may include accidents during preparation work, transporting of materials, the use of heavy duty equipment, improper use of equipment, improper use of harness and lanyard, slip or trip while traversing the work sites, etc. In such cases, these exposures can result in physical injuries such as cuts, bruises, loss of limbs or can even be fatal. Exposure to high noise levels can result in increased stress levels. Since heavy duty equipment and vehicles will be frequently traversing the internal roads as well as the main roads, the safety of other road users can also be at risk.

The potential impacts of project activities on occupational health and safety are negative, direct, short to long term, localised and of major significance. However, in light of the measures to be implemented and enforced, significant incidents, accidents, and fatalities are unlikely to occur. Therefore, these impacts can be reduced to minor.

6.4.3 Cultural Heritage

This section assesses the impact on cultural heritage resources in the project area. There are no listed monuments within the wider project area, and the improvements will occur in an industrial or high-density mixed-use area where potential for undiscovered cultural heritage is expected to be low. However, there are numerous living heritage structures such as churches and mosques integrated into the urban landscape of Land of Canaan, and potentially built heritage structures that could have historic or aesthetic value to the local community. Still, these are out of the PAoI and SAoI.

As described in the section on Socio-Economic Environment, construction activities will be adjacent to areas, which have already undergone a high degree of human disturbance. None of the proposed Project activities are considered to be more intrusive than those activities that were necessary in the initial development of the current existing facilities and infrastructure surrounding the project area. Further, the project area itself has undergone a high degree of land clearing, levelling, sand filling, and compaction. As such, it is unlikely that undiscovered subsurface cultural heritage would be discovered or damaged.

The impending project activities are expected to alter the character of the landscape from a natural environment to a built environment. Still, given the scope of construction works, and therefore proposed infrastructure as part of the project, it is not anticipated that the Project would have any visual effects on the project's PAoI and or SAoI, particularly since these areas have already undergone a high-degree of similar human disturbance.

The mixed-use environment in which the project area is situated includes places of worship including at least 1 No. Evangelical church, 1 No. Mosque, and 1 No. Mandir. These are considered living heritage sites

of moderate importance given the small population they are likely to serve in the sparsely populated area. The impact of disruption to the use of living heritage sites due to the project is anticipated to be of negligible significance, particularly since those sites are not within the PAoI or SAoI, and users of such sites will therefore not be impeded.

No activities with the potential to change levels of access to living heritage sites, or cause damage or alteration to built heritage or other forms of cultural heritage are anticipated during the operational phase.

The potential impacts of the project on the cultural of the area is insignificant. Any impact will be direct, short-term and localised.

6.4.4 Road Traffic

Traffic during the construction phase is expected to increase at the project area as materials offloaded from trucks are stored in the compound, and vice versa, as materials stored in the compound are uploaded onto the trucks for removal. The already congested traffic in the thoroughway of the East Bank Demerara Public Road will increase due to the installation construction traffic signage (“Slow”, “Proceed with Caution”, “Stop”) and use of flagmen, but it will also lead to enhanced safety along the corridor – traffic accidents due to the uncontrolled crossing of trucks into and out of the Project area will decrease.

Furthermore, operation of the warehouse and laydown yard is expected to add as many as forty additional vehicle trips into and out of the site per day for workers, plus an additional five to ten delivery trips per day on average. At peak, operations could generate up to 30-40 round trips for workers plus up to approximately ten for deliveries. Still, this increase is expected to result in a marginal change in traffic congestion in the area.

Potential impacts of traffic congestion are negative, direct, long-term and regional and are of minor significance but Avocat’s operation is unlikely to contribute to congestion given the small fleet and the infrequency of trips.

6.4.5 Employment

As part of the preparation process for this EAMP, stakeholders, which were engaged throughout the project area expressed their expectation for local employment during the project’s construction and operation phase. Approximately seventy local workers may be required during the construction phase of the project. In this context, both skilled and semi-skilled workers will be required as full-time employees or part-time for the duration of the construction phase. The project is expected to generate up to forty full time jobs during operation of the facility. The Company hopes that over time, this number could be increased. However, the extent to which AGHI employs local workers will depend on the skills required and the availability of the local labour. Regardless, this employment will have a positive but very medium impact on the local economy, one that will last for as long as the project operates. A few of the needed workers are expected to be non-Guyanese, but the majority are expected to be local hires.

The impacts of direct and indirect employment on the local population are positive, regional, long term and of major significance, and certain to occur. As such, project employment is considered to result in a Positive Impact.

6.5 Impact Evaluation

In the previous sections the following were done:

- Identification of project aspects;
- Identification of VECs; and,
- Determination of the potential environmental impact of each of the aspects on each VEC.

The evaluation of the significance of each potential environmental impact on each VEC is presented below. Impacts are evaluated using the following criteria:

- Character of the VEC;
- Duration of the impact;
- Magnitude of the impact;
- Spatial extent;
- Type (direct, indirect, cumulative); and,
- Probability of occurrence.

Definitions of the above parameters are given in Table 6-3.

Table 6-3: Assessment of Impact Significance

Duration – what is the length of the negative impact?	
None	no effect.
Short less	than one year.
Moderate	one to ten years.
Long	greater than ten years.
Permanent	irreversible
Magnitude – what is the effect on the resource within the study area?	
None	no effect.
Small	affecting less than 1% of the resource.
Moderate	affecting 1-10% of the resource.
Great	affecting greater than 10% of the resource.
Spatial Extent – what is the scale of the impact in terms of area, considering cumulative impacts and international importance?	
Local	in the immediate area of the impact.
Regional/National	having large-scale impacts.
International	having international importance
Type – what is the impact?	
Direct – caused by the project and occur simultaneously with project activities	
Indirect – associated with the project and may occur at a later time or wider area	

Cumulative – combined effects of the project with other existing /planned activities
Probability – what is the likelihood of an impact occurring?
Low <25%
Medium 25-75%
High >75%

Consideration of the above criteria leads to the definition of a significance for each potential environmental impact / VEC combination. Six significance classes have been defined, as outlined in Table 6-4

Table 6-4: Significance Classes for Environmental Impact

Class	Significance	Description/Comments
1	Significant, Major impact	Impacts are expected to be permanent and nonreversible on a national scale and/or have international significance or result in a legislative noncompliance.
2	Significant, Moderate impact	Impacts are long term, but reversible and/or have regional significance.
3	Insignificant, Minor impact	Impacts are considered to be short term, reversible and/or localized in extent.
4	Insignificant	No impact is expected.
5	Unknown	There are insufficient data on which to assess significance.
6	Positive	Impacts are beneficial to the key VECs.

A summary of the significance of the potential impacts of the various activities relating to the construction and operation of the chemical warehouse and laydown yard on the identified VECs is presented in Table 6-5

Table 6-5: Summary of Potential Impacts

Project Component	Aspect	VEC	Impact	Duration	Magnitude	Extent	Type	Probability	Significance
SITE PREPARATION	Creation of Main Internal Access Roads	Surface Water Quality	Increase overall water column turbidity	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MODERATE
		Air Quality	Increased air emissions (dust, and exhaust emissions)	SHORT	SMALL	LOCAL	DIRECT	25-75 %	MINOR
		Topography and Landscape	Topographic changes and Visual Impact	MODERATE	LOCAL	LOCAL	DIRECT	25-75 %	MODERATE
		Terrestrial Ecology and Biodiversity	Loss of habitat and clearing or damage to vegetation	MODERATE	MODERATE	LOCAL	DIRECT	< 25%	MINOR
		Noise Pollution	Increased noise levels	SHORT	SMALL	LOCAL	DIRECT	25-75 %	MINOR
		Socio-Economic Activities	Temporary employment prospects in the area	SHORT	MODERATE	REGIONAL	INDIRECT	25-75 %	POSITIVE
	Transport and Equipment Use	Air Quality	Increased air emissions (dust, and exhaust emissions)	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MINOR
		Noise Pollution	Increased noise levels	SHORT	SMALL	REGIONAL	DIRECT	> 75 %	MODERATE
		Terrestrial Ecology and Biodiversity	Loss of habitat and clearing or damage to vegetation	SHORT	SMALL	LOCAL	DIRECT	25-75 %	MINOR
	Purchasing of Supplies and Services	Air Quality	Increased CO ₂ emissions	SHORT	SMALL	LOCAL	INDIRECT	25-75 %	MINOR
		Socio-Economic Activities	Increase in economic activity	SHORT	SMALL	REGIONAL	DIRECT	> 75 %	POSITIVE

Project Component	Aspect	VEC	Impact	Duration	Magnitude	Extent	Type	Probability	Significance
	Staffing	Socio-Economic activities	Temporary employment prospects in the area	SHORT	SMALL	REGIONAL	DIRECT	25-75 %	POSITIVE
CONSTRUCTION ACTIVITIES	Excavation and Earthworks for Construction	Groundwater Quality	Leaching of contaminants into broken mains	LONG	MODERATE	REGIONAL	DIRECT	< 25 %	MODERATE
		Air Quality	Increased air emissions (dust, and exhaust emissions)	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MINOR
		Noise Pollution	Increased noise levels	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MINOR
		Topography and Landscape	Visual impacts due to use of unsustainable disposal methods	SHORT	SMALL	LOCAL	DIRECT	< 25%	INSIGNIFICANT
		Terrestrial Ecology and Biodiversity	Loss of habitat, and clear or damage to vegetation	MODERATE	MODERATE	LOCAL	DIRECT	25-75 %	MINOR
		Socio-Economic Activities	Temporary employment prospects in the area	SHORT	SMALL	REGIONAL	DIRECT	> 75 %	POSITIVE
	Transport and Use of Vehicles and Site Machinery	Air quality	Increased air emissions (dust, and exhaust emissions)	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MINOR
		Terrestrial ecology and biodiversity	Loss of habitat, and clear or damage to vegetation	SHORT	SMALL	REGIONAL	DIRECT	25-75 %	MINOR

Project Component	Aspect	VEC	Impact	Duration	Magnitude	Extent	Type	Probability	Significance
		Socio-Economic activities	Increase of employment	SHORT	SMALL	REGIONAL	DIRECT	> 75 %	POSITIVE
	Construction of Project Components	Air quality	Increased air emissions (dust, and exhaust emissions)	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MINOR
		Surface Water Quality	Increase overall water column turbidity	SHORT	SMALL	REGIONAL	DIRECT	> 75 %	MODERATE
		Topography and Landscape	Visual impacts due to use of unsustainable disposal methods	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MINOR
		Noise Pollution	Increased noise levels	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MINOR
		Terrestrial Ecology and Biodiversity	Loss of habitat, and clear or damage to vegetation	MODERATE	MODERATE	LOCAL	DIRECT	> 75 %	MODERATE
		Socio-Economic Activities	Temporary employment prospects in the area	SHORT	SMALL	REGIONAL	DIRECT	> 75 %	POSITIVE
		Waste Disposal	Surface Water Quality	Changes in water quality	SHORT	SMALL	LOCAL	DIRECT	25-75 %
	Groundwater Quality		Leaching of waste into aquifer	LONG	MODERATE	REGIONAL	DIRECT	< 25 %	MODERATE
	Topography and Landscape		Visual impacts due to use of unsustainable disposal methods	MODERATE	SMALL	LOCAL	DIRECT	> 75 %	MODERATE
	Terrestrial Ecology and		Loss of habitat, and clear or	LONG	MODERATE	LOCAL	DIRECT	< 25 %	MINOR

Project Component	Aspect	VEC	Impact	Duration	Magnitude	Extent	Type	Probability	Significance
		Biodiversity	damage to vegetation						
		Community Health and Safety	Health impacts	MODERATE	SMALL	LOCAL	DIRECT	> 75 %	MODERATE
		Surface Water Quality	Changes in water quality	SHORT	SMALL	REGIONAL	DIRECT	25-75 %	MINOR
OPERATION ACTIVITIES	Operation of Chemical Warehouse Storage Facility	Air Quality	Increased air emissions from trucks, forklifts, generator and equipment (gaseous emissions)	LONG	MODERATE	LOCAL	DIRECT	25-75 %	MODERATE
		Noise Pollution	Increased noise levels	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MINOR
		Terrestrial Ecology and Biodiversity	Loss of habitat, and clear or damage to vegetation	SHORT	SMALL	LOCAL	DIRECT	< 25 %	INSIGNIFICANT
		Socio-Economic Activities	Permanent employment opportunities in the area	SHORT	SMALL	REGIONAL	DIRECT	> 75 %	POSITIVE
	Road Operation	Air Quality	Increased air emissions (dust, and exhaust emissions)	SHORT	SMALL	REGIONAL	DIRECT	25-75 %	MINOR
		Terrestrial Ecology and Biodiversity	Loss of habitat, and clear or damage to vegetation	SHORT	SMALL	REGIONAL	DIRECT	25-75 %	MINOR
		Noise Pollution	Increased noise levels	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MINOR

