Environmental and Social Impact Assessment

for CLEAN MARINE GROUP LIMITED MARPOL Port Reception Facility Used Oil Storage and Recycling Freeport, Grand Bahama Revision 3.5 November 2021

Prepared by: Clean Marine Group Ltd. &
Blue Pelican Sustainability Services

based on Envirologic International Ltd.EIA submitted to GBPA December 2020

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Bahamas

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Robert R. Jones	*12 November 2021*
Signed	Date

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Common Abbreviations

MARPOL	International Maritime Organisation (IMO) Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 and the Protocol of 1997
ATEX	Potentially Explosive Atmospheres
CMG	Clean Marine Group
CSG	Cleansing Service Group
GEA	GEA Group
IFC	International Finance Corporation
IMO	International Maritime Organisation
PRF	Port Reception Facility
IDB	Inter-American Development Bank
ESMP	Environmental and Social Management Plan
SGW	Ship Generated Waste
GDP	Gross Domestic Product
PS	Performance Standards
EH&S	Environmental, Health and Safety
GIIP	Good International Industry Practice
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
GBPA	Grand Bahama Port Authority
HDI	Human Development Index
HMI	Human-Machine Interface
IMR	Infant Mortality Rate
FHC	Freeport Harbour Company
MOE	Ministry of Environment
DEHS	Department of Environmental Health Services
DEPP	Department of Environmental Planning and Protection
NEMA	National Emergency Management Agency
MCC	Motor Control Centre
MLW	Mean Low Water
NOx	Nitrous Oxides
SOP	Standard Operating Procedure
TOC	Total Organic Carbon
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
COD	Chemical Oxygen Demand
PFD	Process Flow Diagram
P&ID	Process and Instrument Diagram
PLC	Process Logic Controller
PCB	Polychlorinated biphenyls
PPE	Personal Protective Equipment
PPM	Parts Per Million
SCADA	Supervisory Control and Data Acquisition
VOC	Volatile Organic Compounds
WBG	World Bank Group

WHO	World Health Organisation
ILO	International Labour Organisation
WRMU	Water Resources Management Unit
GBUC	Grand Bahama Utility Company

EXECUTIVE SUMMARY

PROJECT LOCATION AND DESCRIPTION

This Environmental and Social Impact Assessment (ESIA) is being submitted by The Clean Marine Group Limited (CMG) in respect of CMG's proposed MARPOL Port Reception Facility that will be constructed in Freeport, Grand Bahama Island. Submissions will be provided to the Grand Bahama Port Authority (GBPA) pursuant to the GBPA's request for an Environmental and Social Impact Assessment (ESIA), and to the Department of Environmental Planning and Protection (DEPP) in accordance with the Environmental Planning and Protection Bill, 2019. This ESIA is for Phase I of the project. Phase I includes the landward development and operations, whereas Phase II will include additional bulk liquid transfers such as ship to ship transfer and ship to shore transfer. Phase II is not addressed in this ESIA.

The proposed site location for the CMG Facility is on the western side of Freeport Harbour on Parcel 2 of Basin 3 (Figures 4-6). The site more specifically is to the west of the Freeport Container Port offices and encompasses 4.12 acres. The zoning category is heavy industry per the Grand Bahama Port Authority's Freeport Land Use Masterplan (see Figure 16) and the proposed project is consistent with the current zoning designation.

The MARPOL Facility will be the first of its kind in the Bahamas. The Facility will be engineered, procured, constructed, and commissioned by qualified and experienced subcontractors operating under the supervision of CMG. Procurement of the equipment and consulting subcontractors will be managed and documented via CMG's robust procurement processes. Project management of the design and build phase will be performed by CMG's in-house Professional Engineer (CPEng), who is Chartered in the areas of Mechanical Engineering, Project Management and Leadership & Management. CMG was established in 2017 to assist the Commonwealth of The Bahamas in complying with its international obligations to operate a Port Reception Facility under the International Maritime Organisation's MARPOL Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978, relating thereto and as further amended by the Protocol of 1997 (MARPOL), to which the Commonwealth of The Bahamas is a signatory. This will be CMG's first such Facility. The principal aim of the Facility will be to collect and process liquid waste, typically generated by the normal operation of ships. The wastes will be comprised of waste oils and oily water mixtures, off-specification fuels, bilge water, and, in the case of oil tankers, crude oil tank washings. The Facility will later look to expand taking other types of liquid waste under the terms of the International Maritime Organisation's MARPOL Convention, and from the Islands generally, as and when circumstances will allow. Expansion of services to other liquid waste is not addressed in this ESIA.

The CMG reception and treatment Facility will be an estimated $15M+/- capital investment in Freeport in support of the maritime industry, local companies, and the community. The plant will be operated by trained Bahamians and specialist contractors as required. The plant is expected to employ 5 or 6 operators, laboratory staff, environmental and health and safety supervisors, truck drivers, tanker crew, administration and management staff totalling up to 19 full-time and part-time employees and will create indirect jobs both during and post the construction phase.

The CMG Facility will be a support service for handling and treating oily water and used oil. CMG will provide aid to other local companies in the safe and responsible handling and treatment of liquid waste streams. Currently, the collection, storage, and disposal of used oil are a challenge in the Bahamas and Grand Bahama Island. The CMG Facility can aid in addressing this issue but much effort in the way of public education and oversight by local environmental regulators including the drafting of environmental by-laws will be required within the GBPA jurisdiction.

Waste Processing Description

The reception of these wastes/residues at the Facility will be followed by their treatment. The prime objective of a treatment technology for oily wastes/residues is to remove oil from water and sediments in order to produce an oil stream that is suitable for reuse or recycling. The technology to be deployed to accomplish the treatment is well accepted in the industry with supporting efficiency data. The second objective is to generate an aqueous effluent that meets the effluent discharge standards of the World Bank Group (WBG) General Environment, Health, and Safety (EHS) Guidelines limits for effluent. To achieve the effluent discharge standard, several treatment steps will be required. In general, the treatment process is categorised as follows:

- primary treatment (Gravity separation);
- secondary treatment (physical/chemical separation); and
- tertiary treatment (biological/chemical treatment).

The Oil Treatment logistics can be divided into seven components:

- Reception Tanks – storage for the reception of wastes from road tankers and barges. Capable of holding 24 hrs. worth of waste volume. This waste may be agitated at times and heated.
- Transfer Pumps – Pumps to transfer wastewater to treatment tanks. This is a heated tank with recirculated hot water.
- Treatment Tanks – Used to homogenize the incoming wastewater to present a steady and balanced feed to the Tricanter.
- Tricanter Feed Pumps – Transfer heated feed from the treatment tanks to the Tricanter at a controlled rate.
- Tricanter – Used to separate the incoming waste into three separate phases: oil, water and solids.
- Separators – To clarify and dry the oil for re-use. Operates at 90 – 95ºC.
- Oil Storage Tank – For storage of the finished product.

The maximum treatment capacity of the plant will be 15,000 litres per hour (3,963 gallons/hr.) and the Facility will be capable of operating 24 hours per day, 7 days per week, equating to a maximum 120,000 metric tonnes (34,715,880 gallons) of waste processing capacity per annum. The proposed treatment methodology is consistent with other current operations deployed globally. Most elements of the Processing plant will be constructed off-island, and shipped to site in containerized modules. The tank storage Facility, civil works and interconnecting pipework will be constructed locally under the guidance of CMG using local contractors where possible.

Wastewater Disposal

Two liquid waste streams will be generated by the Port Reception Facility (PRF). The first is overland surface runoff from precipitation that may be contaminated by industrial contaminants. The second is the treated effluent process water removed from the influent. Due to the Freeport Harbour Rules, discharges are not generally permitted into Freeport Harbour. Therefore, it is proposed that the treated wastewater will be discharged to a six hundred foot deep well to be drilled on site. Treated wastewater from plant processing of oily waste and bilge water will be treated per the EHS Guidelines emissions limits. There are currently three other 600 ft wells in Grand Bahama for the disposal of treated wastewater. They are at the Grand Bahama Shipyard, GB Power, and the other at Polymers International Ltd.

Solid Waste Management

Three solid waste streams will be generated by the PRF. These waste streams include domestic solid waste (including items that can be recycled), sludge generated by the processing of contaminated liquids, and spent carbon filters used to treat vapours from the process and holding tanks. Solid waste will be managed through the municipal service provided by Sanitation Services Ltd. for domestic waste collection and disposal at the Pine Ridge Landfill. During construction scrap materials such as wood, cardboard, plastics, and other solid waste will be recycled to the extent practicable, and/or disposed of at the Pine Ridge Landfill. Once the Facility has been commissioned all non-recyclable solid waste will be disposed of using the collection and disposal services of Sanitation Services Ltd.

Dry sludge (approximately 1 cubic metre per day), will be generated as a waste stream from the processing of oily liquid ship waste. The sludge may be disposed at the Pine Ridge Landfill following appropriate sampling and analysis. The preferred and proposed method of dry sludge management will be for CMG to adapt a known, patented, process which CMG has the license and the experience to perform, to treat the produced sludge for reuse. Known as Immobilisation, the process combines the sludge with a limestone/soil mix that can be excavated locally. The combined material is then passed through a crusher to homogenise the material to the optimum size before being passed through calibrated weighing hoppers where, if deemed necessary according to the specific qualities of the sludge, common Portland cement is added as an additional bonding agent. Once any bonding agent is added, it is then weighed again and its pH value is tested before being introduced through a screw-type mixer where a calculated quantity of both inert sodium silicate and fresh water is added into the mixing process. This treatment then produces a hard and inert glassy substance whereby all and any elutable pollutants are locked in for several thousand years. The material produced resembles fine gravel that once complete and tested on-site, will meet Florida EPA Standard 62-777 FAC. This material then becomes a valuable resource for use locally, for capping disused landfill cells, road building and/or constructing soundproofing barriers at, for example, airports.

Spent carbon from the odour control system will either be disposed of with Sanitation Services or shipped back to the United States for regeneration.

Construction

The construction of the Facility represents a short-term impact. During construction, there will be slightly more traffic to the area. However, this area is not generally travelled by the general public. Primary users of the access road are employees of CEMEX and Freeport Container Port. With construction activities and site preparation, there may be some increased dust emissions. These will be controlled through proper site management such as periodic wetting of surfaces. Runoff generated during construction will be managed by sediment control measures and good housekeeping practices (such as street sweeping of surfaces and cleaning of sediment control devices). The construction phase of the project is considered a short term Low adverse impact. Social impacts because of construction will be managed by proper security, safety and health protocols and oversight. Positive benefits of the construction will include increased employment and a reliance to the extent practicable upon local hiring preferences for workers and local suppliers.

Description of Impacts

This report analyzed potential negative and positive impacts as a result of the Project. For the construction phase, a total of six potentially negative environmental impacts were assessed, five of which have an overall impact rating of Low, with the proposed mitigation, and one is High, with mitigation. One positive impact was identified during the construction phase (rated as High for job creation). For the operations phase, a total of seven potentially negative environmental/occupational impacts were identified. Four of these rated as Low, one at Very Low, and two at Medium, after the proposed mitigation. Two potentially negative social impacts were identified, one rated at Medium and one at Very Low (after migitation). Two potentially positive social impacts were identified, both rated as High positive impact. These ratings are indicative of a project that is well situated for its intended use. Utilizing available land at the existing port that has been previously disturbed is the least damaging alternative for this project as opposed to constructing a Facility at a greenfield site which would likely require substantial dredging and/or terrestrial impacts. Potential negative social outcomes as a result of the proposed development include two potential impacts: the potential for increased traffic is rated at a Medium impact and the potential for visual impact is rated at Low. Both of these impacts are consistent with the nature of the proposed development and are generally mitigated by the scale of the project and its location relative to other land uses. Traffic management will be part of the ESMP document.

Two generalized positive socio-economic impacts are the result of the capital investment into the local economy along with concomitant job creation, and a reduction in improper oil disposal in the Bahamas. While a benefit to the environment, this social impact will benefit the region through institutional change with regards to oily waste disposal. It is not quantifiable but is rated as a High positive social impact. The socio-economic impact from capital investment is important but also minimized by the fact that the equipment will be purchased and assembled overseas thus minimizing the direct impact that could be gained by local purchase. However, it is unlikely that local suppliers have the capabilities to produce this very specialized equipment and thus this is likely an unavoidable outcome. This impact is also further reduced by the current tax incentives offered by The Bahamas. However, job creation is a major positive socio-economic impact from operations and these impacts will be continuous throughout the life-cycle of the Project. The overall positive social impact rating is considered High.

The overall environmental impacts as a result of construction are Low due to the siting of the Facility within an existing industrial zone and the short-term construction duration. Impacts from the Operational phase are considered within the expected range of risk and impact assuming mitigation, as proposed, is incorporated into the day-to-day functioning of the Facility. The potential negative impacts can be effectively managed by proper industry best practice risk reduction strategies including control and contingency planning. The potential positive impacts will likely result in a net improvement to the environment and socio-economic conditions through a reduction in the improper disposal of ship generated oily wastes. Other net benefits include the long-term impact of job creation, local economic impact and economic diversification away from tourism-related income which currently dominates the local economy.

Public Review

This ESIA and the associated EMP documents were provided to the public for review and comment pursuant to the DEPP EIA regulations. A public meeting was advertised and held on 14 October 2021 during which the project proponents presented an overview of the project, and the environmental consultant provided a summary of the anticipated impacts. The public was invited to attend (via Zoom™) and the public comment period was held open through the 12th of November. The public engagement process was coordinated with DEPP and their representative presided over the process.

While members of the public did attend the public meeting, no formal comments were received and the public engagement process officially closed on 12 November. No changes to the ESIA or EMP documents were required as a result of the public review process.

1.0 INTRODUCTION

This Environmental and Social Impact Assessment (ESIA) has been developed by The Clean Marine Group Limited (CMG) and references International Finance Corporation (IFC) Environmental and Social (E&S) Performance Standards. The ESIA is based on the initial EIA submitted to the Grand Bahama Port Authority (GBPA) pursuant to the GBPA's request for an EIA in respect of CMG's proposed MARPOL Port Reception Facility (PRF). The approval letter dated 14 May 2021 from the Bahamas Department of Environmental and Planning (DEPP) and 04 March 2021 from the GBPA are attached in Appendix 1.

Currently, CMG holds a lease on property owned by the Freeport Harbour Company for land at Basin 3, Freeport Harbour as presented in Figures 4-6. The Facility will be engineered, procured, and constructed under the terms of a fixed contract between CMG and a qualified subcontractor (specific firm to be confirmed following a procurement process). The PRF will be operated by CMG.

1.1 PURPOSE OF REPORT

The purpose of this report is to provide the results of an independent third-party investigation of the potential environmental and social impacts resulting from a proposed commercial development project located at the Port of Freeport, Freeport, Grand Bahama Island, The Bahamas. The project is a proposed Port Reception Facility (PRF) compliant to the International Maritime Organisation's (IMO) International Convention for the Prevention of Pollution from Ships (MARPOL) requirements. The Facility will be designed to accept MARPOL Annex I liquid waste generated by ships at the Port of Freeport.

1.1.1 Location

The Bahamas is an archipelago of nearly 700 coral islands with only around 30 of the islands inhabited. The Bahamas sits in the West Atlantic Ocean, 100 kilometres southeast of Florida in the United States and 80 kilometres northeast of Cuba. The islands are generally flat and low-lying (see Figure 1 – with Grand Bahama Island highlighted). Figure 2 is a map of Grand Bahama Island identifying the location of the city of Freeport with the port located immediately to the west. The PRF will be located within the port at Basin 3 (see Figure 6) which is an area previously disturbed and planned for industrial port-related development. CMG currently operates a small temporary processing facility at this site.

Figure 1: Geographic Setting of The Bahamas and Grand Bahama Island

CMG was established in 2012 to assist the Commonwealth of The Bahamas in complying with its international obligations to operate a Port Reception Facility (referred to as, the "Project" or the "Facility") under the International Maritime Organisation's MARPOL Convention for the Prevention of Pollution from Ships (1973), as modified by the Protocol of 1978, and as further amended by the Protocol of 1997 (MARPOL), to which the Commonwealth of The Bahamas is a signatory.

This Social and Environmental Impact Assessment (ESIA) report provides the results of an investigation into the potential social and environmental impacts (both positive and negative) resulting from the execution of this project (Phases I), as well as a "no-development" option used as a baseline (also referenced as "current conditions"). This investigation was conducted in two phases, including the initial development of an Environmental Impact Assessment (EIA) developed by Clean Marine Group Ltd., with Blue Pelican Sustainability Services and Envirologic International Ltd. (Rev 2 dated 4 March 2021). This report was originally approved with conditions by the Grand Bahama Port Authority (GBPA), per approval letter dated 23 November 2020 and then re-approved without conditions on 4 March 2021 (see Appendix 1 for copy of second approval letter). This initial EIA has been updated and expanded to meet the additional standards of the International Finance Corporation (IFC), Inter-American Development Bank (IDB) and Althelia Sustainable Ocean Fund (a MIROVA Private Capital Fund) as funders for the project. The revisions include provisions for social impact assessment (SIA) as well as increased emphases on stakeholder engagement, and environmental management processes going forward (assuming the project is executed). Section 2 of this document spells out the specific legislative requirements for ESIA within The Bahamas as well as the specifications of the IFC and other relevant professional guidelines.

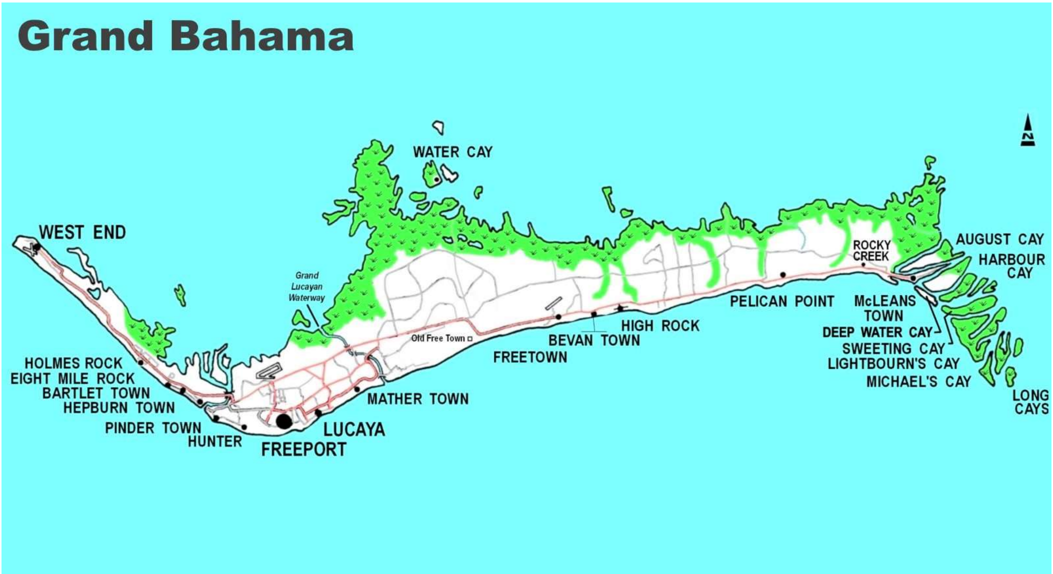

Figure 2: Grand Bahama Island

Clean Marine Group (CMG) proposes to develop a reception and treatment Facility located at the Port of Freeport (Port), Grand Bahama Island, to meet the International Maritime Organisation's (IMO) International Convention for the Prevention of Pollution from Ships (MARPOL) requirements. The specific location is identified in Figure 6. The principal aim of the Facility will be to collect and process liquid waste, typically generated by the normal operation of ships. This will be comprised initially of mainly waste oils and oily water mixtures, off-specification fuels, used lubricating oils and, in the case of oil tankers, crude oil tank washings. The planned treatment capacity is 31 million gallons per annum (120,000 metric tonnes) with operations running 24-hours per day, 365-days per year. A full discussion of the proposed improvements, including phasing, as well as treatment capacities, discharges, logistics and operations is included in Section 4 of this report.

Section 2 of this report provides the legal context for the project and this ESIA. Section 3 of this report provides a history of the development of the Harbour and Section 5 describes the relevant political, economic, and social conditions of the region, with particular emphasis on Grand Bahama Island and Freeport. Section 6 describes the general physical conditions of the area, including climate, geology, hydrogeology, hydrology, soils, vegetation, habitats (both terrestrial and near-shore marine) and species of special concern (Red Data Species). Section 7 reviews the environmental and social impact analysis (both positive and negative) including a brief discussion of project alternatives, including the "no development" option. These are evaluated assuming the proposed design described in the Project description are deployed, with and without mitigatory measures. The final Section (8) is a summary of findings and recommendations for the project. An Environmental and Social Management Plan (ESMP) is being developed to assist with the construction and operations of the Facility if the project proceeds to execution. This plan will be a stand-alone living document that is periodically updated and will assist with ongoing management to reduce negative impacts and emphasize positive impacts from the project.

1.2 DEMONSTRATION OF NEED

MARPOL requires the Government of each Member State (of which The Bahamas is a signatory) to ensure the provision of adequate port reception facilities without causing undue delay to those ships using them. A port reception Facility is anything that can receive ship-generated wastes/residues and mixtures containing oil, noxious liquid substances, sewage, garbage, ozone-depleting substances, or residues from exhaust cleaning systems. The type and size of the Facility depend on the needs of the ships normally visiting any given port.

In MARPOL Annex I, strict requirements are stated, amongst others, for the storage and discharge of oil by ships. Regulation 38 of Annex I require the Parties to the Convention to ensure the provision of port reception facilities for all residues and oily mixtures as follows:

1. all ports and terminals in which crude oil is loaded into oil tankers where such tankers have, immediately prior to arrival, completed a ballast voyage of not more than 72 hours or not more than 1,200 nautical miles;

2. all ports and terminals on which oil other than crude oil in bulk is loaded at an average quantity of more than 1,000 tons per day;

3. all ports having ship repair yards or tank cleaning facilities;

4. all ports and terminals which handle ships provided with the oil residue (sludge) tank(s) required by regulation 12 of Annex I;

5. all ports in respect of oily bilge waters and other residues, which cannot be discharged in accordance with regulation 15 and 34 of Annex I; and

6. all loading ports for bulk cargo in respect of oil residues from combination carriers which cannot be discharged in accordance with regulation 34 of Annex I.

Freeport is the fourth largest trans-shipment oil terminal in the World and is adjacent to the sixth busiest shipping lane. It is home to the Grand Bahama Shipyard and Freeport Container Port and aspires to be a major Cruise Ship destination in the future. According to RAC-REMPEITC (no date), “A new cruise ship terminal is also being developed outside Freeport in Grand Bahamas that will require proper consideration for SGW” (Ship Generated Waste).

The Bahamas is a tourism dependent economy which attracts millions of visitors every year. Tourism makes a significant contribution to the economy and livelihoods of more than half the population, accounting directly and indirectly for 43.6% of its GDP, 55.7% of employment, and 73% of exports in 2017, according to the World Travel and Tourism Council. Global estimates indicate that during the last decade, illegal dumping and routine operations of vessels accounted for between 666,000 and 2.5 million tons of hydrocarbons per year being improperly discharged from vessels into the ocean (Clean Marine Group, 2019). The risk of discharge into the Atlantic Ocean and the Caribbean Sea of pollutants, such as oil, noxious substances, sewage and garbage resulting from the normal operations of ships, poses a serious risk to the marine ecosystem and human health. The large concentration of oily wastewaters can reduce the production and diversity of marine animals and plants. Toxic compounds in oily wastewater can cause ecological disturbances, including alteration of the aquatic community structure and food chains (Han et al., 2019).

Another source of SGW is the liquid discharge from air pollution scrubbers. Nearly 300 million tonnes of scrubber washwater is expected to be discharged in major ports worldwide with a disproportionate share of those discharges occurring in the Caribbean because of the large number of cruise ships sailing the region. An estimated 10 million tonnes of combined scrubber wastewater will be discharged annually at Nassau (5.5 m tonnes) and Freeport (4.8m tonnes) once cruise tourism and cargo traffic returns to pre-COVID levels. Both ports are in the list of the top five most impacted by washwater discharges in the world (Hartnell, Nassau and Freeport Top Port 'Scrubbers', 2021). The high cost and complexity of building and operating a port reception facility to process liquid marine waste streams has resulted in their being no adequate facilities throughout the wider Caribbean, and therefore ships find it difficult to comply with the MARPOL regulations.

Clean Marine Group, Limited (CMG), a private early-stage firm, founded in 2017 in Freeport, has created a business model to adapt an innovative use of cavitational technology for the sustainable management and disposal of liquid and solid waste to the needs of a modern day and efficient MARPOL PRF. They have obtained the license from the Grand Bahama Port Authority to operate and will collect and process oily liquid waste emitted by ships, oily water and sludge, thus allowing ships that use their services to comply with MARPOL regulations.