Project Component	Aspect	VEC	Impact	Duration	Magnitude	Extent	Type	Probability	Significance	
		Socio-Economic Activities	Increase in trading	SHORT	SMALL	REGIONAL	DIRECT	> 75 %	POSITIVE	
	Use of Machinery and Equipment	Air Quality	Increased air emissions (exhaust emissions)	SHORT	SMALL	LOCAL	DIRECT	25-75 %	MINOR	
		Noise	Increased noise levels	SHORT	SMALL	LOCAL	DIRECT	> 75 %	MINOR	
	Waste Disposal	Surface water Quality	Release of contaminant/chemicals being stored	LONG	MODERATE	REGIONAL	DIRECT	25-75 %	MAJOR	
		Groundwater Quality	Release of contaminant/chemicals being stored	LONG	MODERATE	REGIONAL	DIRECT	25-75 %	MAJOR	
		Topographic Changes and Visual Impairment	Visual impacts due to use of unsustainable disposal methods	MODERATE	SMALL	LOCAL	DIRECT	> 75 %	MODERATE	
		Terrestrial Ecology and Biodiversity	Loss of habitat, and clear or damage to vegetation	LONG	MODERATE	LOCAL	DIRECT	< 25 %	MINOR	
		Community Health and Safety	Health impacts	MODERATE	SMALL	LOCAL	DIRECT	> 75 %	MODERATE	
	ACCIDENTAL (NON-ROUTINE) EVENTS	Traffic Collision / Accidents	Air Quality	Increased air emissions	SHORT	SMALL	REGIONAL	DIRECT	25-75 %	MINOR
			Surface Water Quality	Detrimental impacts to the surrounding water quality due to release of chemical(s) being stored/handling at the facility	MODERATE	MODERATE	REGIONAL	DIRECT	> 75 %	MAJOR

Project Component	Aspect	VEC	Impact	Duration	Magnitude	Extent	Type	Probability	Significance
		Aquatic Ecology and Biodiversity	Loss of Aquatic biota	MODERATE	MODERATE	REGIONAL	DIRECT	> 75 %	MAJOR
		Terrestrial Ecology and Biodiversity	Loss of Terrestrial biota	MODERATE	MODERATE	REGIONAL	DIRECT	> 75 %	MAJOR
		Community Health and Safety	Human injury and mortality	SHORT	GREAT	REGIONAL	DIRECT	25-75 %	MAJOR
	Fire and Explosion	Air Quality	Increased air emissions	SHORT	GREAT	REGIONAL	DIRECT	25-75 %	MAJOR
		Noise Pollution	Increased noise levels	SHORT	SMALL	REGIONAL	DIRECT	> 75 %	MODERATE
		Terrestrial Ecology and Biodiversity	Loss of habitat, and clear or damage to vegetation	SHORT	SMALL	REGIONAL	DIRECT	25-75 %	MINOR
		Community Health and Safety	Loss of life due to methanol explosion	SHORT	GREAT	REGIONAL	DIRECT	25-75 %	MAJOR
	Spills and Leaks	Freshwater Quality	Reduced freshwater quality	LONG	MODERATE	REGIONAL	DIRECT	< 25 %	MODERATE
		Topography and Landscape	Change in surface soil type, chemical composition or fertility.	SHORT	MODERATE	REGIONAL	DIRECT	25-75 %	MINOR
		Terrestrial Ecology and Biodiversity	Change in surface soil type, chemical composition or fertility.	SHORT	MODERATE	REGIONAL	DIRECT	25-75 %	MINOR
		Aquatic Ecology and Biodiversity	Loss of aquatic biota due to use of anti-fouling paints, Loss of vessels' ballast	SHORT	MODERATE	REGIONAL	DIRECT	25-75 %	MINOR

Project Component	Aspect	VEC	Impact	Duration	Magnitude	Extent	Type	Probability	Significance
			water, etc.						
	Inappropriate Waste Disposal	Air Quality	Increased air emissions from waste open burning	SHORT	SMALL	REGIONAL	DIRECT	25-75 %	MINOR
		Groundwater Quality	Leaching of waste into aquifer	LONG	MODERATE	REGIONAL	DIRECT	< 25 %	MODERATE
		Topography and Landscape	Visual impacts due to use of unsustainable disposal methods	MODERATE	SMALL	LOCAL	DIRECT	> 75 %	MODERATE
		Terrestrial Ecology and Biodiversity	Loss of biota	LONG	MODERATE	LOCAL	DIRECT	< 25 %	MINOR

6.6 Cumulative Impacts

A conventional project and site-specific approach to environmental assessment has its limitations when it comes to assessing potential cumulative effects on environmental resources. This is because the impact of a particular project on an environmental resource may be considered insignificant when assessed in isolation, but may be significant when evaluated in the context of the combined effect of all past, present, and reasonably foreseeable future activities that may have or have had an impact on the resources in question. Cumulative Impact Assessment (CIA) provides valuable and important inputs as an element of Strategic Environmental Assessment. For these reasons, the explicit assessment of cumulative effects is now considered desirable in environmental assessment practice.

Cumulative effects generally refer to impacts that are additive or interactive (synergistic) in nature and result from multiple activities over time, including the project being assessed. The US Council on Environmental Quality defines cumulative effects as "*the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions*".

Cumulative effects

- are caused by the aggregate of past, present, and future actions;
- are the total effect, including both direct and indirect effects, on a given resource, ecosystem, and human community of all actions taken, no matter who has taken the actions;
- need to be analyzed in terms of the specific resource, ecosystem, and human community being affected;
- cannot be practically analyzed beyond a reasonable boundary; the list of environmental effects must focus on those that are meaningful;
- rarely correspond to political or administrative boundaries;
- may result from the accumulation of similar effects or the synergistic interaction of different effects;
- may last for many years beyond the life of the project that caused the effects; and
- should be assessed in terms of the capacity of the affected resource, ecosystem, and/or human community to accommodate additional effects.

Project Activities and Environment

AGHI in partnership with GLASS, is seeking to construct and operate a chemical warehouse facility and laydown yard at Lot 'a' of Tract 'Y', Pln. Land of Canaan on the East Bank Demerara. The parcel of land that will be developed for this purpose is 9.825 ac (3.976 Ha) in size and will be sub-divided into four 2.46 ac (9940m²) blocks. Each block will be developed to store approximately 1,000,000 gallons of specialty and commodity chemicals. The construction phase for each block of the project is estimated to take approximately two years.

The development of the petroleum sector in Guyana requires investments in local infrastructure to adequately provide shore base services to offshore oil and gas operators. Hence, the purpose of this project is to build a chemical warehouse facility to service Guyana offshore energy projects.

The project will result in a number of construction activities being undertaken across several development stages. These include land clearing works, construction of concrete base/foundation, erection of chemical storage warehouse, installation of external paving and drainage, installation of security post, perimeter

fencing and external yard lighting, construction of storage shed, office area/kitchen/conference room and QA/QC area, and installation of site septic system within the project site.

The project area is in a sparsely populated area but within reach of housing infrastructure, small-scale businesses, industrial sites, and other developments occurring within the Land of Canaan area. The project corridor will be localized to Land of Canaan. The general land use comprises a mix of commercial, residential, and industrial uses.

The Baker Hughes Supercenter which is located to the immediate north of the AGHI's project site is seen as a critical operation in conjunction with AGHI's operation. These two companies are offering similar high risk services and are within close proximity of each other, which suggests that they are likely to have short and long term cumulative effects on the surrounding environment. In fact, both operation shares a SAOI of 50m of which have overlapping areas. As a result of this, it was suggested by the EPA, that a CIA be conducted to assess how current and planned activities will impact air, water and surrounding communities.

Baker Hughes Supercenter¹³

Baker Hughes is one of the world's leading energy technology companies and has operations in more than one-hundred and twenty countries with sixty-seven thousand employees. The company is focused on designing, manufacturing and servicing transformative technologies to take energy and industry forward. Baker Hughes portfolio of services and products include oilfield services; oilfield equipment; turbomachinery and process solutions for onshore and offshore productions, among other types of operations; and digital solutions. Baker Hughes is committed to reducing its environmental footprint by minimizing emissions and waste from its operations each year. At the global level, the company partners with customers to reduce their environmental footprint, invents technologies and invests in a portfolio of low-carbon products and services.

Baker Hughes (Trinidad) Limited established an Oil Field Services facility in Land of Canaan, Guyana to support the offshore oil and gas operators. The company is committed to complying with all of Guyana's environmental requirements relevant to its operations. Baker Hughes offers a broad portfolio of technology solutions for energy and industry to improve productivity, reliability and create transformative outcomes. The company offers a portfolio of services and products which include:

- Oilfield services to help produce oil and gas at the lowest possible cost per barrel through the lifetime of a well, starting with evaluation of the asset to its decommissioning.
- Oilfield equipment which delivers a comprehensive suite of solutions, systems and products primarily to subsea operations.
- Turbomachinery and process solutions for onshore and offshore productions, liquefied natural gas, pipeline and gas processing, refinery and petrochemical, and industrial.
- Digital solutions that use intelligent, connected technologies to sense, monitor, control and inspect operations to facilitate digital transformation.

The new multimodal supercenter has been built together with Baker Hughes' existing completion warehouse and liquid mud and completion fluids plant, providing full support to customers in Guyana and

¹³ Information sources from Baker Hughes Environmental Management Plan prepared in 2020 for the Land of Canaan Oilfield Service Supercenter

Suriname. The supercenter represents a multimillion-dollar investment from Baker Hughes over 15 years and includes a workshop, warehouse, and laydown storage yard including maintenance facilities and equipment. Baker Hughes will also offer subsea equipment and installation services at the new supercenter. The supercenter is expected to employ more than 100 employees within five years, and the majority are expected to be Guyanese.

Potential Cumulative Impacts for AGHI's and Baker Hughes Supercenter Operations

The impacts of the proposed AGHI's project are widely discussed in this chapter. For Baker Hughes, the scope of work covered by the EMP is more focused on evaluation related to the production, storage and transportation of associated products and derivatives rather than impacts associated with this preliminary stage of work related to the civil engineering works necessary to clear the site, improve the soil conditions, and to provide the foundations on which the eventual facilities will be built. More so, the timing of construction of the two facilities would result in differences in the resulting impacts. If they were constructed concurrently, there was the possibility of impacts being of higher intensity, but the recovery would have occurred over a shorter timescale. If construction was one after the other, the total intensity of impact may be less, but the recovery period will extend. In a similar manner, if the facilities are constructed at different times, as is the case, the magnitude of total impact is less, but the overall recovery period will be longer. Furthermore, growth and colonisation rate of the affected areas could be reduced due to the continuous activity in the area.

The fact that the Baker Hughes Supercenter facility is an already well-established operation and has been constructed a few years ago eliminates the need for a CIA for the construction phase of AGHI's facility. In fact, impacts that would have been felt during the construction phase of the Baker Hughes Supercenter facility would have been short term and localized. These impacts would have faded with time upon the completion of construction works allowing both primary and secondary areas of influence to recover.

However, for the purpose of assessing the cumulative impacts of AGHI's project, alongside that of Baker Hughes, assessments can only be made for the operation phase. Moreover, in the absence of site specific information, and in order to be able to conduct a cumulative impact assessment, it is here assumed that the potential impacts at the Baker Hughes Supercenter operation are very similar or even the same as those associated with the AGHI's project during its operational phase.

The following are negative cumulative impacts which are likely to occur during the operation of the chemical warehouse and laydown yard:

- A combined mass of built-up and impermeable surfaces between both operations is likely to see an increase in the volume of stormwater discharge. This can add strain on the already inadequate existing drainage network within the community and result in flash floods.
- Large volume of stormwater discharge can result in increased erosion and subsequent increased levels of turbidity and re-suspension of the bottom sediments in nearby waterbodies, which can eventually end up into the Demerara River.
- Noise levels from noise emitting activities and equipment may intensify due to simultaneous activities such as use of generators and trucks operating in and out of the facilities.
- Unforeseen events such as fire and floods at the facilities can have harmful impacts on the health of the surrounding environment. In the case of floods, the combined quantities of hazardous chemicals stored at both locations, if exposed to any of the VEC, can have significant long term effects and would require external forces for cleanup efforts. On the other hand, a major fire at

any of the two facility can pose a serious threat to that of the other due to the nature of the chemicals and materials being stored. Moreover, a fire at the Baker Hughes Supercenter will pose a greatest threat to operations at AGHI since their operation is located upwind of AGHI and includes the storage of dangerous explosives.

- Accidental spillage or release of chemicals and other hazardous and explosive substances. Whatever the cause, the effect will be highly dependent on the size of spill and the type of compound released. A major release could be devastating to all the VECs concerned, with the duration of impact in terms of tens of years. As such, release from both operations simultaneously, unknowingly, can inflate the impacts on concerned VEC.
- The creation of additional stresses on existing local utilities and services, including water, power, and emergency responders. However, given the relatively small scale of the AGHI operation, demand for power and water are low. Moreover, water is not used in the operational processes and thus, adverse impacts to water supply and of effluent discharges to water quality of the surrounding drainage system are minimal.