This project will also emphasize the creation of public goods that benefit the population and governing bodies of Bahamas and the wider Caribbean, through activities that help to improve the regulatory framework for MARPOL in the region and increase the number of Caribbean countries that develop an interest in and the capacity to follow MARPOL regulations. CMG is also investigating the applicability of the cavitation technology to land-based environmental or water-quality issues in the Bahamas, and the capture, synthesis and dissemination of the knowledge generated from this project, including lessons learned, best practices, and key factors of success. This is the one of the proposals selected under the Blue Tech Challenge launched in 2018 to identify business models aiming to contribute to the sustainability of the ocean economy (Lab, 2019).

In preparing this ESIA CMG has given full consideration to minimizing the impact of the Facility on the local environment, whilst significantly benefitting the local community in being able to process oil and oily-water waste residues generated throughout the Bahamas and by ships visiting the region. Health, Safety and Environmental aspects will be the core considerations in every aspect of the proposed PRF and CMG will continuously explore all avenues to promote safety standards whilst reducing the Facility's environmental impact.

1.3 EXISTING FACILITIES AND SERVICES

Freeport is the fourth largest trans-shipment oil terminal in the world and is adjacent to the sixth busiest shipping lane. It is home to the Grand Bahama Shipyard and Freeport Container Port and aspires to be a major Cruise Ship destination in the future. Freeport, Bahamas is owned and operated by The Grand Bahama Port Authority (GBPA), a private entity that encompasses a 230-square-mile economic zone. Ships calling to Freeport arrange for the receipt and disposal of SGW through ship agents who in turn work with the Port Authority Sanitation Department. Shipyards in Freeport provide waste reception services to clients and bill directly for the use of port facilities (RAC-REMPEITC, 2017). Freeport, being a regional container trans-shipment hub, receives the highest number of container ships in the Bahamas: 801 in 2016. The port also handles significant numbers of general cargo ships, vehicle carriers and bulk carriers, as well as significant numbers of cruise and passenger ships (695 in 2016) with the majority being cruise ships (RAC-REMPEITC, 2017).

Current operations at the port of Freeport include:

- Bahamas Oil Refinery Company International Ltd
- Bradford Grand Bahama Ltd
- Freeport Container Port
- Freeport Harbor Terminal

- Grand Bahama Shipyard Ltd
- Cemex (Bahamas) Ltd

Previous stakeholder engagement (see RAC-REMPEITC, 2017) was initiated to assess the type of reception facilities that should be provided as an obligation under MARPOL. This assessment focused on sludge tank residues and oily bilge waters and other residues. It was determined that facilities for the reception of cargo related oily wastes from tankers possibly need to be provided in the ports of Freeport and South Riding Point. The estimated amounts of Annex I wastes, based on the analysis of port calls, are presented for these ports and facilities below (approximated values). Data provided by RAC-REMPEITC, Table 1 identifies the estimated yearly volumes of MARPOL Type I waste entering the Port. According to the stakeholder engagement completed as part of the RAC-REMPEITC study, no port facilities are currently available to safely manage this volume.

Table 1: Estimated Yearly SGW at Freeport

Type of Ship Generated Waste (data is assumed from 2016)	Volume (cubic meters / U.S. gallons) per annum
Wash water	2,594,163 / 685,305,364
Liquid oil residues	259,416 / 68,530,457
Estimated oily solids	25,942 / NA
Sludge tank residues	20,707 / 5,470,211
Oily bilge water	17,733 / 4,684,563

1.3.1 Summary of Benefits

A MARPOL Facility in Freeport Harbour will enhance the image of the Harbour as a major maritime Facility, thus providing a competitive edge over other ports in the region.

Summary of the proposed development benefits:

- A total investment of B$ 15,000,000;
- Hiring of 19 employees in Phase I;
- The first MARPOL Facility in the Bahamas;
- A MARPOL Facility to service the marine industry in the Harbour and eventually ships nearby;
- Increased revenue to utility providers; and,
- Used oil collection and disposal Facility for Grand Bahama Island.

1.4 DESCRIPTION AND QUALIFICATIONS OF PROJECT PROPONENTS

Clean Marine Group (CMG) has trialed a new technology, utilizing a cavitational field of electrons that is capable of breaking down oil and water emulsions and processing contaminated water without using harsh chemicals and using only a fraction of power compared to other proven technologies (Hildenbrand, No date). These systems are frequently used for the treatment of oily wastewater/process water creating less sludge and dissolved solids than with chemical treatment (Partha Kundu and Mishra, 2018) . The planned capacity is 120,000 metric tonnes (34,715,880 gallons) of waste per annum. “Through the development of this MARPOL Facility Clean Marine Group will create a new industry and economy for the Bahamas which will in turn create jobs, income and supplement other existing Bahamian industries and entities, helping the Bahamas to protect the Oceans surrounding it and the rest of the wider-Caribbean” (The Maritime Executive, 2021). Funding for the project has been secured (to date) for $12M (U.S.) through support from the Inter-American Development Bank (IDB). The venture has also received substantial investment from the private sector and is in the process of receiving further substantial investment from Althelia Sustainable Ocean Fund, a MIROVA Private Capital Fund.

CMG’s Board comprises two senior lawyers with a wide experience of international shipping and marine pollution legislation. The corporate leadership is identified below in Figure 3.

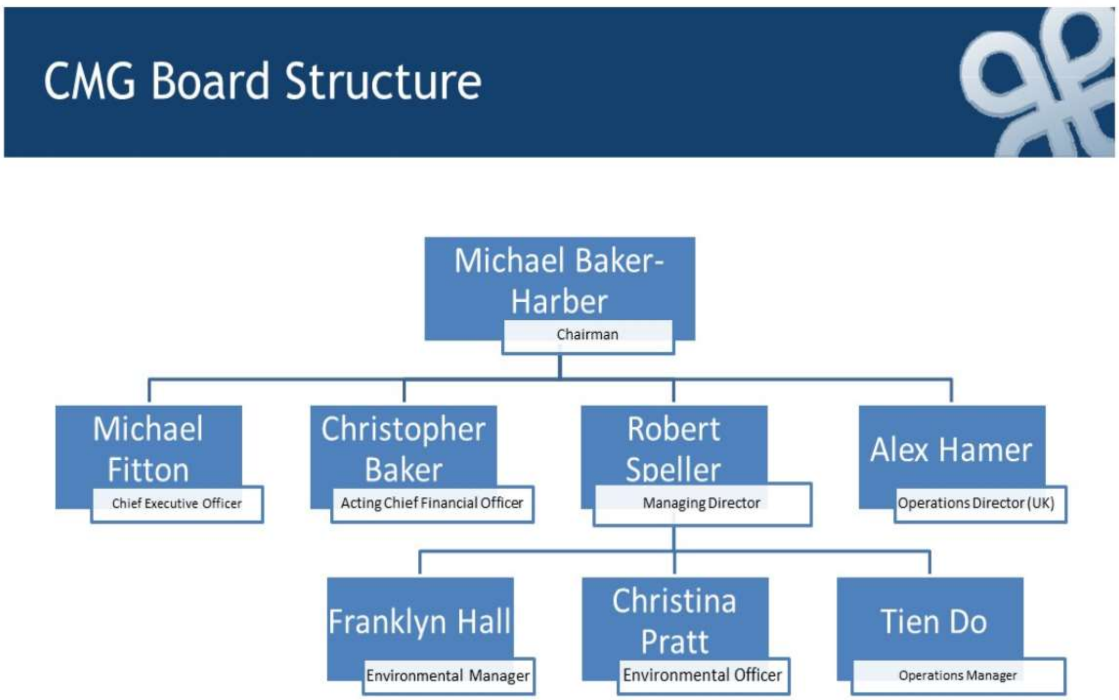

Figure 3: CMG Corporate Structure

CMG will operate in Grand Bahama through its wholly owned subsidiary Clean Marine (Grand Bahama) Limited. Further subsidiaries may be established in due course to conduct business throughout the rest of the wider Caribbean. The Facility will be designed by CMG, with input from technology companies with substantial experience with these processes. CMG will complete a procurement process to establish the suppliers who will receive the contract to engineer, procure, design and supply/set-up the MARPOL Port Reception Facility for and on behalf of CMG who will then operate the Facility.

The PRF will be designed, constructed and operated according to the International Safety Guide for Oil Tankers & Terminals, the International Chamber of Shipping Oil Companies, International Marine Forum and the International Association of Ports and Harbors. Potential subcontractors will be required to possess acceptable standards of health and safety and environmental best practices such as ISO 9001:2015; ISO 14001:2015 and other Environmental Management accreditations as appropriate.

Figure 4: Freeport Harbor Aerial Photo

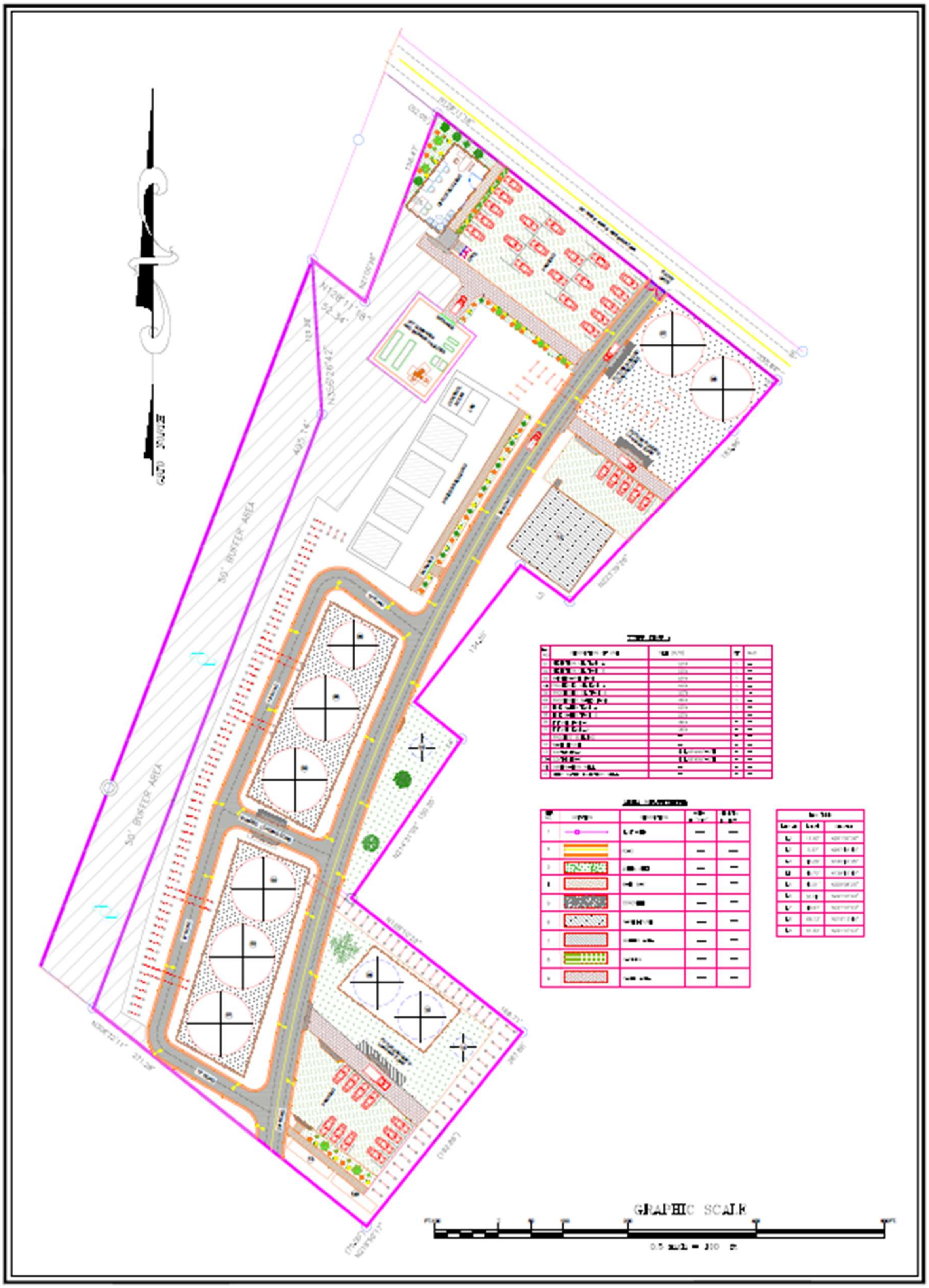

Figure 5: Layout and Schematic

Figure 6: Proposed CMG project location

2.0 POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

This section of the report identifies the relevant policy, legal and administrative frameworks, including relevant legislation, that applies to the development of the project. The description includes project policies by potential funders such as the International Finance Corporation (IFC), and the World Bank, as well as, Bahamian national legislation, and local administrative approvals.