The operation of both facilities can result in positive cumulative impacts. The following are positive cumulative impacts which are likely to occur:

- Significant positive impacts may be gained by the local community through direct and indirect employment opportunities as AGHI's operation will complement Baker Hughes presence in the local community.
- The facility will increase the country's ability to provide much needed shore base services to the budding offshore activities, while bearing fruit to the recently passed local content policy which encourages oil companies to support the growing local Guyanese businesses.
- A greater percentage of locals employed will be exposed to training and much needed capacity building.
- Potential positive effects may also occur through links with existing businesses and industries within Guyana, such as existing waste facilities for the re-use and recycling of many products such as paper, cardboard, glass, mineral oils and lubricants.

Recommendations for Minimizing Cumulative Impacts

The implementation of all of the mitigation measures outlined in the mitigation measures section would reduce or avoid most of the impacts arising from the activities of the AGHI and the same goes for Baker Hughes operations. Nevertheless, there are still some impacts which are very difficult to reduce or avoid, especially if they are inflated by similar activities within proximity. In order to lower the risk of these impacts to a manageable level, additional measures will have to be implemented. Such measures can be implemented at the start of the project i.e. during the design phase. Efforts should be directed towards reaching a design that takes into account both present and future operation conditions at the location, given that the area is rapidly becoming an extensive site for offshore supporting industries of similar nature.

Even though it can be difficult for companies to share information and ideas with each other, especially companies that are in the same line of business, good communication between AGHI and Baker Hughes is encouraged and is essential in order to properly implement individual internal mitigation measures as well as collective measures designed to minimize or avoid cumulative impacts. In this case, the sharing of information regarding results and difficulties during the process of putting measures into practice is

critical, as it can avoid system failures that can be detrimental to both companies. Proper and regular communication between the two companies can allow for the integration of emergency procedures and responses, particularly as it relates to unforeseen events such as flood or fire. Mechanisms can be put in place for early notification of fire at either facility and for the sharing of fire-fighting and emergency response resources.

The two companies can also combine resources to re-establish and maintain the main drainage outlets that are clogged so that increased stormwater discharge can be properly channeled to the Demerara River.

7.0 MITIGATION PLAN

This section of the EAMP recommends detailed mitigation procedures to be considered by the Joint Venture (AGHI and GLASS) in order to address those potential impacts identified as being Class 1 (significant, major impact) or Class 2 (significant, moderate impact). The primary goal of the mitigation and management plan is to reduce the impact to an acceptable level (Class 3 or greater) for all of the project aspects.

This section presents the recommended mitigation measures divided into the five VEC categories (water, air and climate, land, ecology).

7.1 Water Resources

7.1.1 Groundwater

The following measures are recommended to prevent groundwater contamination during the construction phase of the warehouse and laydown yard facility:

- Release of any materials that may contaminate groundwater must be prevented, as such all contaminated effluent must be contained.
- Subsurface pipes, such as the GWI water intake pipeline should be adequately maintained so as to avoid breakage and possible backflow of contaminated surface water. Appropriate shutoff valves should be installed and used correctly.
- Concrete slabs should be free of any chemicals or additives that might leach out and affect ground water quality.
- The project must have regular site inspections and apply spill and pollution prevention procedures for handling and storage of materials, chemicals and containers.
- Piling and foundations should be constructed so that they do not create a vertical pathway into deep strata that may be used for groundwater abstraction.
- All containers will be clearly and adequately labelled to identify the contents.
- A project spill response plan should be in place that includes the placement of emergency spill kits in storage areas.
- Spills should be contained or absorbed to prevent ground and groundwater contamination.
- The linings of the first flash and the stormwater catch drains should be intact, and undamaged after routine removal of solids.

The following measures are recommended to prevent groundwater contamination during the operational phase of the warehouse and laydown yard facility:

- The operational area of the property should be made impermeable. This area should be lined with a layer of white sand and loam followed by a layer of geotextile, the sand, then a layer of impermeable HDPE liner, then sand followed a final second layer of geotextile and sand as described in the project description.
- Adequate spill prevention and protection should be applied where no concrete slabs or lining exist, to prevent leaching to groundwater.
- All storage tanks should be above ground and in bunds with impervious liners.

- All fuel and chemical storage areas will be curbed to accommodate up to 110% of the total amount of substance being stored for spill containment and equipped with sump boxes to collect spill or leaked materials.
- Emergency spill response kits will be readily available to clean up any spill occurring.
- All wastes should be regularly removed and disposed of in an environmentally sound manner.
- All containers will be clearly and adequately labelled to identify the contents.
- Concrete structures/bases throughout the facility should be intact.

7.1.2 Surface Water

The following measures are recommended to prevent surface water contamination from discharges, particularly to the Demerara River during the construction and operation phases:

- In general, surface water should be viewed as a valuable resource in all areas, and its preservation should be allocated the highest priority.
- All activities should prevent the release of any contaminant that might enter the external surface waters.
- Adequate spill prevention and response measures should be in place.
- Good housekeeping should be practiced during construction to avoid spreading litter and wastes from human/construction activities.
- All stormwater exit points should be equipped with shutoff valve and oil and grease separators.
- Water exiting the facility should be tested for known contaminants based on chemicals being stored and handled at the facility.
- If quality does not meet specifications the flow must be stopped and pumped back to a collection facility for further treatment or removal for off-site disposal.
- Adequate materials management procedures must be implemented for handling and storage of materials and containers to prevent and minimize spills or leaks.
- Operating procedures should be in place for all operational activities, identifying specific training, checking and review on a regular basis.
- Contingency plans should be available to respond to, contain and/or recover accidental spills in the shortest possible duration so as to avoid contaminated runoff from enter the aquatic environment. These must be coordinated with the EPA's Permit requirements and national systems for responding promptly and effectively to potential polluting incidents.
- Curb and slipper drains should flow into a collection sump where oil, if contained in water, is separated via weirs. The collected oil shall be removed regularly to prevent overflow and disposed in an environmentally acceptable manner.
- Water quality monitoring should be conducted as recommended in the monitoring plan.
- Within the facility an emergency response plan must be established to respond to an event of chemical spillage, leak or explosion of significant nature. Neighbouring facilities should also be made aware of the procedures, particularly the Baker Hughes Supercenter which is located to the immediate north of the AGHI facility.

7.2 Air Quality and Climate

The following management and control measures are recommended to prevent air and climate pollution during the construction phase of the warehouse and laydown yard facility:

- Comply with the requirements of the WHO Air Quality Standards by enforcing air quality monitoring regularly, particularly at the locations identified in the monitoring plan.
- Minimise unnecessary journeys and adopt a policy of switching off machinery and equipment when not in use.
- Dust suppression should be undertaken where necessary by spraying affected land surfaces with water and/or covering construction materials stockpiles.
- Vehicle movements should be kept to a minimum and hard cover areas for vehicle movements should be used where possible.
- Speed restrictions will be applied to internal accesses across the project site so as to prevent dust nuisance and more so, to prevent collisions and other accidents.
- All trucks carrying sand, construction materials and construction waste should be covered to prevent spread of dust.
- Burning of waste in open air shall be prohibited.
- When consistent with safe operating practices, daytime work is encouraged to avoid night-time lighting.
- As part of the purchasing procedures machinery, equipment, vehicles and materials that have the lowest CO₂ emissions possible should be considered.
- Low energy use products, where available, will also be consider when purchasing.

The following management and control measures are recommended to prevent air and climate pollution during the operational phase the warehouse and laydown yard facility:

- Air emissions from point sources shall meet all the national and international standards identified in Chapter 4 of this EAMP.
- Consider as part of the purchasing procedure choosing machinery, equipment, vehicles and materials that are fuel-efficient.
- Regular monitoring and maintenance of all equipment and generators should occur as part of the environmental monitoring plan. This would ensure that any emission exceedance is noticed, then mitigation measures can be put in place until the appropriate criteria are met.
- Air quality monitoring should be carried out at locations identified in the monitoring plan.
- Ensure that emissions of ozone depleting substances such as halons and chlorofluorocarbons (CFCs) are prohibited from the operation.
- Burning in open air shall be prohibited.

7.3 Land

Mitigation measures relating to land are largely aimed at restricting visual impact and topographic changes. The following management and control measures are recommended to minimise the impacts to land during the construction phase of the warehouse and laydown yard facility:

- Limit vehicle movements to essential construction areas to avoid unnecessary soil compaction.
- Use hard cover areas for vehicle movements where possible.
- Solid wastes (combustible or non-combustible) generated shall be collected through the solid waste management system set up for the project site.
- All hazardous wastes generated by the project operations will be transported to a waste disposal facility outside of the project area.

- A recycling policy should be implemented for all solid wastes including construction waste where possible.
- Waste lubricants, lube oil and/or solvents should be re-used, recycled or be disposed of by a reputable hazardous waste management company.
- Records of all offsite waste transfers should be maintained, listing date of transfer, destination, compound identification, volumes removed, and personnel responsible.
- Areas of exposed soil should be monitored during periods of heavy rainfall.
- Large material stockpiles should be covered during periods of heavy rainfall;
- Silt traps should be installed in vulnerable areas of the property. Erosion control operations should be performed under favourable weather conditions.
- Earthworks should be avoided during periods of heavy rainfall. Storm water runoff over exposed soil surfaces will be along pre-established paths and will contain breakers and other devices to control flow velocity, as well as silt traps/fences to the extent practical.

7.4 Ecology and Biodiversity

Construction and operational activities are not expected to impact biodiversity. However, management measures are still recommended to be implemented.

7.4.1 Terrestrial Ecology and Biodiversity, and Agriculture

The following management and control measures are recommended to control the impacts to terrestrial ecology and biodiversity during the construction and operation phases of the warehouse and laydown yard facility:

- Landscaping component should include species of trees that will attract avian species by providing feeding and nesting habitats.
- Species chosen to re-vegetate the site after construction should serve as both a landscape function and a habitat function without compromising either. Vegetation selected should be based on suitability, native, habitat, flowering plants and shrubs.
- Contingency plans should be in place and emergency response procedures developed to allow immediate response to accidental spillage and/or releases of chemicals or other hazardous materials.
- General housekeeping should be ongoing to prevent litter and other wastes associated with site activities from fouling the site and areas adjacent to the site.
- Where feasible, noise levels during dawn, dusk, and night hours should be minimised to reduce disturbance to fauna, particularly birds.
- Vehicles and equipment should be well maintained to minimize unnecessary emissions and leaks.
- Established vehicle tracks and roads should be used to minimize habitat destruction from off-road travel.
- Adequate materials and chemical storage and handling practices should be followed to reduce uncontrolled releases.

7.4.2 Aquatic Ecology and Biodiversity

The following management and control measures are recommended to minimize aquatic impacts during the construction and operation phases of the warehouse and laydown yard facility:

- Proper materials and product storage and handling practices should be followed to reduce uncontrolled releases, especially during loading and offloading of harmful chemicals.
- General housekeeping should be ongoing to prevent litter and other wastes associated with site activities from fouling nearby aquatic ecosystems.
- Contingency plans should be in place and emergency response procedures developed to allow immediate response to accidental spillage and/or releases of chemicals or other hazardous materials.
- Care should be taken to minimise damage to aquatic habitats and fauna during excavation activities through adequate planning and execution.
- Sediments should be chemically analysed prior to disposal. If increased turbidity is observed beyond 100 m of the disposal site, silt curtains or other containment devices should be implemented.
- Routine maintenance should be conducted to ensure minimal re-suspension of sediments in nearby water bodies.

7.5 Socio-Economic Activities

7.5.1 Workers and Community Health and Safety

To reduce health and safety risks to project workers, construction contractors should be required to implement Health and Safety management measures specified within this EAMP, and which are in alignment with local legislation and construction industry best practices. Monitoring of compliance with this EAMP should also be ongoing for the duration of construction. A minimum, the following management measures should be implemented:

- Ensure a stocked first-aid kit is available and easily accessible on site, and adequate to cater for the number of onsite personnel.
- Workers must be provided with basic PPEs (e.g., hardhats, high-visibility vests, safety footwear), and activity specific PPEs where necessary e.g., welding goggles/safety goggles when welding. The use of PPEs must be enforced.
- Workers must be provided with respiratory protection during activities which generate dust, fumes or mists (e.g., dust masks, respirators etc.)
- Workers must be provided with ear/noise protection during periods of excessive noise (e.g., earmuffs/ear defenders).
- Fire fighting equipment must be available and accessible onsite (e.g., fire extinguisher, filled water tanks, fire buckets etc.).
- An Accident/Incident Register must be maintained onsite in keeping with section 69 (7) of the OSH Act, cap 99:10.
- Ensure workers are properly trained on how to use construction machinery and equipment.
- Workers are to be trained on occupational health and safety hazards relevant to the construction phase.
- Regular maintenance of machinery and equipment should be done.
- A “Muster Point” should be designated where employees should assemble in the event of a fire or any other emergency.