2.1 EXISTING INTERNATIONAL POLICY

2.1.1 IFC Performance Standards (PS) on Environmental and Social Sustainability

The International Finance Cooperation (IFC) is a sister Organisation of the World Bank and member of the World Bank Group. The World Bank Group is the largest global development institution focused on the private sector in developing countries. It has set two goals for the world to achieve by 2030: end extreme poverty and promote shared prosperity in every country. IFC's sustainability framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The policy on Environmental and Social Sustainability describes IFC's commitments, roles, and responsibilities related to environmental and social sustainability. The IFC Performance Standards provide guidance on how to identify, avoid, mitigate, and manage environmental and socioeconomic risks and impacts of complex projects. There are eight Performance Standards, including:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- Performance Standard 2: Labour and Working Conditions;
- Performance Standard 3: Resource Efficiency and Pollution Prevention;
- Performance Standard 4: Community Health, Safety, and Security;
- Performance Standard 5: Land Acquisition and Involuntary Resettlement;
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- Performance Standard 7: Indigenous Peoples; and,
- Performance Standard 8: Cultural Heritage.

This ESIA utilizes these performance standards in the assessment of environmental and social impacts as a result of the project. Specifically, PS 1-4, and 6 apply to this ESIA. In addition, the IFC PS will assist CMG in managing the environmental and social risks to ensure that development opportunities are enhanced with an E&S Management Plan (ESMP). The ESMP is described in more detail in a separate stand-alone document (Part 1 address the construction phase and Part 2 addresses the operations phase).

2.1.2 World Bank Group EH&S Guidelines

The Environmental, Health and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at a reasonable cost. CMG's application of the EHS Guidelines will be tailored to the mitigation of hazards and risks established for the project on the basis of the results of the ESIA in which site-specific variables, such as area, assimilative capacity of the environment, and other project factors, are taken into account. Specifically, the Environmental, Health, and Safety Guidelines for Ports, Harbors, and Terminals (World Bank Group, 2017) provides best practice for the assessment of impacts related to these facilities. This document has guided the assessment approach for this ESIA. According to this document, environmental impacts associated with port and terminal construction and operation primarily include:

- Terrestrial and aquatic habitat alteration and biodiversity
- Climate change resilience
- Water quality
- Air emissions
- Waste management
- Hazardous materials and oil management
- Noise and vibration (including underwater)

Occupational health and safety issues for these facilities primarily include:

- Physical hazards
- Chemical hazards
- Confined spaces
- Exposure to organic and inorganic dust; and
- Exposure to noise.

Each of these environmental, social and occupational impacts and issues are described in more detail in Section 7. Other international standards applicable to the project include the International Labor Organisation (ILO) Core Labor Standards, the Basel Convention and the International Maritime Organisation's (IMO) Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention. These are described in the ESMP reports prepared for the Facility.

2.2 EXISTING NATIONAL POLICY

The Bahamas, as a member of the British Commonwealth Blue Charter Agreement, is represented by the following Action Groups:

- Coral Reef Protection and Restoration
- Mangrove Ecosystem and Livelihoods
- Marine Protected Areas
- Ocean Acidification
- Ocean and Climate Change
- Ocean Observation
- Sustainable Aquaculture
- Sustainable Blue Economy.

The Blue Charter helps Commonwealth countries work together on a fair, inclusive, and sustainable approach to ocean protection and economic development which includes planning and training tools to implement sustainable practices to protect marine resources.

2.3 EXISTING NATIONAL LEGISLATION

The main legislation that will guide the Facility operation is the Environmental Health Services Act, 1987 which was published in the Extraordinary Official Gazette, The Bahamas on May 11, 1987. Under this Act, "The Minister makes regulations for the giving effect to or carrying out the purpose, intention and provisions of this Act, and without prejudice to the generality of the foregoing, such regulations may provide for -." To date, few environmental regulations have been promulgated in support of the Act. Part IV, Regulations, 17. (e), does state, "the prevention and control of pollution of any waters, measures for monitoring and ensuring the safety of water supplies and prevention of the supply and use of unsafe water for human consumption." Additionally, Part VII, 22. (1), "Any port officer or health officer who discovers or is notified of …any contaminant or pollutant on board a vessel in any port shall forthwith notify the Director of such discovery."

2.3.1 Environmental Health Services Act 1987

An Act to promote the conservation and maintenance of the environment in the interest of health, for proper sanitation in matters of food and drinks and generally, for the provision and control of services, activities and other matters connected therewith or incidental thereto.

2.3.2 Environmental Planning and Protection Act 2019

The Environmental Planning and Protection Act of 2019 applies throughout the territory of The Bahamas including every island and cay. This Act provides a legal framework for the protection, enhancement, and conservation of the environment. It also provides for the prevention and mitigation of pollution in order to maintain the quality of the environment. It establishes the Department of Environmental Planning and Protection (DEPP) to regulate and oversee the review of Environmental Impact Assessments and Environmental Management Plans. The Extension of the Order, 2020, otherwise referred to as the Environmental Impact Regulations, establishes the procedures for the development and review of environmental documentation in support of the issuance of a Certificate of Environmental Clearance. A copy of these regulations is included in Appendix A of this Report. The regulations are broken into the following major sections:

- Citation and Interpretation
- Part II – Procedures for Proposed Projects
- Part III – Monitoring and Compliance
- Part IV – Miscellaneous
- First Schedule
- Second Schedule
- Third Schedule

This legislation uses as a definition of an EIA and EMP the following:

> "Environmental Impact Assessment" means a study identifying and evaluating — (a) the likely impacts of a proposed activity on the environment; (b) any alternatives to the proposed activity; (c) the potential means of mitigating and accessing the likely climate related impacts of the proposed project;
>
> "Environmental Management Plan" means the management of the environmental programme of an organization in a comprehensive, systematic, planned and documented manner; and includes the organizational structure, planning and resources for developing, implementing and maintaining policy for environmental protection."

These definitions are generally consistent with internationally recognized definitions with the exception that they do not specifically address social and economic impacts and thus may not be seen as a comprehensive assessment of total impacts. The specific requirements as described in the regulatory schedule do include these components but these are provided at a very high level. For comparison, the definitions utilized by the Global Environment Fund (GEF) include social and economic impact considerations.

> "Environmental and Social Risk and Impact Assessment means an assessment of the project or program's potential environmental and social impacts and risks that is appropriate to the nature and scale of the potential impacts, including comprehensive environmental and social impact assessments for projects with significant risks, strategic or regional impact assessments for programs, and more limited assessments for projects of limited scope and potential impact. Environmental and Social Management Plan (ESMP) means a document that identifies the Environmental and Social Risks and Impacts that are relevant for a project or program, and measures to anticipate, avoid, prevent, minimize, mitigate, manage, offset or compensate any adverse Environmental and Social Risks and Impacts, to monitor such risks and impacts throughout the project or program life-cycle, and to enhance environmental and social outcomes."[1]

This report has adopted the more comprehensive definition and includes socio-economic aspects in the evaluation of impacts. The EIA regulations also require public consultation as part of the review and approval process. The project proponents have initiated public consultation as described in Section 7 of this report.

The following is a summary of each of these Sections of the EIA legislation:

<u>Citation & Interpretation</u>

The regulations are cited as, "the Environmental Impact Assessment Regulations, 2020". The Interpretation provides for definitions of the regulations, with specific relevant examples below:

- Environmental Impact Assessment, means a study identifying and evaluating –

(a) The likely impacts of a proposed activity on the environment;

(b) Any alternatives to the proposed activity;

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[1] https://www.thegef.org/sites/default/files/documents/guidelines_gef_policy_environmental_social_safeguards.pdf

(c) The potential means of mitigation and accessing the likely climate related impacts of the proposed project;

- Environmental Management Plan, means the management of the environmental programme of an organization in a comprehensive, systematic, planned and documented manner; and includes the organizational structure, planning and resources for developing, implementing and maintaining policy for environmental protection.

- Proposed Project or Project, means any development, project, plan, program, or policy that is in the feasibility stage and includes any demolition, abandonment, decommissioning, modification, addition or expansion to an existing project.

Part II – Procedures for Proposed Projects

This part stipulates that no project, as defined above, shall proceed without a Certificate of Environmental Clearance (CEC) as granted by the Department of Environmental Planning and Protection (DEPP) and the Director of DEPP may issue a directive to cease and desist unpermitted activities. This Section also stipulates the process for making an application for a CEC via a preliminary review. If an EIA or EMP (or other study) is not required, the Director will issue a CEC. The Director will then review and shall determine whether an EIA, EMP, or other studies are required. If it is required, the Director will review the documents once submitted and issue a determination of their adequacy within sixty days.

The balance of this Section describes the process for conducting a public consultation. Upon the conclusion of the public consultative process, including any revisions to the documentation and/or project, the Director will grant the CEC. The Director may include conditions of approval with the CEC and appoint a designee who will inspect the project to ensure compliance with the provisions of the CEC.

Part III – Monitoring and Compliance

This Section of the regulations describes the responsibilities of the Project Proponent and of the Department (DEPP) with respect to continuous inspections and reporting for compliance. Identified deficiencies must be corrected under threat of penalty. This Section also spells out the requirements for a Performance Bond (pursuant to the Ministry of the Environment, Act 2019, to be held in security, to cover probable costs associated with environmental damage relative to the project. The value of the bond will not exceed five per cent of the project value.

Part IV – Miscellaneous

The Miscellaneous portion provides descriptions of the duty of the DEPP to post a website for these regulations, a statement on confidentiality of proprietary or confidential information and for appeals to the Minister.

Schedules

The first Schedule (A) is a form to provide required information for a preliminary project review and the application for a CEC (B). The second Schedule (regulation 5(2)) provides an Outline for An Environmental Impact Assessment (Part A) and for the development of an Environmental Management Plan (Part B). The Third Schedule is a blank format of the CEC letter to be issued by the Minister.

2.3.3 Freeport Harbour Rules

The Freeport Harbour Rules Act (Chapter 269 Statue Laws of the Bahamas) commenced on December 12, 1968. This act is specifically for the operation and use of Freeport Harbour and rules governing vessels in the Harbour. While most provisions of this Act articulate rules governing the operation of ships within the harbour, Section 24 states:

> No person shall deposit, place or discharge into the Harbour any offal, garbage, cans, dead animals or fish, gaseous liquid, gasoline, calcium carbide, tar, trade waste, untreated sewage or any other refuse or matter which is liable to pollute the harbour or to cause scum to form on its surface or sediment on its bottom, or to create the odor of gases or putrefaction.

2.3.4 Health and Safety at Work Act

The Facility must comply with the Bahamas Governments Health and Safety at Work Act (Chapter 321 C). Under this Act, "It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees."

Under Paragraph 5 of this Section, it states the following:

> (1) It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety.
>
> (2) It shall be the duty of every self-employed person to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that he and other persons (not being his employees) who may be affected thereby are not thereby exposed to risks to their health or safety.
>
> (3) In such cases as may be prescribed, it shall be the duty of every employer and every self-employed person, in the prescribed circumstances and in the prescribed manner, to give to persons (not being his employees) who may be affected by the way in which he conducts his undertaking the prescribed information about such aspects of the way in which he conducts his undertaking as might affect their health or safety.

2.3.5 Chapter 261 Hawksbill Creek, Grand Bahama (Deep Water Harbour and Industrial Area)

The GBPA was established in 1955 under the Hawksbill Creek Agreement (Hawksbill Creek Agreement – Deepwater Harbour and Industrial Area) with the responsibility for the development, administration and management, and provision of services within the "Port Area." The Port Area is defined as the Freeport city limits. As a result, the GBPA was mandated to build a deep-water harbour, an industrial community, and the required infrastructure for Freeport. The GBPA licenses and regulates businesses in the Port Area including having the responsibility for the GBPA Building and Sanitary Code regulations and enforcement. The Port Authority has also adopted the Bahamas Government Bahamas Building Code. New projects within the Port Area are approved after consultation with the GBPA's Building and Development Services Environmental Department and preparation of an EIA.

The creation of Freeport Harbour is a direct result of the provisions in the Hawksbill Creek Agreement. The GBPA has allowed for the expansion of Freeport Harbour and the development of businesses in the Port Area in accordance with Chapter 2, Paragraph 22, of the Hawksbill Creek Agreement which states:

> "That subject to the provisions of sub-clause (10) of clause 1 hereof only the Port Authority shall have the sole right from time to time and at all times during the continuance of the Agreement to plan, layout, and vary the development of the Port Area in such a manner as the Port Authority shall in their absolute discretion deem fit and proper and that neither the Port Authority nor any Licensee shall have during the continuance of this Agreement require any building permit from the Government or any Department thereof for any excavation and/or for the erection or demolition of any building or structure in the Port Area, or for the installation, operation, maintenance, or removal

of any machinery, plant equipment, or other apparatus in or about any buildings and/or structures within the Port Area."