The following specific management and control measures are recommended during the operation phase:

- Comply with Guyana's Occupational Safety and Health Act.
- An emergency notification system should be implemented to inform nearby industries, particularly Baker Hughes Supercenter and residences of an emergency.
- Fire services may require specific information on the operation so that the most effective fire fighting methods can be determined. This should be done prior to such emergencies whereby the Guyana Fire Service (GFC) should be engaged by the company on all operations, including a list of all chemicals stored at the facility.
- A site health and safety plan should be developed (including emergency procedures) and all employees and subcontractors (for construction and maintenance works) should have induction training.
- Appropriate training should be given for particular tasks (where necessary), and subcontractors should prove employee competency.
- Adequate PPE should be used, based upon risk assessments for particular tasks or handling of hazardous materials or chemicals.
- Work with local transport authority and the Guyana Police Force (GPF) on scheduling of large loads that are being transported by road, particularly during the operation phase when transporting dangerous chemicals to and from the facility.
- The company's Journey Management Plan (JMP) should be triggered once the project is in operation.

A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers will be made aware of the following general rules:

- No alcohol / drugs to be present on site.
- No firearms must be allowed on site or in vehicles transporting staff to / from site (unless used by security personnel).
- Prevent excessive noise.
- Prevent unsocial behavior.
- Bringing pets e.g., caged birds onto the site must be forbidden.
- Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives, (e.g., fires for cooking, the use of surrounding areas / bush as a toilet is forbidden).
- Trespassing on private/commercial properties adjoining the site is forbidden.
- Driving and operating vehicles, machinery and equipment under the influence of alcohol is prohibited.
- Smoking is prohibited onsite.

Appropriate, timely and continuous engagement of stakeholders adjacent to the project footprint areas should be undertaken to ensure that they are well-informed of the nature, progress and duration of project activities, and have a good understanding of associated safety risks.

A grievance mechanism for the construction phase should be developed and publicized to ensure that stakeholders are provided with a consistent process to voice any concerns regarding health and safety risks from project activities.

7.5.2 Cultural Heritage

In the case of living heritage sites such as churches, mosques and mandirs, engagement with the administrators of these institutions should be undertaken to understand their operating and peak hours and regular events such as worship services. This will allow for coordination and planning to avoid or minimize undue disruptions, especially with regards to construction traffic using the EBD public road. Key points of contact and a predefined protocol should also be established for the living heritage site administrators to alert the project of any impromptu events such as funerals so that provisions can be made to avoid disruptions.

It is considered unlikely that undiscovered, underground cultural heritage would be discovered in the project area. However, since it is still a possibility, AGHI will take measures to preserve them using the following Chance Finds Procedure, which outlines a clear protocol to stop work and notify the Ministry of Culture, Youth and Sports and the National Trust of Guyana if anything resembling archaeological resources is found during future excavation activities.

If any person discovers a physical cultural resource, such as (but not limited to) archaeological sites, historical sites, remains and objects, or a cemetery and/or individual graves during excavation or construction, the following steps shall be taken:

1. Stop all works in the vicinity of the find, until a solution is found for the preservation of these artefacts, or advice from the relevant authorities is obtained;
2. Immediately notify the site foreman. The foreman will then notify the Construction Manager and the HSE Officer (HSEO);
3. The details of the find must be recorded immediately by the HSEO in an Incident Report, thus causing a minimum disruption to the work schedule of the Contractor. The results of all archaeological work must be reported to the local authority(ies), once completed. This must be supported with photos.
4. The Construction Manager/HSEO will immediately notify the Ministry of Culture, Youth and Sports and the National Trust of Guyana (hereinafter referred to as the Heritage Team) of the find, and forward the Incident Report to these authorities;
5. Delineate the discovered site or area; secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities take over;
6. In the interim, the Construction Manager/HSEO must undertake and complete a preliminary evaluation of the findings. Here, a rapid assessment of the site or find to determine its importance must be done. Based on this assessment the appropriate strategy can be implemented based on advice from the local authority(ies). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage such as aesthetic, historic, scientific or research, social and economic values of the find;
7. The Construction Manager/HSEO must then provide the Heritage team with photos, other preliminary evaluation information as relevant for further identification and assessment of the significance of heritage items.
8. The Ministry must then be allowed to investigate the fact and provide response in writing to the company.
9. Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage.

10. Construction works could resume only after permission is granted from the responsible authorities.

One of the main requirements of the procedure is record keeping. All finds must be registered. Photolog, copies of communication with decision making authorities, conclusions and recommendations/guidance, implementation reports - kept. No activities with the potential to change levels of access to living heritage sites, or cause damage or alteration to built heritage or other forms of cultural heritage are anticipated during the operations phase.

7.5.3 Road Traffic

The impacts associated with the traffic during the construction and operation of the chemical warehouse and laydown yard could be minimized using the following measures:

- During the construction and operations phases, maintain the traffic and schedule activities, to the extent possible, to be conducted during off-peak times (e.g., early in the morning or night). Therefore, ensure lorries and heavy vehicles are not traveling along the EBD public road between the hours of 06:00 to 09:00 AM and 5:00 pm to 7:00 pm.
- Deploy traffic and safety signs in close cooperation with the authorities.
- Coordinate the delivery of materials at times that minimize impacts to the existing traffic.
- Conduct periodic driver safety reviews (including records) and training if needed.
- Parking along the public road shoulders should be avoided
- Loading and offloading of construction and other materials to be done within the property.
- Traffic warning signs should be installed on the approach to the site.
- The company's Journey Management Plan (JMP) should be triggered once the project is in operation.

7.5.4 Employment and Infrastructure

Given the positive nature of the impact, no additional management measures are required. Still, the following measures will be implemented to amplify positive impacts:

- Priority should be given to employing persons from within the neighbouring areas.
- Remuneration provided to local staff must be in keeping with Guyana's labour laws or higher set standards so as to be competitive in all categories of workers.
- Local workers must carry out their duties within standard working hours and be fairly compensated.
- The opportunities of employing women and vulnerable groups of people must also be explored, and considerations made to ensure that there are opportunities for all genders.

7.5.5 Noise

The following management and control measures are recommended to reduce the noise level during construction phase to comply with national standards for noise emissions:

- Regular inspection and maintenance of construction vehicles and equipment should be made to maintain smooth running of vehicles.

- Machinery and generators with ‘quiet’, ‘muffled’ or ‘silenced’ running should be used where available.
- Restricted working hours for particularly loud or intrusive activities such as piling.
- Fitting vehicles with effective exhaust silencers, where available.
- Using air compressors and generators that are sound reduced with properly lined and sealed acoustic covers.
- Optimal selection of haul and access roads to avoid sensitive locations, such as residential areas.
- Regular maintenance of equipment in accordance with manufacturer’s instructions should be carried out to reduce the risk of increased noise emissions from worn or poorly maintained parts.
- In areas where excessive noise may occur, noise countermeasures should be applied such as acoustic insulation.
- Inform the public of noisy construction activities in the area.
- All feasible and reasonable noise mitigation measures must be implemented during the facility’s construction and operation phase, with the aim of achieving the noise management levels set out in the *GNBS Guidelines for Noise Emissions into the Environment*.

The following management and control measures are recommended to reduce the noise level during the operation phase:

- In all cases, equipment will be operated to comply with national and international regulations. Personnel working in confined areas where noise exceeds 90 dB must wear hearing protection equipment.
- Regular maintenance of equipment in accordance with manufacturer’s instructions should be carried out to reduce the risk of increased noise emissions from worn or poorly maintained parts.
- In areas where excessive noise may occur, noise countermeasures will be applied, such as insulation.
- A regular program for noise monitoring (along the site boundary) as outlined in the monitoring plan should be carried out to validate the predicted noise levels and ensure that the environmental noise limit is not exceeded.
- It is recommended that all compressors and generators be fitted with acoustic enclosures with low noise ventilation systems, fire and gas detection and fire extinguishing systems.
- Large pump sets will be fitted with “dog house” style acoustic enclosures, if necessary.

7.6 Summary of Residual Impacts Following Mitigation

With the appropriate application of the mitigation measures provided in this report, the proper implementation of the monitoring plan, and ensuring normal efficient operation, the residual construction and operational impacts, if any, are expected to be minor or insignificant. With appropriate monitoring and mitigation measures, the detected impacts should be reduced to a minimum (short term, reversible and localised). Table 7-1 summarises the expected residual impacts (after application of mitigation, monitoring, etc.) resulting from the project’s activities.

Based on this analysis, it can be concluded that if recommended mitigation, management and monitoring measures are followed, the proposed project can be constructed and operated without significant impact to the environment. It should be noted that non-routine events will always carry a higher significance due to the magnitude and extent thus every precaution must be taken to ensure that the probability of these events remains unlikely.

Table 7-1: Summary of Residual Impacts

Project Component	Aspect	VEC	Impact	Significance before Mitigation	Significance after Mitigation
SITE PREPARATION	Creation of Main Internal Access Roads	Air Quality	Increased air emissions (dust, and exhaust emissions)	MODERATE	MINOR
		Topography and Landscape	Topographic changes and Visual Impact	MODERATE	MINOR
		Terrestrial ecology and biodiversity	Loss of habitat and clearing or damage to vegetation	MINOR	INSIGNIFICANT
		Noise Pollution	Increased noise levels	MINOR	INSIGNIFICANT
		Socio-Economic activities	Temporary employment prospects in the area	POSITIVE	POSITIVE
	Transport and Equipment Use	Air Quality	Increased air emissions (dust, and exhaust emissions)	MODERATE	MINOR
		Noise Pollution	Increased noise levels	MODERATE	MINOR
		Terrestrial ecology and biodiversity	Loss of habitat and clearing or damage to vegetation	MINOR	INSIGNIFICANT
	Purchasing of Supplies and Services	Air Quality	Increased CO ₂ emissions	MINOR	INSIGNIFICANT
		Socio-Economic activities	Increase in economic activity	POSITIVE	POSITIVE
	Staffing	Socio-Economic activities	Temporary employment prospects in the area	POSITIVE	POSITIVE
	Excavation and Earthworks for Construction	Air Quality	Increased air emissions (dust, and exhaust emissions)	MODERATE	MINOR
		Noise Pollution	Increased noise levels	MINOR	INSIGNIFICANT

Project Component	Aspect	VEC	Impact	Significance before Mitigation	Significance after Mitigation
CONSTRUCTION ACTIVITIES		Topography and Landscape	Visual impacts due to use of unsustainable disposal methods and soil erosion	INSIGNIFICANT	INSIGNIFICANT
		Terrestrial Ecology and Biodiversity	Loss of habitat, and clear or damage to vegetation	MINOR	INSIGNIFICANT
		Socio-Economic Activities	Temporary employment prospects in the area	POSITIVE	POSITIVE
	Transport and use of vehicles and site machinery	Air Quality	Increased air emissions (dust, and exhaust emissions)	MINOR	INSIGNIFICANT
		Terrestrial Ecology and Biodiversity	Loss of habitat, and clear or damage to vegetation	MINOR	INSIGNIFICANT
		Socio-Economic Activities	Increase of employment	POSITIVE	POSITIVE
	Construction of Project Components	Air Quality	Increased air emissions (dust, and exhaust emissions)	MODERATE	MINOR
		Surface Water Quality	Increase overall water column turbidity	MODERATE	MINOR
		Topography and Landscape	Visual impacts due to use of unsustainable disposal methods	MINOR	INSIGNIFICANT
		Noise Pollution	Increased noise levels	MINOR	INSIGNIFICANT
		Terrestrial Ecology and Biodiversity	Loss of habitat, and clear or damage to vegetation	MODERATE	MINOR
		Socio-Economic Activities	Temporary employment prospects in the area	POSITIVE	POSITIVE

Project Component	Aspect	VEC	Impact	Significance before Mitigation	Significance after Mitigation
	Waste Management	Surface Water Quality	Changes in water quality	MAJOR	MINOR
		Groundwater Quality	Leaching of waste into aquifer	MODERATE	MINOR
		Topography and Landscape	Visual impacts due to use of unsustainable disposal methods	MODERATE	MINOR
		Terrestrial ecology and biodiversity	Loss of habitat, and clear or damage to vegetation	MINOR	INSIGNIFICANT
		Community Health and Safety	Health impacts	MODERATE	MINOR
OPERATION ACTIVITIES	Operation of Chemical Warehouse Storage Facility	Air Quality	Increased air emissions from trucks, forklifts, generator and equipment (gaseous emissions)	MODERATE	MINOR
		Noise Pollution	Increased noise levels	MINOR	INSIGNIFICANT
		Terrestrial ecology and biodiversity	Loss of habitat, and clear or damage to vegetation	INSIGNIFICANT	INSIGNIFICANT
		Soil	Contamination	MINOR	INSIGNIFICANT
		Socio-Economic activities	Permanent employment opportunities in the area	POSITIVE	POSITIVE
	Road Operation	Air Quality	Increased air emissions (dust, and exhaust emissions)	MINOR	INSIGNIFICANT
		Noise Pollution	Increased noise levels	MINOR	INSIGNIFICANT
		Socio-Economic activities	Increase in trading	POSITIVE	POSITIVE
	Use of Machinery and Equipment	Air Quality	Increased air emissions (exhaust emissions)	MINOR	INSIGNIFICANT

Project Component	Aspect	VEC	Impact	Significance before Mitigation	Significance after Mitigation
	Waste Management	Noise	Increased noise levels	MINOR	INSIGNIFICANT
		Surface Water Quality	Release of waste being stored	MAJOR	MINOR
		Groundwater Quality	Release of waste being stored	MODERATE	MINOR
		Topographic changes and visual impairment	Visual impacts due to use of unsustainable disposal methods	MODERATE	MINOR
		Aquatic Ecology and Vegetation	Loss of aquatic habitat, and damage to vegetation	MINOR	INSIGNIFICANT
		Community Health and Safety	Health impacts	MODERATE	MINOR
ACCIDENTAL (NON-ROUTINE) EVENTS	Traffic Collision / Accidents	Air Quality	Increased air emissions	MINOR	INSIGNIFICANT
		Surface Water Quality	Detrimental impacts to the surrounding water quality due to release of chemical(s) being stored/handling at the facility	MAJOR	MODERATE
		Aquatic Ecology and Biodiversity	Loss of Aquatic biota	MAJOR	MINOR
		Terrestrial ecology and biodiversity	Loss of Terrestrial biota	MAJOR	MINOR
		Community Health and Safety	Human injury and mortality	MAJOR	MAJOR
	Fire and Explosion	Air quality	Increased air emissions	MAJOR	MAJOR
		Noise Pollution	Increased noise levels	MODERATE	MINOR
		Terrestrial ecology and biodiversity	Loss of habitat, and clear or damage to vegetation	MINOR	MINOR

Project Component	Aspect	VEC	Impact	Significance before Mitigation	Significance after Mitigation
		Community Health and Safety	Loss of life due to explosion	MAJOR	MAJOR
	Spills and Leaks	Freshwater Quality	Reduced freshwater quality	MAJOR	MODERATE
		Topography and Landscape	Change in surface soil type, chemical composition or fertility.	MINOR	MINOR
		Terrestrial ecology and biodiversity	Change in surface soil type, chemical composition or fertility.	MINOR	MINOR
		Aquatic ecology and biodiversity	Loss of aquatic biota due to use of anti-fouling paints, Loss of vessels' ballast water, etc.	MINOR	MINOR
		Air Quality	Increased air emissions from waste open burning	MINOR	MINOR
	Inappropriate Waste Management	Groundwater Quality	Leaching of waste into aquifer	MODERATE	MODERATE
		Topography and Landscape	Visual impacts due to use of unsustainable disposal methods	MODERATE	MINOR
		Terrestrial ecology and Biodiversity	Loss of biota	MINOR	MINOR

8.0 ENVIRONMENTAL MANAGEMENT AND MONITORING FRAMEWORK

This section of the EAMP outlines a HSE management framework for the construction and operation of the chemical warehouse and laydown at Land of Canaan. Its purpose is to provide a process to ensure environmental statutory compliance, consistency with international guidelines and standards, and promotes effective environmental management at the facility during all project phases.

8.1 HSE Responsibility

AGHI, as the project proponent and the holder of the Environmental Permit to be issued by the EPA, will be responsible for ensuring compliance with the health, safety and environmental requirements relevant to the project.

However, day to day compliance onsite will be the responsibility of GLASS, since GLASS will be operating the facility. GLASS will engage the services of an HSE personnel as part of the staff compliment of the facility and who will be responsible for the implementation of the necessary measures to ensure health, safety and environmental compliance.

In addition, all workers would be aware of their environmental responsibilities, and all operational staff members must undergo an induction/orientation programme which will focus on HSE awareness, particularly as it relates to the handling of chemicals and other hazardous materials. Each Supervisor would be responsible for management of environmental and safety issues in his/her section.

8.2 Training / Employee Education

The Company will embark on a programme of training for all employees. All employees will be required to undergo the HSE orientation training. In addition, specific training will be provided to employees based on their role and responsibilities. Training will be continuous throughout the operation's life, and will include but not limited to the following areas:

- Environmental requirements and practices
- Responsible Care
- Safety and Security
- Incident Reporting
- Emergency Preparedness, Response and Notification
- Environmental Protection
- Site Hazards
- Use of Personal Protective Equipment
- General Safety Rules and Safety Program
- First Aid and CPR
- Mock Spill Response
- Fire Drills
- Safe Handling of Fuel and Chemicals

Environmental Awareness training programme would cover the following areas:

- The environmental framework and environmental management at the operating site

- Guyana's legal, institutional and regulatory framework the governs such operation, as well as employees' and employers' responsibilities

In addition to the orientation programme/site induction, where appropriate, refresher training sessions will be conducted. Typically these will vary in frequency. For example, during construction, daily toolbox talks will take place, backed up by monthly HSE meetings and special training sessions, such as for confined spaces. For operation, every two years, all employees and permanent contractors would have refresher training on environmental awareness and issues relevant to their work activities.

Hazardous materials handling training would be provided to workers who handle them. The level of training would be appropriate to the material being handled and the circumstances.

Environmental training records would be kept and stored in a suitable manner, consistent with other such records.

8.3 Compliance with Laws / Regulations / Monitoring Plan

To ensure good HSE practices and compliance, the Joint Venture will ensure that all the necessary permits and approvals are obtained and adhered to. The key permits/approvals to be obtained are:

1. Environmental Permit from the EPA
2. Facility Registration with the PTCCB
3. Outline Planning Permission from the CHPA
4. No Objection from the NDC
5. Approval for the Import and Storage of Chemicals from the PTCCB

Permits obtained would be stored in a location which is readily accessible to the appropriate staff to ensure that they are aware of the requirements.

Should any other approvals or permits be required for new activities, these should be obtained prior to the commencement of the activities. The facility shall comply with relevant legislation, as presented in Chapter 4 of the EAMP.

8.4 HSE Monitoring

This section provides the monitoring requirements for the proposed chemical storage facility. The operation will engage the services on a HSE personnel. One of the duties of this personnel is to ensure that the monitoring program/requirements are fulfilled and properly implemented. The HSE personnel would be provided with all the necessary assistance from personnel of the different departments at the facility.

The proposed monitoring program should compose of three main categories:

- Environmental Monitoring
- Socio-Economic Monitoring
- Monitoring documentation and Reporting

Environmental monitoring should be conducted during both the construction and operation phases. The environmental monitoring program would include:

- Surface water quality
- Effluent discharge
- Air emissions
- Noise levels
- Solid and hazardous waste collection and disposal
- Monitoring of incoming and outgoing chemicals
- Health and safety requirements
- Incidents and accidents
- Community engagement
- Grievances received

Monitoring of Environmental Parameters

The plan for the monitoring of environmental parameters is presented in Table 8-1, including the parameters to be monitored, the monitoring frequency, and the locations to be monitored. Monitoring locations are shown in Figure 8-1.

Table 8-1: Environmental Monitoring Parameters

Parameter	Frequency	Locations
Surface Water Quality <ul style="list-style-type: none"> • Temperature • pH • Dissolved Oxygen • Turbidity • Total Dissolved Solids • Chemical Oxygen Demand • Oil and Grease • Total Suspended Solids 	Quarterly	Monitoring is proposed to be conducted at the surface discharge points and in the receiving drains upstream and downstream of the facility. These locations are shown in Figure 8–1.
Air Emission <ul style="list-style-type: none"> • Volatile Organic Compounds (VOCs) • Nitrogen Dioxide (NO₂) • Carbon Monoxide (CO) • Particulate Matter (PM_{2.5}) • Particulate Matter (PM₁₀) 	Annually	Upwind and downwind of the facility. These locations are shown in Figure 8–1.
Noise: <ul style="list-style-type: none"> • Ambient Noise (Decibels) 	Quarterly	The property boundary and 15 meters from any significant noise source. These locations are shown in Figure 8–1

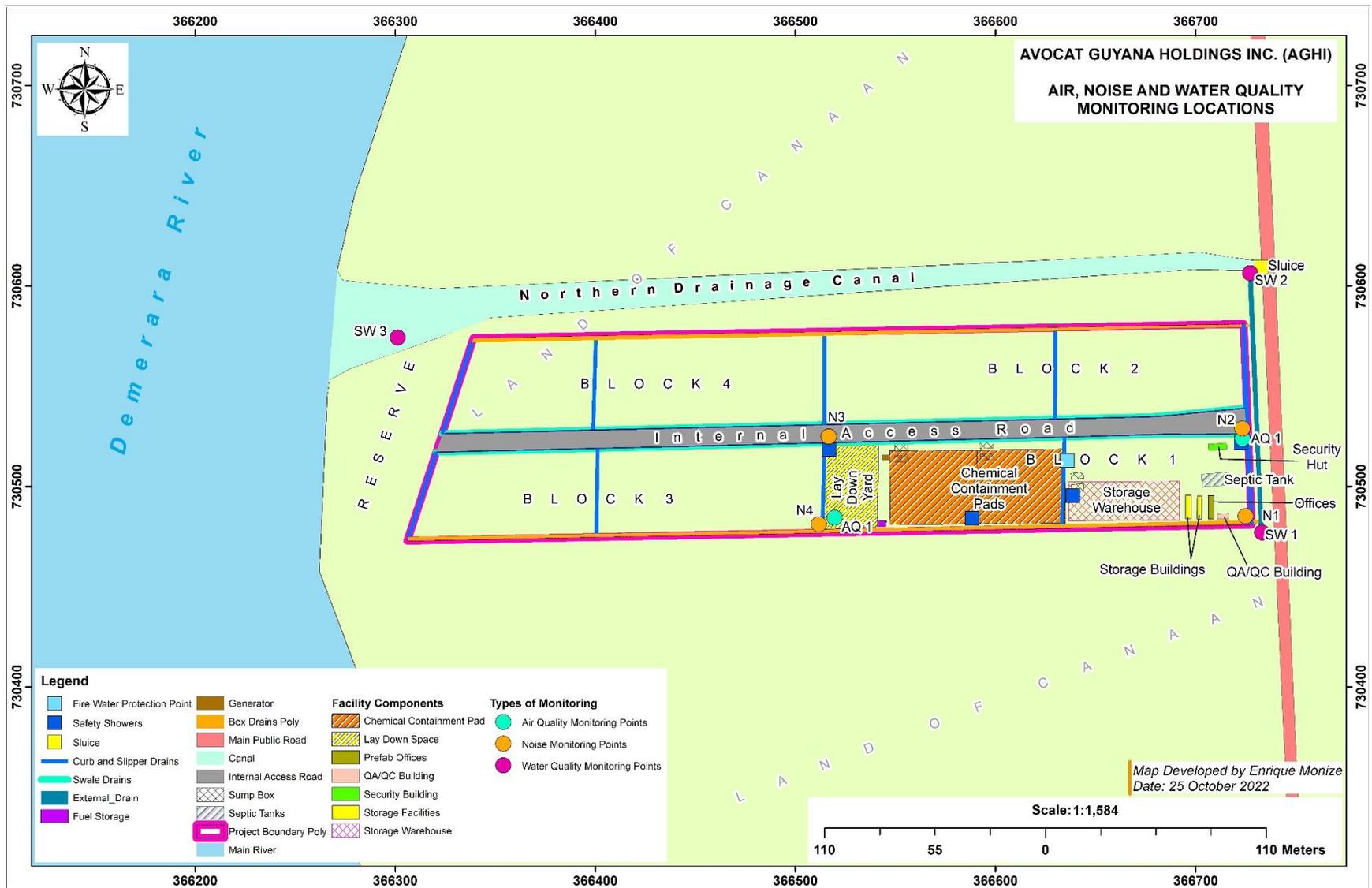


Figure 8-1: Proposed Locations for Monitoring of Air Quality, Surface Water Quality and Noise

Health and Safety Monitoring

Monitoring to ensure health and safety compliance will be done, as is outlined in Table 8-2.

Table 8-2: Monitoring of Health and Safety

Parameter	Frequency	Locations
Health and Safety <ul style="list-style-type: none"> • Use of PPE • Induction Training • Toolbox talks • Use of Job Safety Analysis (JSA) • Installation of appropriate HSE signage • Installation of emergency response procedures • Installation of appropriate emergency response equipment (fire extinguishers, first aid kits, spill kits, eye flush and bath facilities) • COVID 19 and monkey pox precautionary measures. 	Daily and/or Weekly	Around the operational areas
Housekeeping	Continuous	Throughout the facility
Number of Accidents and Incidents	Monthly	
Employees Health Conditions	A baseline check-up on all employees (before commencement of work), particularly those involved in high risk activities. Employee medical check-up results, carried out periodically shall also be documented and stored.	Throughout construction and into operation
Alcohol and Drug Use	Random test to be conducted	

Solid and Hazardous Waste Monitoring

During both the construction and operation phases, waste would be handled according to a waste management plan. Monitoring is required to ensure proper implementation of the management plan. Solid and hazardous waste quantities and destination (final disposal) would be documented and kept, to ensure proper handling and disposal.