The GBPA was also encouraged to establish factories and other industries within the Port Area. Under Section 2 Paragraph 1 sub-clause (3) of the Hawksbill Creek Agreement, it mandates the GBPA to:

(3) "Use their best endeavours to promote and encourage the establishment of factories and other industrial undertakings, and in particular factories, industrial undertakings, and industries which will make use of the natural resources and products available at Hawksbill Creek such as limestone rock and pine timber, within…"

2.3.6 Freeport Harbour Company (FHC)

As the landlord for the leased property to CMG and administrator for the Harbour, the FHC has the right to inspect, audit, and make recommendations to CMG to ensure the CMG operation does not adversely impact upon the environment and public health. Furthermore, as administrator for the Harbour, the FHC can make rules and regulations that it deems necessary for the administration and operation of the Harbour. The GBPA environmental department has asked for approval from the FHC as part of the permitting process for the Project.

2.3.7 Chapter 30 Freeport, Grand Bahama

It is noted that the GBPA, in exchange for specific tax concessions, was mandated under the Freeport, Grand Bahama Act, 1993, Statue Laws of the Bahamas 2000, Chapter 30 under Schedule (Clause 1) Works and Undertaking, Item 9- to "Promote home porting and container port Facility at Freeport Harbour".

2.3.8 The GBPA under the Freeport Bye-laws Act

Under this Act, the GBPA is allowed to make and enforce bylaws for the purpose of maintaining proper standards of building, construction, sanitation and hygiene within the area of Grand Bahama Island known as the Port Area and other purposes connected with the orderly development of said area.

2.4 MINISTRY OF ENVIRONMENT (MOE)

Under the MOE, two departments are important for environmental management: The Department of Environmental Health Services DEHS and Department of Environmental Planning & Protection. The Department of Environmental Health Services (DEHS) is the environmental regulatory department responsible for environmental control, solid waste collection and disposal. In Grand Bahama, the DEHS is responsible for garbage collection and disposal for settlements outside the "Port Area". Sanitation Services Company is responsible for garbage collection and disposal within the Freeport city limits. Also, the DEHS is responsible for regulating and enforcing public sanitation and beautification of the Bahamas.

The Department of Environmental Planning & Protection (DEPP), formerly known as the Bahamas Environment, Science &Technology (BEST) Commission, was established via the Environmental Planning and Protection Act, (2019). This Act established the Department of Environmental Planning and Protection (DEPP). According to the DEPP webpage:

> "The Mandate of The Department of Environmental Planning and Protection (DEPP) is to provide for the prevention or control of pollution, the regulation of activities and the administration, conservation and sustainable use of the environment and for connected purposes. The Department also manages multilateral environmental agreements.

The Department also manages research permit applications for scientific investigations involving or affecting natural resources within The Bahamas. In addition, the Department is responsible for the development and implementation of policies, programmes and plans for the effective management and conservation of the physical environment within The Bahamas."

2.5 OTHER GOVERNMENT MINISTRIES AND DEPARTMENTS

Other government agencies which have or may have responsibility for the oil releases to the sea are the Ministry of Transportation and Aviation, Port Department, National Emergency Management Agency (NEMA), and the National Oil Spill Advisory Committee.

Ministry of Transportation and Aviation

The Ministry of Transportation and Aviation is responsible for Road Traffic, Postal Department, Department of Civil Aviation, Department of Meteorology, and Port Department.

Port Department

The Port Department is a government agency which falls under the authority of the Ministry of Transport & Local Government. It is headed by a Port Controller, who carries out the daily administrative functions that are enacted under the Port Authorities Act, of 1961; the Boat Registration Act of 1961 and the Water Skiing and Motor Boat Control Act, of 1970.

National Emergency Management Agency (NEMA)

The mission of NEMA is, "To reduce the loss of life and property within the Commonwealth of The Bahamas, by ensuring that adequate preparedness and mitigation measures and response and recovery mechanisms are established to counteract the impact of natural, man-made and technological hazards."

National Oil Spill Advisory Committee

The purpose of the Committee is to ensure that The Bahamas is in a state of readiness, as it pertains to oils spills in the territorial and archipelagic waters of The Bahamas.

2.6 SUMMARY

The Project must comply with all Commonwealth of the Bahamas Statue Laws, Freeport Bylaws, Grand Bahama Port Authority Building and Sanitary Codes and adhere to the Environmental and Social Management Plan (ESMP). Moreover, the developer must comply with all environmental monitoring requirements and conditions prescribed by the GBPA if the project receives approval. CMG will apply for all the necessary permits required under the GBPA Building Code if the project is approved.

3.0 HISTORY OF FREEPORT HARBOUR

The City of Freeport was founded after the signing of the Hawksbill Creek, Grand Bahama (Deep Water Harbour and Industrial Area) Act on August 4, 1955, between the Bahamas Government and Wallace Groves of the GBPA. This Act, which is commonly referred to as the "Agreement", has had a profound impact on the development of Grand Bahama Island. It is directly responsible for the birth of the City of Freeport, as well as the development of the Freeport Harbour, which was undeveloped prior to 1955 (Figure 7).

The Agreement enabled the GBPA to purchase 50,000 acres of Crown Land surrounding Hawksbill Creek. It also granted a conditional purchase lease to the GBPA for the seabed underlying Hawksbill Creek and gave permission to purchase land from private owners in the vicinity of Hawksbill Creek. In return, the GBPA was responsible for excavating a deep-water harbour and turning basin.

3.1 PAST HARBOUR DEVELOPMENT

Circa 1956, the GBPA began work on the harbour and the turning basin at the southern mouth of Hawksbill Creek. The harbour channel was to measure no less than 200 feet wide and 30 feet deep at mean low water. The radius of the basin was to measure no less than 600 feet with a minimum depth of 27 feet at mean low water. Figure 8 taken either in late 1957 or early 1958 illustrates this initial harbour project taking place.

Prior to 1955 and the dredging of Freeport Harbour a small bridge existed over the creek near the loading area for a lumbering operation. This bridge was the only connection between western Grand Bahama and the other settlements that existed along the southern coast and the Pine Ridge lumbering camp. The extensive strand of mangroves that existed within Hawksbill Creek prior to the dredging of Freeport Harbour can be seen in Figure 9. Also, a topographic survey showing the relative pristine Hawksbill Creek area including Billy Cay and the shipping operation and small excavated portion at the southern entrance of Hawksbill Creek that existed to support the Pine Ridge lumber camp is presented in Figure 10.

The dredging of Freeport Harbour started circa 1967 and resulted in the old bridge across the creek being demolished and a new causeway being constructed along the more northerly portion of Hawksbill Creek at the narrowest section, which was officially named the Queen's Highway but commonly referred to as the Fishing Hole Road (Figure 11).

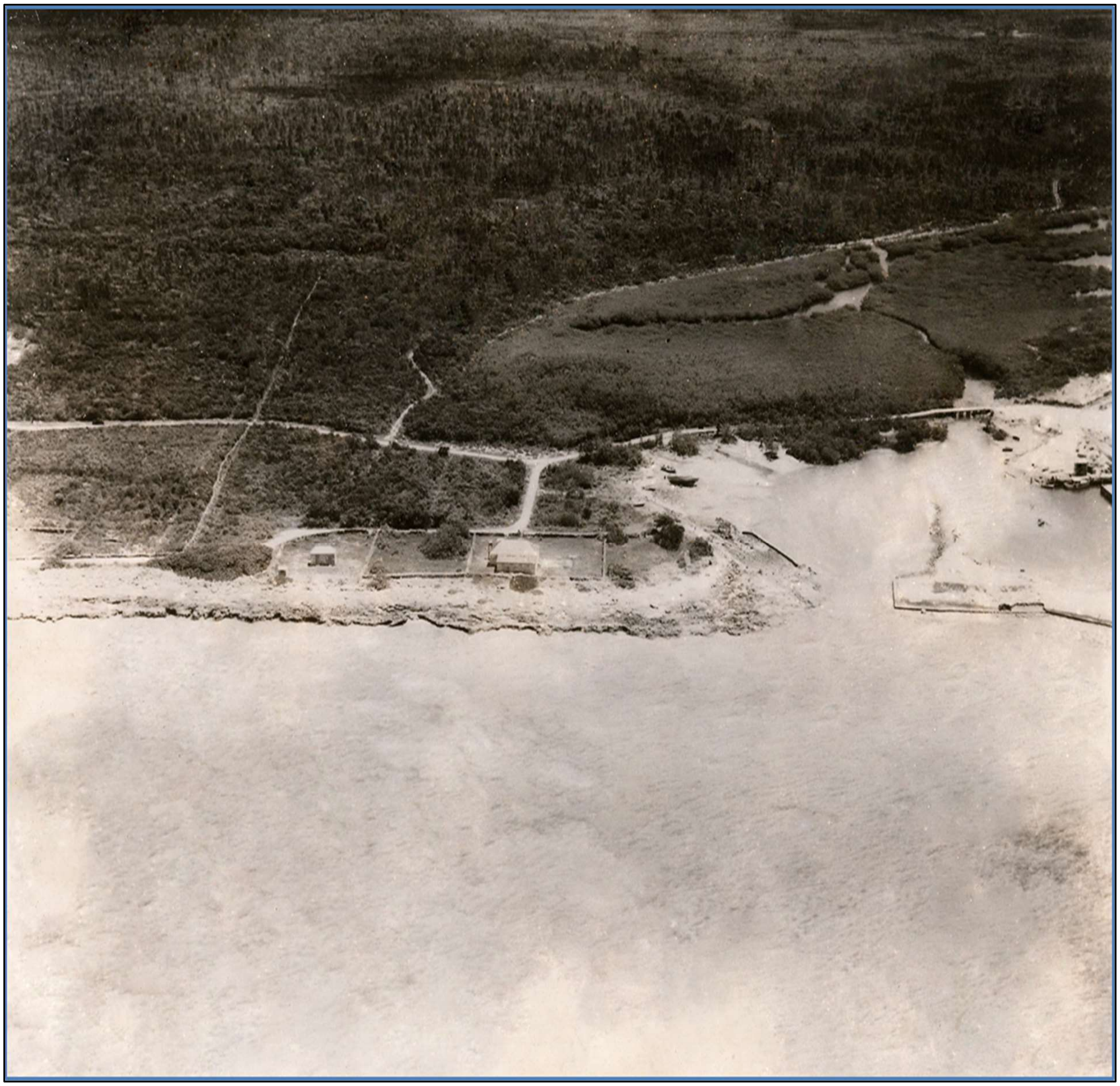

Figure 7: Pre-1955 aerial photograph of Hawksbill Creek South

Freeport, Grand Bahama. Dredging inner harbour.