Monitoring of Incoming and Outgoing Chemicals

A record will be maintained for all incoming and outgoing chemicals. This log shall be reviewed regularly to determine the amount of each chemical kept onsite. An inventory of safety data sheets for all chemicals on the site should also be kept. Any new chemical proposed to be brought to the facility for the first time must be approved by site HSE personnel prior to it being brought on site.

Socio-economic Monitoring

This monitoring covers relevant socio-economic impacts of the project and surrounding community/activities. A simple analysis of the number of local population employed, number of stakeholders' engagement conducted and grievances received and resolved. These can be monitored throughout the project's construction and operation phases.

8.5 Record Keeping and Reporting

Monitoring will be used as a means of identifying and addressing existing or potential environmental problems. All areas of concerns would be monitored as necessary. However, operational related activities such as use of safety gears and compliance with health and safety procedures will be monitored on an ongoing basis.

For water quality monitoring, samples will be collected and analyses will be conducted *in-situ* and at laboratories. Monitoring of noise levels and ambient air quality will be conducted *in-situ*. A third-party will be contracted to undertake these monitoring activities. Records of monitoring will be kept by the company on-site and made available to the EPA or other regulatory authorities upon request.

An Annual Environmental Report will be prepared and will be submitted to the EPA and will include results of monitoring activities. Incident Reports will be prepared for any incident which may occur. Further, environmental and health and safety compliance will be discussed at meetings, including non-compliances, corrective actions, and emerging issues. This will also contribute to better environmental and health and safety compliance.

In addition to HSE related monitoring there will be a routine schedule for equipment monitoring and maintenance in keeping with equipment and machinery design standards and specification.

8.6 Stakeholder Engagement

Engagement with stakeholders relevant to the project has already commenced through the process of preparation of this EAMP. The engagement conducted to date is documented in Chapter 5. A Stakeholder Register was developed and will be utilized for future engagements. This register will continue to be updated as additional stakeholders are identified. The list includes surrounding commercial entities and residents and regulatory institutions.

Stakeholder engagement will build on the already existing system and structure of stakeholder activities with the active participation of relevant local authorities. The planned activities will provide for a more systematic way of engagement and information sharing, and data gathering from relevant and interested stakeholders. Stakeholder engagement activities will record the following information on an on-going basis:

- Type of information disclosed, date and form of disclosure and distribution channels.
- Minutes of meetings, lists of participants and locations of any meetings organized with affected people.
- Individuals, groups, organisations and institutions that have been consulted.
- Key issues and concerns discussed and raised by affected people
- Response mechanism, follow-up actions and investigations
- Documentation of activities and processes and response to stakeholders

During the construction stage, meetings will be held with local residents and businesses etc. to provide information on the project and progress. During the operation phase periodic engagement will be held with stakeholders to update them of the project and discuss any areas of concern.

Stakeholder engagement will be led by the Company's HSE personnel and the engagement plan will be a living document which will be revisited and updated, if necessary, to reflect the changes in stakeholder engagement due to project advancement and new stakeholders if any. The information that is required to be disclosed may change if there are changes in the project design, schedule, area of influence and activities.

8.7 Grievances

A grievance redress mechanism will be implemented to ensure that the Company is responsive to any concerns and complaints, particularly from affected stakeholders and the nearby community. The grievance mechanism covers both employees and non-employees (i.e., affected people and other relevant stakeholders).

Any comments or concerns can be brought to the attention of the Company verbally (by telephone or visiting the office, or in writing (by post or e-mail). Individuals can request the right to have their name kept confidential and this mechanism does not preclude the right for stakeholders to process grievances through other judicial means. All grievances will be:

- Acknowledged within 14 working days
- Responded to no later than within 30 working days

A specifically designated member of staff will record the grievance information in a Grievance Log. This will include:

- Stakeholder name and contact details
- Details of the grievance and how and when it was submitted, acknowledged, responded to and closed out.

The grievance management process is depicted in Figure 8-1.

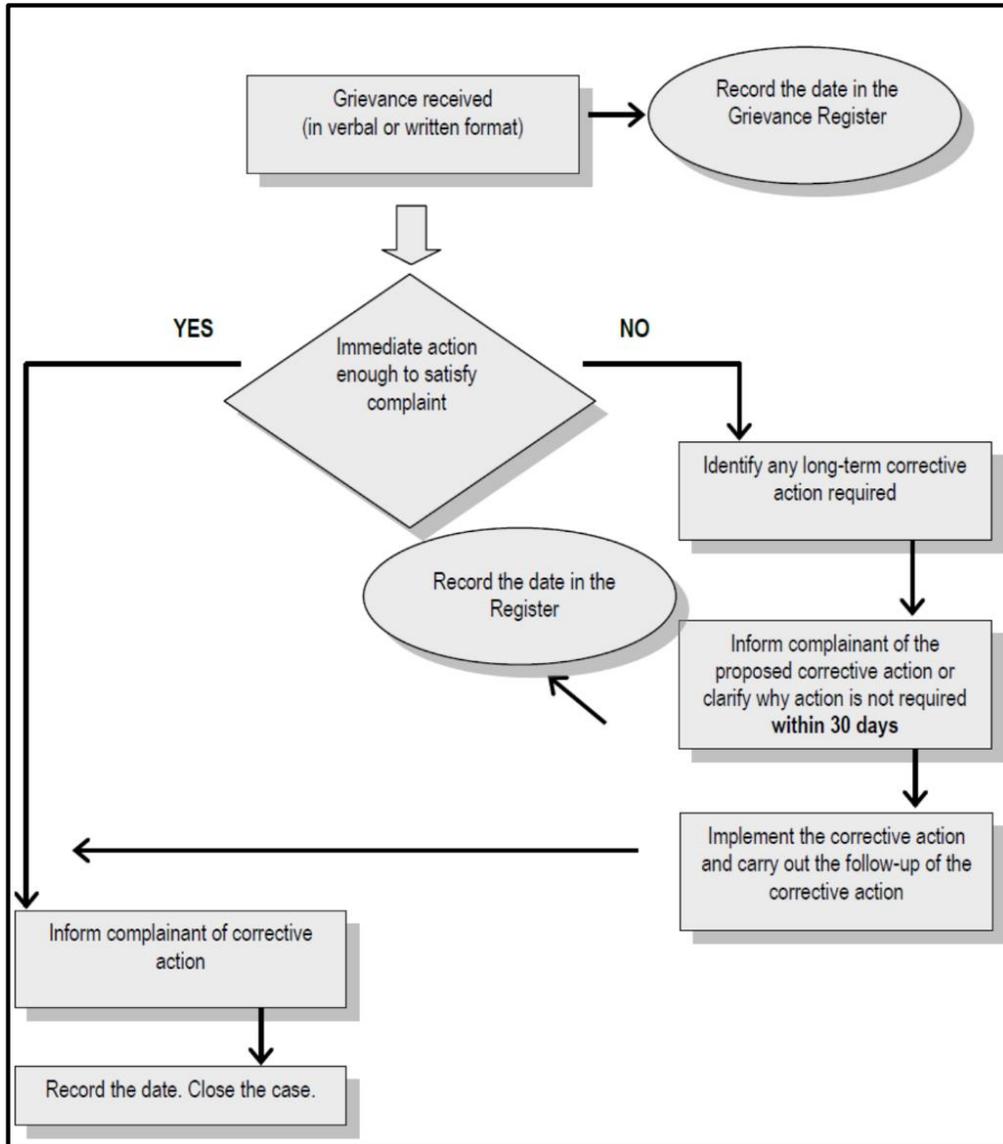


Figure 8-1: Grievance Procedure

9.0 EMERGENCY PREPAREDNESS AND RESPONSE PLAN

Several measures are built into the project design, construction and operation to ensure that the working environment is healthy and safe. These measures were discussed in the preceding chapters. Although the company has undertaken measures to minimise the environmental, safety and health risks, unforeseen events can lead to emergencies. In the event of an emergency, the objectives are to ensure a prompt and effective response, and to minimize the effects.

The Joint Venture of AGHI and GLASS will prepare a detailed Emergency Preparedness and Response Plan (EPRP) for the chemical warehouse and laydown yard to be constructed at Land of Canaan so as to adequately and effectively respond to any emergency which may occur. This Chapter presents a synopsis of the Emergency Preparedness and Response Plan.

9.1 Introduction

This EPRP describes the general types of emergencies, the measures to be implemented to respond to these emergencies, and actions to be followed should an emergency occur. The EPRP includes:

- Emergency Contact Details
- Emergency Procedures including first person response and notification procedures
- Description of an Emergency
- Authority of Control
- Emergency Equipment
- Scenario Description and Response
- Incident Reporting

The information contained in this EPRP will be provided to employees and placed at strategic locations within the compound such as the office and within the warehouse. Workers will be adequately oriented and trained on safety and the practical applications of the emergency response procedures, including through periodic emergency drills.

9.2 Emergency Response Philosophy

The EPRP is based on the following objectives:

- Protection of human health and safety.
- Protection and minimization of existing and potential impacts on the environment.
- Containment of the spread of any spilled or leaked materials such as fuel or chemicals;
- Commencement of clean-up activities and site remediation as soon as possible following an emergency.

Emergencies are unplanned events or events that are considered highly unlikely to occur. As such, it is important that procedures are put in place to respond to such situations should emergencies arise. The principal objective of the EPRP is the protection of the company's personnel, its assets and the environment in the general Aol of the project through the provision of emergency response materials and equipment and development of emergency response skills and systems. It is recognized that some crises

may have severe impacts and would require a response mechanism well beyond the capacity of what the company can deliver. Under these circumstances support from other entities, including Government agencies, would be required.

9.3 Identification of an Emergency

An environmental emergency would involve widespread actual or potential destruction or contamination of the environment that calls for immediate action. Some events relevant to the project that would trigger an emergency response procedure include:

- **Fires:** Fire risk can be associated with arson or fires arising from operations of the facility.
- **Minor and Major Accidents:** Both minor and major accidents can occur during the construction and operational phases. Minor accidents at the facility can result in cuts, scrapes, burns and bruising while major accidents can include broken bones and burns among others.
- **Unplanned Discharges of Hazardous Materials:** Given that chemicals and fuel will be stored and handled at the facility there is the potential for both minor and major spills to occur.

9.4 Emergency Contact Details

There are key institutions and agencies that would need to be contacted in the event that an emergency occurs. Table 8-1 outlines the contact information for key institutions relevant to this operation.

Table 9-1: Emergency Contact Information

Institutions	Telephone Number
Environmental Protection Agency	225-5467-68 225-6044 225-6048
Diamond Hospital	265 4681-5
Georgetown Public Hospital Corporation	227-8241
Timehri Fire Station	261 2291/ 261 2211
Diamond Fire Station	<u>216-2162</u>
Timehri Police Station	261 2222
Madewini Police Outpost	261 5444
Grove Police Station	265-2233
Ministry of Labour	227-3133
Caledonia – Good Success NDC	266-2239

9.5 Emergency Procedures and Responsibilities

All personnel must be aware of potential risks and take the necessary steps to effectively mitigate and manage hazards in their work area. In addition, all personnel are expected to raise an alarm if they discover an accident, fire or spill, in keeping with the procedures set out in this Plan.

Only duly trained personnel would respond to fires or spills, or administer First Aid. Workers would respond differently depending on the type of emergency and training. Response procedures will be posted at strategic points in all work areas.

9.6 Authority and Control

The management of the facility has the authority to take control of any incident or accident. Management can take a decision to close down any part of the operation or the entire operation following an incident or accident. The type of emergency would determine the level of response required. The main authority of control would be the Facility Manager. The Manager will be supported by the HSEQ Officer.

9.7. Emergency Preparedness Measures and Response Procedures

Emergency preparedness measures are included in the project design and will be maintained onsite throughout the operation. Response procedures are to be applied to both minor and major incidents and accidents. Adequate information, materials and equipment will be maintained onsite to respond to emergencies. Given the location of the facility there is easy access to communication, including both cellular and land line service. Emergency services are also located in relatively close proximity including medical, fire and police.

The following sections detail the emergency equipment and materials, training and emergency procedures relating to the types of emergencies which would be put in place.

9.7.1 Fire

Measures will be implemented to prevent and respond to fires.

Equipment and Materials

The following fire response equipment and materials would be made available to respond to fires:

- A fire response pump will be provided at the project site within proximity to the storage warehouse and the chemical storage pads. This is to be used during fire emergencies so as to contain fires that are small and manageable in nature.
- Appropriate fire extinguishers will be placed at strategic locations around the facility to respond to different types of fires. Fire extinguishers will be located along the normal path of travel, easily accessible, and readily available. The following will be taken into consideration when placing fire extinguishers:
 - Locate extinguishers near likely fire hazards.
 - Place extinguishers so access to them will not be blocked by fire.
 - Install enough extinguishers to deal with the severity of the blaze that may be expected, the rapidity with which it might spread, intensity of heat, etc.
 - Locations are marked conspicuously.
 - Each unit is identified for the type of fire it is designed to combat.
 - Protect extinguishers from traffic.
 - Place extinguishers so that their tops are not more than 4 feet above the floor.

Portable extinguishers will be of the right type and the right capacity (volume) so as to extinguish the amount of material that may be involved in a fire. Table 9-2 shows the uses for different types of extinguishers and will be used as a guide for choosing the proper extinguishers for the facility. Nevertheless, the multipurpose extinguishers will be the preferred choice since these are good for areas where fires may involve different classes of materials. Dry powder extinguishers, for example, would be good for a fire involving all or one of the following: solvents (Class B), and electrical (Class C). Also, a second extinguisher for Class D fires (e.g., Met-L-X) will be also be installed.

Once the appropriate extinguisher for fire (Class A, B, C or D) is determined, the “P.A.S.S” system would be employed, as outlined below:

- **P**ull the pin or ring.
- **A**pproach the fire and stop about 8 feet away. Aim the nozzle at the base of the fire.
- **S**queeze or press the handle to activate discharge.
- **S**weep the nozzle slowly from side to side, aiming at the base of the fire.

Signs bearing “P.A.S.S” instructions will be posted at each fire point within proximity to the fire extinguisher.

Table 9-2: Use for Various Types of Fire Extinguishers

TYPE OF EXTINGUISHER	EFFECTIVE AGAINST	DO NOT USE ON
Water	Class A fires: burning paper, wood, rubber, textiles.	electrical, liquid or metal fires
Carbon Dioxide	Class B fires: petroleum hydrocarbons (flammable solvents, motor oil, grease)	metal fires (including lithium aluminum hydride)
Dry Powder or Dry Chemical	Class C fire: burning liquids, large quantities of flammable solvents, electrical fires	metal fires, fires involving delicate instruments
Met-L-X and Class D extinguishers with special granular formations	Class D fires: burning metal (e.g. lithium, magnesium, potassium, sodium, alloys of reactive metals, metal hydrides, metal alkyls, and other organometallics)	paper, trash, liquid, electrical fires
Halon Substitute fire extinguishing media	Class A, B, and C fires	Class D fires

- All trucks transporting fuel and chemicals will be required to have and maintain an appropriate extinguisher.
- Buckets containing sand will be properly placed at strategic locations, preferably next to the fire extinguishers.

- The facility will be capable of notifying all onsite personnel in the vicinity of a fire so that they may evacuate buildings expeditiously. In this regard, a fire alarm system would be installed and employees made aware of the sound of the alarm. Locations which may not have any alarm system would also have alternative ways of notifying employees and other persons. These alternative methods will be communicated to all necessary personnel.
- Fire blankets would be readily available in each chemical storage area to use to cover an injured victim who may be in shock until emergency medical help arrives.
- An Evacuation Plan will be prepared for the warehouse.
- A “Muster Point” will be established for employees to gather in the event of a fire.

Training

Workers of the facility will be provided with training in first response in the case of a fire. The following training is to be conducted:

- Safe and effective use of fire extinguishers and other response equipment.
- Triggering the fire alarm system which will be installed.
- Conducting fire drills for all staff periodically.

Response Procedures

In the event of a fire, employees will initiate the following procedure which they would be familiar with as a result of fire drills:

1. Immediately warn others, sound the fire alarm and evacuate work areas to assemble at the muster point. The person that spots the fire should alert a member of the staff trained in fire control. Trained personnel should determine if the fire can be controlled with fire extinguishers or if the Guyana Fire Service (GFS) should be contacted. No one should attempt extinguishing a fire alone.
2. Inform the Manager.
3. Trained personnel would attack the fire if safe to do so with firefighting equipment provided but without taking personal risks. Only personnel trained to fight fires would do so.
4. Take decisions on containment:
 - If it is a small fire, use fire extinguisher or sand buckets.
 - In the event of a fuel fire, if possible and without risk, cool tank with water from the side until well after fire is out and stay away from ends of tank. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

5. For large fires, immediately contact the GFS operations at Timehri and Diamond. Guidance on containment may be sought from the GFS. Also inform the management of neighbouring operations.
6. In the event of an explosion, trained personnel should determine if the situation can be controlled by site personnel, if not, then the GFS should be contacted. No one should attempt to enter the area until the situation has been assessed from a safe distance. The area should be barricaded, and all non-essential personnel should leave the area. All efforts should be made to prevent the situation from endangering the community or the environment. Without risking the safety of the employees.
7. The Manager to conduct a head count of the personnel assembled at the Muster Point. If anyone has been injured and require medical attention, they will be transported to the Diamond Hospital.
8. Management, in consultation with the GFS (if the GFS has been called to the scene), will determine if it is safe to return to work.
9. An Incident Report will be prepared.

Special Consideration

In responding to fires it is important to use the most appropriate response measure based on the classification of the fire, as is outlined below:

1. Class A - Fires in ordinary combustible materials such as wood, coal, paper, or fabric where wetting and cooling is the method of extinguishing used. Here water or solutions containing a large percentage of water are of first importance
2. Class B - Fires in flammable petroleum products and other flammable liquids or greases where it is essential to exclude oxygen as a method of extinguishing
3. Class C - Fires in or near energized electrical equipment so that the use of water as an extinguishing agent would be hazardous, necessitating the use of a " non-conducting" extinguishing agent.
4. Other Fires - Certain combustible materials or reactive chemicals require, in some cases, special extinguishing agents or techniques. Smothering or coating is the basic approach of extinguishing.

9.7.2 Accidents

Both minor and major accidents can occur at the facility and response procedures will be implemented to address both situations if they occur. Minor accidents at the facility can include cuts, scrapes, burns and bruising while major accidents can include broken bones and burns among others. The system to respond to these accidents is presented below.

Equipment and Materials

- Safety Data Sheets (SDS) are to be kept onsite for the hazardous materials to be stored and utilized.

- First aid kits will be made available onsite at the office and operational areas and would be stocked with essential items to provide first response to injuries from minor accidents.
- A vehicle will be kept onsite during construction and operational hours to provide transportation in the event of injured personnel requiring transport to a health facility.
- The facility will be equipped with up to four emergency showers, two on either end of the yard and one each within the chemical storage areas.
- Eyewash stations will be installed at the storage and operational areas.

Training

- Staff would be provided with training to respond to basic emergencies. Selected staff will be provided with training in First Aid and CPR.

Response Procedures

In the event of an accident the following response procedures will be initiated:

- In the case of minor accidents, basic first aid and or will be administered at the facility.
- In the case of major accidents:
 - Manager will be informed.
 - The degree of injury will be assessed, including to determine whether there are any broken bones, burns or severe sprains, or if the employee is conscious or unconscious
 - Transportation to the Diamond Hospital will be arranged. If the injuries are too severe to transport the patient by car, an ambulance should be used. A company representative must accompany the injured person to the clinic, or any other medical facility used to treat the patient.
- An entry will be made into the Accident Register.
- The Ministry of Labour will be informed in accordance with the Occupational Safety and Health Act. If the accident results in a fatality, the Ministry will be notified within 24-hours.

9.7.3 Spills of Chemicals and Fuel

The main activity at the facility will be the storage and handling of chemicals. Fuel will also be stored onsite. Spill can occur as a result of breach of storage containers. There is also the risk of spills occurring from handling or transfer of these materials. A spill can either be major or minor. A major spill is any spill of an acutely hazardous material greater than 1 litre which presents an immediate danger to health, safety or the environment, or is an immediate fire hazard.

Measures are detailed in the EAMP to prevent spills from occurring, as well as preventing spilled materials from breaching containment areas and entering the environment. In addition, the measures outlined below will be implemented to respond or contain any spill in general.

Equipment and Materials

The management of the facility will ensure that all chemical storage areas have sufficient spill control equipment either within the storage areas themselves or readily available to respond to spills involving the chemicals being stored. Chemical spill supplies will be capable of dealing with a spill of up to two gallons. The minimum equipment will include:

- neutralizing materials;
- absorption materials;
- broom and dustpan;
- bags, large, 6 millimeter polyethylene;
- mop;
- bucket (polyethylene);
- containers (5 gallon plastic);

The following will also be implemented:

- The entire operational area will be constructed with an impervious base.
- A containment berm will be constructed around the fuel storage tank.
- Within the warehouse a curbed impervious area will be used to store liquid chemicals. Two chemical containment pads will also be used to store chemicals. These areas will comprise four sides bund wall and sloped to form a containment sufficient in height to contain spills. The area will be sloped in two directions to a grated 4ft x 4ft x 2ft deep sump.
- Drains will have shut-off valves to isolate in the event of chemical spill.
- SDS are to be kept onsite for the hazardous materials to be stored and utilized.
- Universal spill response kits will be procured and kept onsite to respond to both dry and wet spills.
- Vacuum pumps will be provided.

Establishment of Outside Technical Assistance and Response Capability

The management of the facility will engage off-site resources such as a hazardous waste disposal contractor and an emergency response contractor, to be called upon to perform functions beyond the ability, scope or permitted actions of the facility's staff in the event of a major spill.

Training

- Relevant staff would also be trained in proper handling and storage practices for both chemicals and fuel.
- Workers would be trained in spill response, including containment and clean-up, through mock spill exercises.

Response Procedure

The following procedure will be initiated if there is a spill at the facility:

- Inform the Manager and determine the need for evacuation of the facility.
- Concentrate all initial efforts toward the containment of the spill. All valves and pumps that may be supplying the spill must be shut in the "off" position. Temporary dikes of sand or other compatible material must be used to contain spill path. If possible, utilize the on-site spill kits to stop the flow.
- Prevent the movement of people or vehicles into restricted area.
- Use spill kits to clean up minor spills.
- For significant spills take action to prevent the spilled material spreading and contaminating the waterways and soil. Keep spilled material within the containment area. Use vacuum pump to retrieve as much spills material then use absorbents.
- Make entry into the Accident and Emergency Record book.

Spill Procedures for Minor Spills

In the event of a minor spill the following emergency procedures shall be implemented:

1. If injured or contaminated with a hazardous substance immediately implement personal decontamination procedures (i.e. eyewash, first aid, safety shower, etc.) prior to reporting spill.
2. Trained personnel at the facility will be responsible for the containment and clean-up of all minor spills using in-house equipment and materials available for such event such as chemical spill kits.
3. Proper PPE, including splash goggles, chemical resistant gloves, and a long-sleeved overall coat shall be donned during the clean-up of all minor spills.
4. Consult SDS for hazard information and clean up instructions.
5. Control the source and confine the spill to a small area using spill kit supplies. Avoid walking in spill or breathing vapours.
6. If necessary, the spilled chemical will be treated and free liquid will be absorbed using appropriate material
 - For corrosive liquid use a neutralizer

- For flammable solvent an absorbent such as sand or specific solvent absorbent from the spill kit.
7. If the spilled material is a solid debris it will be cleaned up with a dust pan and hand broom.
 8. All debris will be collected in an appropriate container, tightly sealed or closed. A Hazardous Waste Tag will be attached to the container which will be moved to a Satellite Accumulation Area for disposal.
 9. All disposable PPE and clean up materials will be disposed of as hazardous waste by a certified contractor that is specialised in the handling and disposal of such waste and materials.
 10. All non-disposable PPE will be decontaminated and stored.
 11. If the material spilled is not covered under the minor spill definition then management personnel will implement the major spill procedures.
 12. A chronological report of the spill event must be prepared to document all event actions.

Spill Procedures for Major Spills

In the event of a major spill at the facility, management personnel at the facility will be responsible to implement the following measures:

1. Notify persons in the immediate area that a spill has occurred.
2. Avoid breathing of vapours, mists or dust of the spilled material.
3. Turn off all ignition sources, if possible.
4. If injured or contaminated with a hazardous substance immediately implement personal decontamination procedures (i.e. eyewash, safety shower, etc.) prior to reporting spill.
5. Evacuate room or containment area and close the door.
6. Contact the relevant authorities listed in Table 9-1 using any in house telephone or mobile.
7. Contact established off-site resource i.e. emergency response or hazardous waste disposal contractor.
8. In order to assess the situation be prepared to provide the following information:
 - Name and call back number
 - The location of the spill (building and room number)
 - Type of material spilled
 - The amount of material spilled
9. Consult SDS for hazard information and clean up instructions.
10. Trained personnel at the facility fully equipped with the necessary PPE will be responsible for temporary containment using in-house equipment and materials available for such event, until the arrival of the certified Emergency Response or Hazardous Waste Disposal Contractor, who will take control of further containment and clean-up activities.
11. The certified Hazardous Waste Disposal Contractor will be responsible for the clean-up, collection and disposal of all contaminated substances.
12. All disposable PPE and clean up materials shall be disposed of as hazardous waste by a certified Hazardous Waste Disposal Contractor that is specialised in the handling and disposal of such waste and materials.
13. All non-disposable PPE shall be decontaminated and stored.
14. A chronological report of the spill event must be drafted to document all event actions.