Figure 8: Circa 1958+/- of Freeport Harbour

Figure 9: Circa 1956 of Freeport Harbour under construction

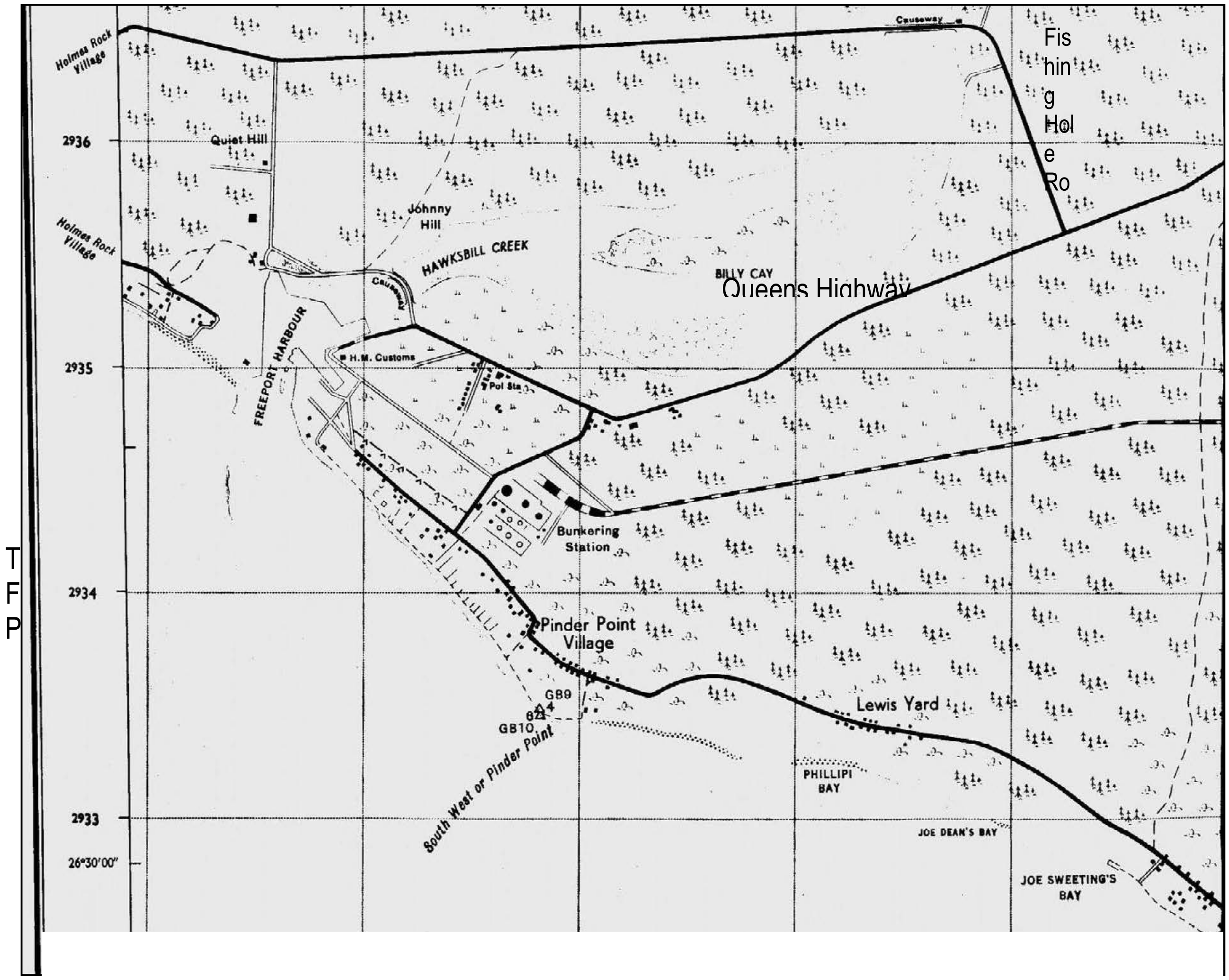

Figure 10: 1961 Topographic Map of Freeport Harbour from 1958 aerial photograph

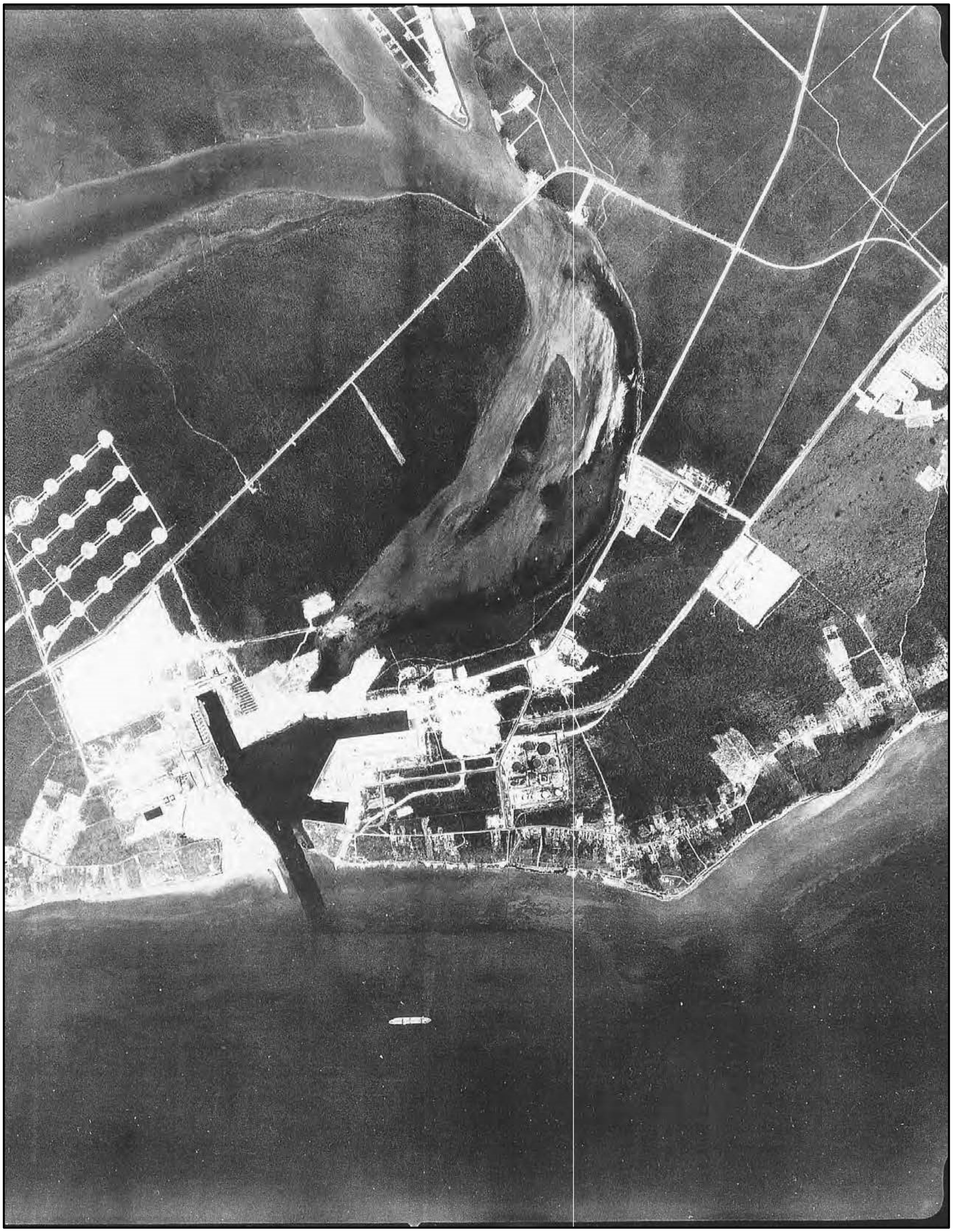

Figure 11: 1967 Aerial photograph of Freeport Harbour

The harbour has continued expanding up until today. Other aerial photographs showing the expansion of Freeport Harbour are presented in the Figure 12, 1999 photograph, Figure 13, 2005 Photograph, and Figure 14, 2012 Photograph.

Figure 12: 1999 Aerial photograph of Freeport Habour showing dredging for GB Shipyard Basin

Figure 13: 2005 Aerial photograph showing land reclamation in Hawksbill Creek South

Figure 14: 2012 Aerial Photograph of Freeport Harbour

Since the initial dredging of the southern entrance of Hawksbill Creek, the harbour has increased in both size and depth. Freeport now boasts the deepest harbour in the region with a consistent depth of 52 feet (16 meters) below Mean Low Water (MLW) in the main body with a channel entrance of 500 feet and it has become a strategic location for maritime and other industries. The harbour and surrounding property currently encompass approximately 1,600 acres.

Industrial companies that established in the early years of the harbour include Bahama Cement Company, The Bahamas Oil Refining Company (BORCO) and Syntex Pharmaceuticals International Ltd. The new harbour created an area for these companies and others to operate and thrive. As a result, Grand Bahama quickly became the industrial capital of the Bahamas which began attracting further economic investment. In a February 1967 National Geographic Society article titled, “The Bahamas: More Land than Sea,” Wallace Groves, Chairman of the GBPA, explained the GBPA’s sentiments on Freeport’s growth. He said: “Our formula is simple. We attract industry by making life pleasant for people working here – and for visitors as well. Without tourists we could not afford a jet airport, golf courses, and theaters – all the things that make a community. These things bring more industry.”

A major development occurred in 1995 when the GBPA partnered with Hutchinson Port Holdings (HPH) in a joint venture whereby HPH purchased an interest in the Freeport Harbour Company, the Grand Bahama Airport Company and the Grand Bahama Development Company. The first task at hand was building the

Freeport Container Port. This Facility according to the Grand Bahama Port Authority Handbook is now one of the world's fastest-growing container trans-shipment hubs able to handle an estimated 1.3 million TEU (Twenty-foot Equivalent Units) per year.

Another milestone for the Harbour development was the establishment of the Lloyd Werft Freeport Ship Care Facility (Lloyd Werft) in 2000 that was renamed the Grand Bahama Shipyard after Lloyd Werft sold its interest in the Facility. The Grand Bahama Shipyard project became a reality due to Harbour expansion in the late 1990's. The addition of the Grand Bahama Shipyard and the Container Port helped transform Freeport into a World Class Maritime Center. The Grand Bahama Shipyard is a state-of-the-art Facility that has two floating dry docks and one finger pier.

Other companies that have established facilities in the harbour area over the past 20 years include Bradford Marine, Bicham, Bahamas Industrial and Technologies, Bahama Rock, Pharmachem Technologies, Quality Services, City Services, Polymers International, Bahamian Brewery and Beverage, Bahamas Hot Mix and the construction of the West Sunrise Power Plant owned by Grand Bahama Power.

In 2014, Freeport Harbour Company embarked on the East Harbour Expansion Project. This project is a three-phase project that encompasses a 255-acre expansion of the deep-water harbour with approximately 171 acres of landfill area using the dredge spoil. This expansion is being undertaken to provide for a new container port site and additional berths for the Grand Bahama Shipyard and other commercial berths along the perimeter of the expansion area (Figure 15).

Freeport Harbour also has a major cruise ship terminal, which receives various cruise ships from different cruise lines. There is also scheduled ferry service from Fort Lauderdale and West Palm Beach, Florida to Freeport. Thus, Freeport Harbour has become a major maritime centre in the region and has created a dual economy for Grand Bahama; one based on tourism and industry.

While activity in the harbour has increased significantly since 1955 the environmental services have not kept pace with development, hence the need for the MARPOL Facility.

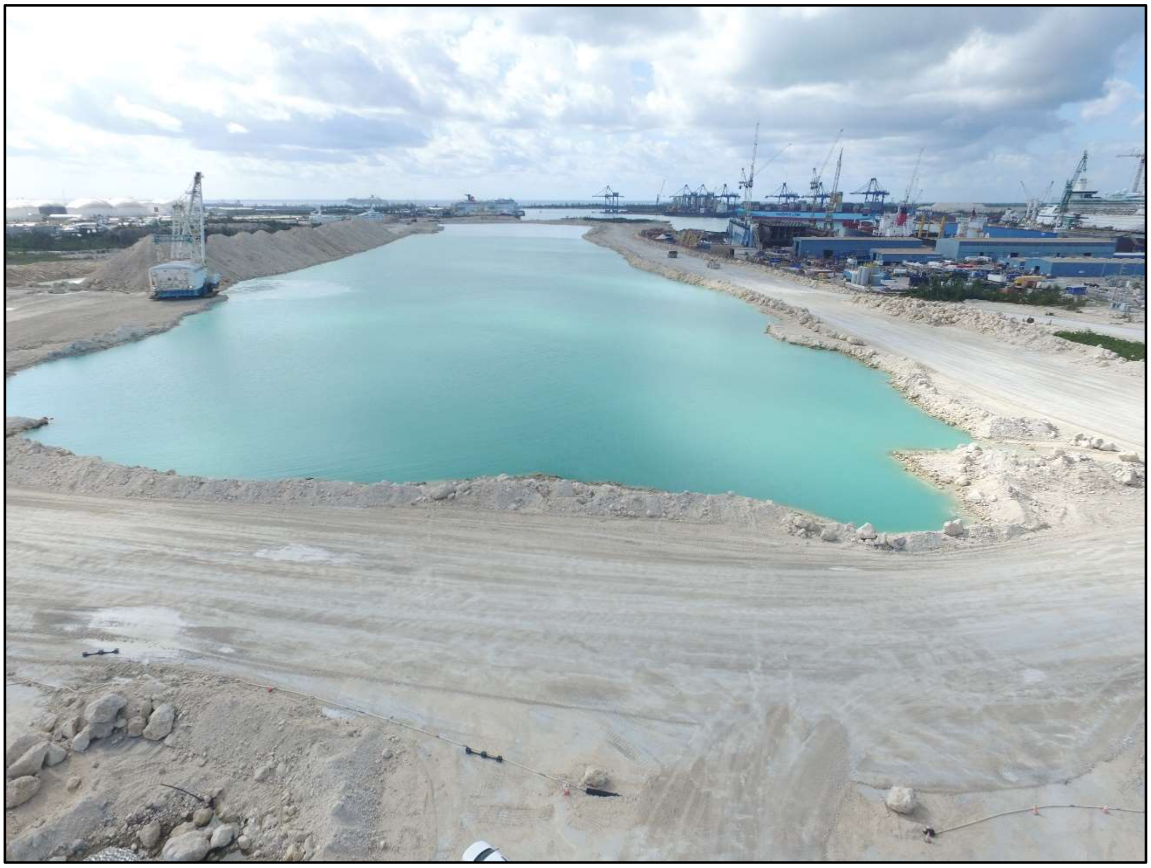

Figure 15: East Harbour Expansion Project (February 2018 Photograph)

In summary, the signing of the Agreement led to the transformation of the southern portion of Hawksbill Creek from a low-lying mangrove area to a deep-water harbour. The harbour has been excavated on several occasions to accommodate larger class ships and has been under expansion since 1955. This continual expansion has resulted in Freeport becoming a world-class port Facility. Numerous jobs and career opportunities have been created for Bahamians outside the tourism sector, thus diversifying and stabilizing the economy of Grand Bahama. With the harbour expansion, it is likely more businesses in the maritime industry will either expand or new businesses will take root in Freeport in the future.

3.2 FREEPORT HARBOUR MASTER PLAN

The Freeport Harbour Master Plan has been a dynamic one which has evolved with slight changes over time. The overall port master plan is shown in Figure 16.

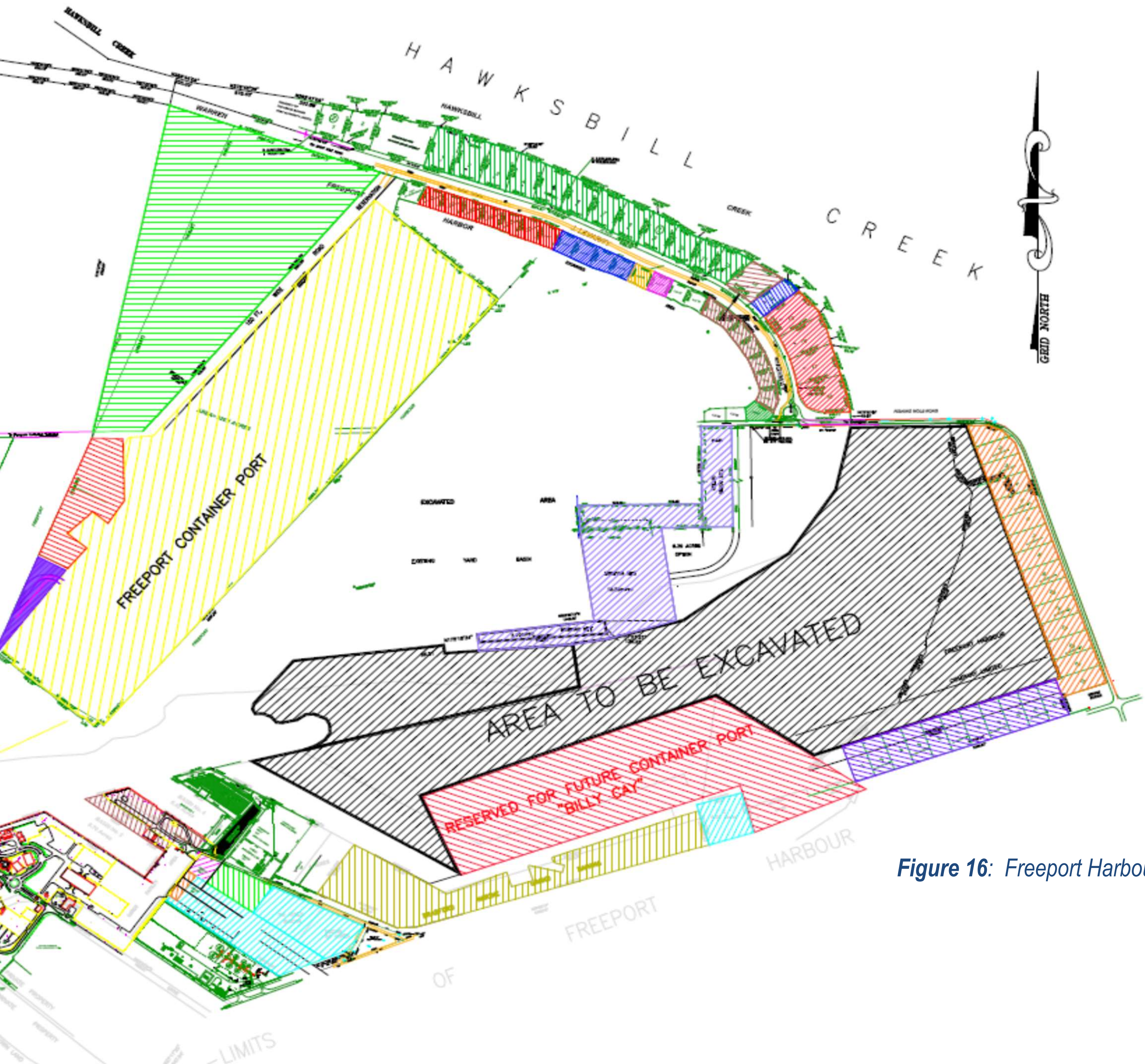

***Figure 16**: Freeport Harbour Company Master Plan*

The Master Plan shows the dredging of approximately 255 acres of Hawksbill Creek South and future container port site, approximately 171 acres created on fill area, as a key component of the plan.

Additional berths will be created to the south of the Grand Bahama Shipyard and along the east and south perimeter of the East Harbour Expansion project area. Figure 17 below is a google earth aerial photograph (September 13, 2019) of Freeport Harbour, which shows additional areas being created.

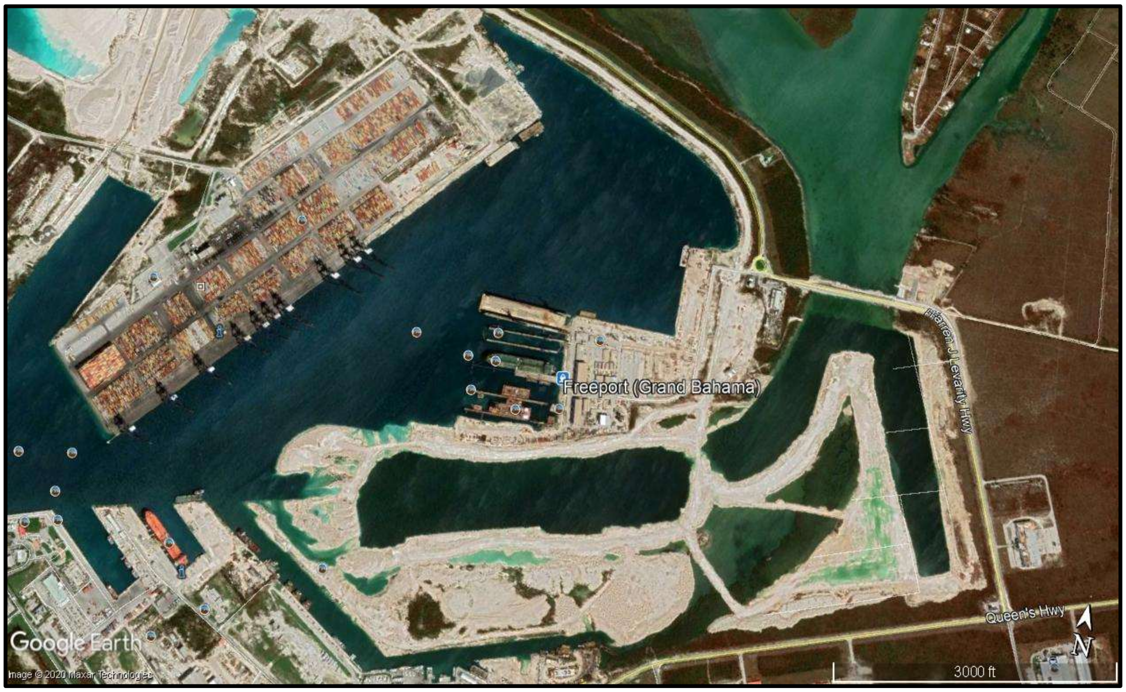

Figure 17: Aerial Photograph (September 2019) of Freeport Harbour (Source: Google Earth)

4.0 PROJECT DESCRIPTION

4.1 INTRODUCTION

CMG proposes a phased modular development to initially cater to MARPOL Annex I type waste (Oil and Oily Water Mixtures). Future plans may include expanding to treat other types of liquid waste, such as Annex II (Noxious Liquid Substances), Annex IV (Sewage) and Annex VI (Ozone-depleting substances), as the requirements and development cycles progress. CMG will seek GBPA approval for these other wastes separately if proposed. This ESIA is specifically for Phase I of the CMG development plan for Annex 1 waste.

The different types of oil wastes/residues that CMG will be treating are:

- oily bilge water;
- oil residues (sludge);
- oil tank washings (slops);
- scale and sludge from tank cleaning.

Oil residues consist mainly of oil which might be contaminated with water, whereas oil tank washings, and bilge water consist mainly of water contaminated with a limited amount of oil. Sludge is a separate category because of its high solid content and the fact that in most cases it is not easily pumpable and contains a considerable amount of oil (50-75%).

Section 4.2 describes the general construction of the Facility whereas Sections 4.3 and 4.4 are process narratives for the new Facility including the treatment of the aforementioned waste streams. Section 4.5 describes the processing plant and Section 4.6 describes the road transport plan.

4.2 CONSTRUCTION

The Facility will have eight components constructed or assembled on site, including:

1. Laboratory
2. Warehousing, Administrative (offices and car parking)
3. Vessel Berth shared with Freeport Harbour Company
4. Truck reception and screening
5. Waste Storage and Initial Dewatering – exterior location
6. Boiler – interior location
7. Treatment and Recycling Facility – interior location
8. Disposal Well – exterior location

The general site plan (see Figure 18) identifies the proposed layout of the Facility. The construction of the project will be initiated with the following sequential phases:

- Contractor mobilization
- Installation of perimeter and access controls
- Installation of all sediment and erosion controls
- Installation of all laydown yards and equipment staging locations

- Rough Grading
- Installation of all underground utilities
- Installation of all foundations and building pads
- Equipment delivery
- Equipment assembly and installation
- Electrical equipment installation and cable/electrical extensions
- Equipment Input/Output (I/O) checkout
- Commissioning
- Final grading and stabilization
- Punchlist completion
- Demobilization

No berth construction for basin #3 is proposed at this time.