Special Considerations

Below are measures to respond to specific chemical spills and decontamination afterwards:

- Alkaline Corrosive Materials - Clear the area of non-emergency personnel. Contain spill area by damming with spill absorbent materials. Wear a slicker suit, chemical goggles, and chemical boots for cleanup operations. Secure spill source. For large spills use a vacuum to clean up the spill for proper disposal. For small spills remove contaminated soil to proper container for disposal.
- Acidic Materials - Clear the area of non-emergency personnel. Secure the leak's source. Wear rubber gloves, chemical goggles, rubber boots, and chemical cartridge respirators or self-contained breathing apparatus. Contain spill area by diking with spill absorbent materials.
- Flammable and Combustible Solvents - Clear the area of non-emergency personnel. Secure spill source and contain the spill. Secure the area from ignition sources such as forklifts, plant pick-ups and maintenance carts. Use a vacuum truck for large spills.

For decontamination, all personnel and equipment must be (cleaned) decontaminated. Reference the SDS for any information need to determine the best cleaning solution or neutralizer. The following should be done:

1. Clean the equipment with compatible solution.
2. Clean all boots, hard hats, and other PPE with a compatible solution.
3. Dispose of chemical suits and gloves in solid waste container
4. Personnel should wash with fresh water and soap.

9.8 Evacuation Plan

Detailed evacuation plans would be designed and posted in large buildings or encloses, particularly the warehouse and containment pads. These would be large drawings outlining all emergency exits, escape route and location of in-house emergency response equipment. Emergency response plans would be posted at strategic locations throughout the building and will be made known to all staff and visitors of the facility. These plans will also outline all muster /assembly points at the facility.

Proper signage would be used throughout the facility so as to ensure a safe working environment. Signage are particularly important for emergency exits and exit routes, and location of emergency equipment.

9.9 Incident Reporting

The company will notify the EPA within and agreed timeframe but not beyond 12 hours of the occurrence of any environmental emergencies such as fuel spills, hazardous materials or waste spills, and any natural, technological or human induced factors that cause or threaten to cause environmental damage as well as to harm to human health or livelihood. The reporting will be done verbally via a telephone call to the Agency. Subsequently, an incident/accident report. The Manager will have direct responsibility for the preparation of such a report. For spills less than 2m x 2m the Agency will be informed via the Annual Environmental Reports.

In addition, the Ministry of Labour will be informed of any accidents that occur onsite using the Accident Register format available in the Occupational Health and Safety Act. The Ministry requires notification of a fatality within 24-hours.

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APPENDICES

Appendix A – MoU between AGHI and GLASS

MEMORANDUM OF UNDERSTANDING

THIS AGREEMENT is made as of the 1st day of November, 2021.

B E T W E E N:

GUYANA LOGISTICS AND SUPPORT SERVICES INC (GLASS),
Registered Address 110 Duke & Barrack Streets, Kingston,
Georgetown, Guyana.

("GL")

- And -

OF THE FIRST PART

AVOCAT GUYANA HOLDINGS INC. (AGHI),
Registered Address: # 1 Croal Street, Starbrock, Georgetown, Guyana

(individually a "Party" and collectively the "Parties")

OF THE SECOND PART

WHEREAS this Memorandum of Understanding ("MOU") between the Parties signals the Parties' intention to incorporate a company pursuant to the general terms of this MOU.

NOW THEREFORE the undersigned hereby agree as follows.

1. JOINT VENTURE

The Parties hereto hereby agree to associate themselves in a joint venture for the purposes set out below.

1.1 Nothing contained herein shall in any manner whatsoever constitute the association of the Parties in the agreement to be a commercial partnership or any other partnership relationship. No Party shall have the authority to act for, or to assume any obligation or responsibility on behalf of, any other Party except as otherwise expressly provided herein. The rights and obligations of each Party shall be in every case several and not joint or joint and several.

1.2 Except as may be otherwise expressly provided herein, nothing herein shall restrict in any way the freedom of any Party, except with respect to its participating interest in the Joint Venture, to conduct as it sees fit any business or activity whatsoever, including the development or application of any process, and the

2. PURPOSE

2.1 The purpose of this MOU is to establish a mutually beneficial, cooperative and productive relationship for the development of a chemical storage facility and laydown yard at the parcel of land located at Lot lettered "a" being a portion of tract of land marked "V" being a portion of that part of lot lettered "D", a portion of the north part of Land of Canaan, in the Craig Caledonia



village district, on the East Bank of the Demerara River, in the county of Demerara in the Republic of Guyana, SA.

- 2.2 Work together to obtain all relevant approvals from the Environment Protection Agency (EPA), Central Housing and Planning Authority (CHPA) and any other relevant authorities required for the development of the facility
- 2.3 To lease and obtain a sub-lease from a prospective client prior to construction of said facility.

3. AGREEMENT OF TERMS

- 3.1 GLASS proposes to lease the facility and sub-let to prospective clients while operating a logistic base for the potential client

4. LENGTH OF LEASE

- 4.1 Subject to agreement between both parties.

5. NOTICE

5.1 Any notice, document or other communication required or permitted by this MOU to be given by either or both of the Parties shall be in writing and is sufficiently given if delivered personally, or if sent by prepaid ordinary mail posted in GUYANA, or if transmitted by a form of recorded telecommunications tested prior to transmissions, to such party and addressed as follows:

if to

Attention: Mr. Glenn Low A Chee
GUYANA LOGISTICS AND SUPPORT SERVICES INC (GLASS),
Registered Address: 110 Duke and Barrack Streets, Kingston,
Georgetown, Guyana, SA

Attention: Monica Dookharan
AVOCAT GUYANA HOLDINGS INC. (AGHI)
Registered Address: #1 Croal Street, Starbroek, Georgetown, Guyana, SA

6. GENERAL

6.1 The parties agree that each of them, together with their agents and employees will maintain confidential and not disclose to any third party (except professional advisors) without the written consent of each other any information relating to the negotiations concerning this MOU. Each party further agrees that any and all information obtained by each of them in the course of their discussions will be used only in connection with the negotiation of the transactions contemplated herein and that such information will not be used directly or indirectly for any other purposes.

6.2 Without prejudice to the non-binding nature of this Agreement, this MOU will terminate upon the earlier of (i) 365 days from the date of execution of this Agreement, (ii) the parties' mutual consent to terminate this MOU. The MOU may be extended and renewed on an annual basis, upon terms to be agreed upon by the Parties. Upon the termination of this MOU, it shall become void and of no further



force and effect, except for the provisions of Sections 6 which shall survive such termination.

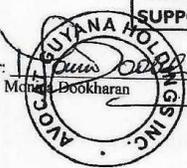
6.3 Each of the Parties will be responsible for and bear all of its own costs and expenses in connection with this MOU and the transaction contemplated herein.

6.4 This MOU shall be construed, interpreted and the rights of the parties determined in accordance with the laws, other than the conflicts of laws rules of GUYANA and the parties shall submit to the jurisdiction of the courts of Guyana.

6.5 This MOU may be executed in one or more counterparts each of which counterpart shall be deemed to be an original and legally binding document, and all of which, when taken together, shall constitute one and the same document. The exchange of the executed counterparts of this MOU and the signature pages thereto by facsimile or by electronic transmission in portable document format (PDF) shall constitute effective execution and delivery of this agreement as to the parties and may be used in lieu of the original executed MOU for all purposes.

IN WITNESS WHEREOF the parties have executed this MOU as of the date first written above.

Per: 
Glenn Low-A-Chee


Per: 
Monica Bookharan
11/11/2021

GUYANA LOGISTICS & SUPPORT SERVICES INC.

Appendix B – AGHI Taxpayer Identification Number (TIN)

130045


Certificate of Registration
Taxpayer Identification Number (TIN)

Taxpayer Name: AVOCAT GUYANA HOLDINGS INC.
Business Name: AVOCAT GUYANA HOLDINGS INC.
Taxpayer Type: COMPANY
Address: LOT 1 CROAL STREET
STABROEK
GEORGETOWN

Date Issued: August 14, 2019
This Taxpayer has been registered under the provisions
of the Income Tax (Amendment) (No. 2) Act # 15 of 2006

Tax Office: HEAD OFFICE

TIN: 017234579



Commissioner General
Guyana Revenue Authority

GRA14115455

Appendix C – GLASS Environmental Policy



ENVIRONMENTAL POLICY

DOC. ID	REVISION NO.	DATE OF REVISION	NO. OF PAGES
ENV-PO-01	02	3 RD MARCH, 2022	PAGE 1 OF 1

POLICY STATEMENT

Guyana Logistics and Support Services Inc. is committed to provide a quality service in a manner that ensures a safe and healthy workplace for our employees, while minimizing our potential impact on the environment. We will operate in compliance with all relevant environmental legislation and we will strive to use pollution prevention and environmental best practices in all we do.

We are committed to:

- Integrate the consideration of environmental concerns and impacts into all of our decision making and activities
- Promote environmental awareness among our employees and encourage them to work in an environmentally responsible manner
- Train, educate and inform our employees about environmental issues that may affect their work
- Reduce waste through re-use and recycling and by purchasing recycled, recyclable or refurbished products materials where these alternatives are available, economical and suitable
- Promote efficient use of materials and resources throughout our facility including water, electricity, raw materials and other resources, particularly those that are non-renewable
- Avoid unnecessary use of hazardous materials and products, seek substitutions when feasible, and take all reasonable steps to protect human health and the environment when such materials must be used, stored and disposed of
- Purchase and use environmentally responsible products accordingly
- Where required by legislation or where significant health, safety or environmental hazards exist, develop and maintain appropriate emergency and spill response programs
- Communicate our environmental commitment to clients, customers and the public and encourage them to support it
- Strive to continually improve our environmental performance and minimize the social impact and damage of activities by periodically reviewing our environmental policy in light of our current and planned future activities

AUTHORIZED BY:

MR. GLENN LOW-A-CHEE
Managing Director

3rd March, 2022

This document becomes obsolete two years after it has been approved. Use of this document beyond this period is prohibited. Please return to the QHSE Manager, GLASS for a review.

Appendix D – GLASS Health and Safety Policy



HEALTH & SAFETY POLICY

DOC. ID	REVISION NO.	DATE OF REVISION	NO. OF PAGES
OHS-PO-01	04	3 RD MARCH, 2022	PAGE 1 OF 1

POLICY STATEMENT

Guyana Logistics and Support Services Inc. continues to hold the health, safety and security of its employees, stakeholders and the environment which we operate in as the most important elements of the organization. Safety is indeed the business of every staff member; therefore, it is a requirement that each employee and contractor to take HSSE seriously in its entirety in execution of their duties to ensure a healthy and harm free working environment for the benefit of all.

Our commitment to Health and Safety are as follows:

- Have a risk-based thinking approach towards all our activities, allowed by a high level of awareness and training of our staff, where all staff can return safely home
- Continuous prevention of injuries, ill health and environmental impact by conducting an annual risk assessment combined to our risk management program
- Ensuring the continual improvement of our HSSE system through performance monitoring and regular management reviews
- Strict compliance to applicable legal and regulatory requirements, including ISO 45001: 2018
- Ongoing engagement with our suppliers and contractors to set clear expectations for the highest HSSE standards; training and development where necessary
- Promotion of a positive HSSE culture through involvement of employees at all level

AUTHORIZED BY:

A handwritten signature in blue ink, appearing to read "Glenn Low-A-Chee", is written over a horizontal line.

MR. GLENN LOW-A-CHEE
Managing Director

3rd March, 2022

This document becomes obsolete one year after it has been approved. Use of this document beyond this period is prohibited. Please return to the QHSE Manager, GLASS for a review.

Appendix E – Laboratory Water Quality Analysis Report



Institute of Applied Science and Technology

University of Guyana Campus, Turkeyen, Greater Georgetown, Guyana.

Phone: (592) 222-4213-5, 4218, 5864. Fax: (592) 222-4229

website: www.iast.gy

Results of Analysis

Client: Avocat Guyana Holding Inc.
Lot "A" of Tract "Y"
Land of Canaan
East Bank Demerara

Date Submitted: 2022-08-24

Date Completed: 2022-08-30

Sample Matrix: Water

Parameters Tested	SW1	SW2	SW3
Biochemical Oxygen Demand (mg/L)	1.20	ND	ND
Oil and Grease (mg/L)	0.08	0.05	0.06
Total Suspended Solids (mg/L)	40.00	20.00	60.00

Note: SD-Standard Deviation
ND- Not Detected

Method Reference" Standard Methods 20th Edition

Institute of Applied
Science & Technology

Mr. Mahendra Rampersaud
HOD Bio-Prospecting/Analytical Department

Mr. Deonarine Jagdeo
Director (a.g)

Thank you for choosing I.A.S.T