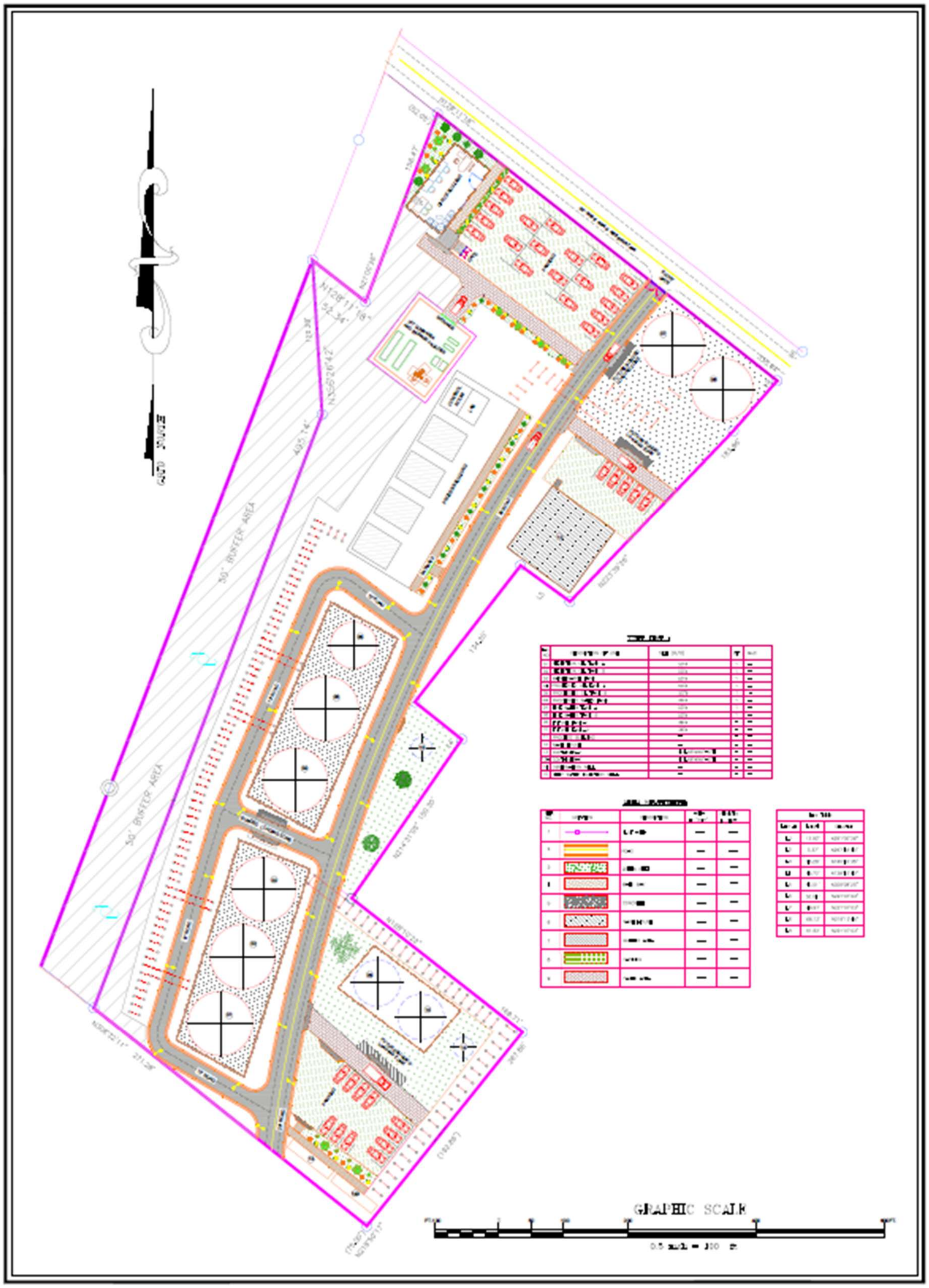

Figure 18: General layout and improvements

A one or two-story building will be required for the Warehouse, Laboratory, Control Room and personnel welfare facilities including a canteen and toilet facilities for six people. The building will conform to the Bahamas Building Code/ GBPA Building Codes and National Fire Protection Association NFPA. The Office building will be located to the northeast of the remainder of the site and will include reception for visitors and parking. The buildings are being designed to appropriate life-safety codes including appropriate egress, signage, fire protection and personal protective equipment (eye wash/shower stations, etc.). The structural design should be cognizant of the wind speeds and storm surges that are anticipated (including future increases in storm strength). Specific building materials and architectural design is in process.

Storage tanks, pumps, lines and valves are being constructed above ground (with the exception of drains). This allows for visible inspection and easier testing accessibility. System integrity testing will be completed during the commissioning and prove-out phase before it is turned over for operations.

High voltage drops will be completed at the appropriate locations with step-down transformers as needed. It is anticipated the new treatment system will require back-up power (to be provided by diesel generators) for redundant service along with switchgear and a motor-control center (MCC). No additional substations will be required to support the proposed project as anticipated loads are within the current utility capacity.

The construction phasing will be initiated by civil/site work on the premises in mid-2021 while final selection and design is completed for the process equipment. The process equipment will be fabricated off-site and shipped to the Harbour where it will be assembled in-place and commissioned. Supervision will be provided by CMG and the designer of record (DoR) during the construction program. Construction is expected to be complete by mid-2022 with the plant fully operational by late-2022 with an approximate 15-month build-out.

As CMG is still in discussions with the Freeport Harbour Company regarding the design and construction of the berth at Basin #3, it is very unlikely that CMG will acquire the ship/barge for collection of oily water in the first year of operation. The initial customers will be those that dock in Freeport Harbour; therefore, their waste can be transferred by CMG pump trucks. Pump trucks will comply with the relevant offloading procedures at the customers' premises. CMG will notify the GBPA Building and Development Services of their plans regarding the construction of the berthing area once the details have been finalized with the Freeport Harbour Company.

4.2.1 Design Program

The project is being developed as a design-build construction method with specifications and management by CMG. The treatment systems are being professionally designed by licensed engineers. The design is per current United Kingdom and Bahamian building standards, as well as best professional engineering practice. The final design package will be sealed by a professional engineer. The civil/site works are being designed by a local engineering firm and will also be signed by a professional engineer licensed in The Bahamas. Major design components include the following:

- Building Architectural plans
- Life-Safety Code analysis
- Structural design for building and all improvements
- Piping design (including supports, foundations and pipe stress analysis)
- Mechanical systems (including pump systems, valves, operators and feed systems)
- Civil design including grading and drainage as well as paving sections, storm drain and access control
- Process design including process flow diagrams, process and instrument design, interlock controls and alarms
- Electrical design including power needs, controls, SCADA, HMI and PLCs

- Other site improvements including security controls such as perimeter fencing, security cameras (tilt and pan), door alarms and gate controllers
- Data system design (including fibre runs, controls and panels)
- Manned security gate at new access road.

The design program will also include a Process Hazard Analysis (PHA) or Hazardous Operations (HAZOP) Analysis, whichever is most appropriate, to determine potential project operational risks (including health, safety, and environmental hazards). The goal of the PHA is to identify potential risks early enough in the design process so that the risks can be “designed out” of the system. Those risks that cannot be designed out will require other forms of risk mitigation which may include warning signage, additional specialized training, personal protective equipment, and other risk avoidance/reduction measures as appropriate. For this particular project, the threats of high winds and storm surges must be included as a risk factor. Future strengthening of storm events should be considered based on the most recent climate change studies. For example, utilities should be provided below ground where practicable to avoid damage from storms.

The final design package will be submitted for approval to the GBPA Building Department.

4.3 GENERAL PROCESS NARRATIVE

The maximum treatment capacity of the plant will be 15,000 litres per hour (3,963 gallons/hr.) and the Facility will be capable of operating 24 hours per day, 7 days per week, equating to a maximum 120,000 metric tonnes (34,715,880 gallons) of waste processing capacity per annum. Compared to the estimated port needs (Section 1.2 of this report), this capacity is approximately 40 per cent of the existing estimated demand. The process flow diagram prepared by Montrose Solutions, (Appendices 3-5) identifies the major components and capacities of the treatment train for the oil and oily waste reception Facility. The oil/oily waste is off-loaded from tanker truck to the reception oil tanks (two tanks at 2,000 cubic meters capacity each). These tanks will be 50 feet in diameter and 36 feet in height. The storage tanks will then feed the primary treatment trains (A-C). Each train will have a 5 m3/hour throughput. Each primary treatment train will then feed the secondary train for water treatment and oil treatment. The secondary water treatment will maintain a throughput of 5 m^3/hour discharging to the processed water storage tanks (two tanks each with a 1,000 m^3 capacity). The processed water tank will then discharge the processed water to an on-site well for injection. A future phase may discharge to a tertiary water treatment system with the capability to discharge to tankers or the 8-inch municipal water headworks. The secondary oil treatment train will maintain a throughput capacity of 3.75 m^3/hour and will discharge to the processed oil storage tanks. Each of the two tanks will have a 2,000 m^3 capacity (50 feet in diameter and 36 feet in height). The processed oil tanks will discharge to tanker trucks for delivery of the oil to end-users.

The Oil Treatment Process can be divided into seven components:

- Reception Tanks – storage for the reception of wastes from road tankers and barges. These are sized to holding 24 hours-worth of waste
- Transfer Pumps – Pumps to transfer wastewater to Treatment Tanks. This is a heated tank with recirculated hot water
- Treatment Tanks – Used to homogenize the incoming wastewater to present a steady and balanced feed to the Tricanter
- Tricanter Feed Pumps – Transfer heated feed from the treatment tanks to the tricanter at a controlled rate

- Tricanter – Used to separate the incoming waste into three separate phases: oil, water and solids
- Separators – To clarify and dry the oil for re-use. Operates at 90 – 95°C
- Oil Storage Tank – For storage of the finished product.

4.3.1 Process Controls

The control of the plant will be automated with manual overrides wherever required. The process and instrument design schematic (P&ID) demonstrates the various control points, alarms and inter-locks. The controls will be automated via a process logic controller (PLCs) fed by a dedicated Motor Control Centre (MCC). This will allow for a supervisory control and data acquisition center (SCADA) that will feed information to a plant operator via a Human-Machine Interface (HMI) panel that will display at a minimum the following information:

- All tanks levels
- Status of all valves
- All flow rates
- All temperatures
- Any pressures where relevant
- Tricanter operating parameters e.g., bowl speed, differential speed, scroll torque
- Off-site communications and control using a remote computer.

Most elements of the Processing plant will be constructed off-site by a subcontractor to exacting ATEX standards (or comparable), and shipped to site in modules that will be offloaded and fixed in place. The ATEX directives consist of EU directives describing the minimum safety requirements of the workplace and equipment used in potentially explosive environments. The Tank Storage Facility, civil engineering and interconnecting pipework will be constructed locally under the guidance of CMG and the DoR. The modular design will allow for future expansion of the plant, as and when required, via the addition of more modules. All modules will be housed within buildings that meet the Bahamas Government/ GBPA Building Codes. Those buildings will also house all required lifting apparatus (for installation and maintenance), the main plant control panel, a boiler room, warehouse and welfare space for all operators.

4.4 OPERATIONS

4.4.1 Receiving

Before accepting waste from any ship, it is important that an advance notification is received as to which particular ship will want to discharge ship-generated wastes/residues to the Facility, and when. CMG will require a ship’s report using a variation on the International Maritime Organisation (IMO) standard format for advance waste notification to port reception facilities (Form MEPC.1/circ. 834, Procedure 2). This will be received via the ship's agent.

If CMG accepts the waste, samples will be collected and analyzed in the CMG laboratory, which will allow accurate charges to the client and ensure that the material is accurately described on the Advance Notification Form. Waste which is not accurately described can either be charged at a different rate to that which was quoted or could even be rejected if it is not acceptable to CMG.

The Truck Reception area will be bunded and the discharge of any wastes will be diverted into an underground flume which will flow into a sump pump. The bund and sump will have sufficient capacity to hold an entire tanker full of waste and will have a level alarm that will alert operatives not to offload until the cause of the level alarm has been resolved. On its way to the sump pump, it will pass through a self-cleaning step screen that will remove all particles above the size of the screen bar apertures, set at 1mm. Screened waste will be pumped into the selected reception tank.

CMG will collect waste in a responsible manner using best management practices and following the road transport code of practice as outlined in ESMP. The Procedures will be revised if and when the Ship to Shore and Ship to Ship operation commences. CMG will ensure the safe collection of such waste through its standard operating procedures (SOP's), and training of involved staff, which will be prepared prior to plant commissioning and using guidance from IMO publications. Occupational safety will be important in safeguarding against fire and explosion utilizing SOP's. Staff will be equipped with personal protection equipment including self-contained breathing apparatus if necessary.

CMG will operate the Facility in accordance with the recommendations of the following International Maritime Organisation (IMO) publications:

- The Revised Recommendations on the Safe Transport of Dangerous Goods and Related Activities in Port Areas; and
- Crude Oil Washing Systems
- International Maritime Organisation's MEPC.1/Circ.834/Rev.1 Consolidated Guidance for Port Reception Facility Providers and Users.

All safety guidelines will follow:

- Road tanker transport as per International Carriage of Dangerous Goods by Road (ADR) and local requirements
- International Safety Guide for Oil Tankers and Terminals ISGOTT (5th Edition); published by the International Chamber of Shipping, the Oil Companies International Marine Forum and The International Association of Ports and Harbours.
- Ship to Ship Transfer Guide, published by the Oil Companies International Marine Forum and set forth by MARPOL, FHC, and Bahamas Port Authority guidance (if applicable).
- Guidelines on Port Safety and Environmental Control, published by The International Association of Ports and Harbours.

It is noted that the ship to shore and ship to ship transfer operations will not happen in the first year of operation and no specific date has been set for this process to commence. It is not assessed as part of this report.

The tanker truck reception area (located to the east side of the site) will be in the form of a rectangular bund off a circular driveway. The area will be bunded on three sides and open on the fourth to allow tankers to drive in and out without the need to reverse. Across the entrance to the bund, there will be a raised road hump that will act as a retainer to keep any spillage inside the bunded area.

The floor of the bund will be sloped away from the entrance towards the underground flume. There will be drain openings into the flume to allow any spillage to flow directly into the flume. Detail drawings of the flume will be provided during the building construction permitting process. A flexible hose connection will be provided that will connect directly onto the tanker without the need for the tanker driver to use any of his own hoses. This will prevent dirty hoses from being carried away on the road tanker. The flexible hose provided will be of such a length that the driver will need to have the rear wheels over the raised road hump and inside the bund. The flexible connection hose will be fed directly into the underground flume. When not in use the hose will be placed in a holder to avoid spillage from the hose and will be locked into place until an offload is authorized.

Incoming waste streams will be delivered into a reception flume that will be a covered culvert. The discharged waste streams will flow along the culvert and through a 1mm step screen that will remove all particles of 1mm or above. These fine screens are fitted with both moving and fixed step bar units which gradually extract the captured solids from the liquid flow. As the process is discontinuous, a layer of screen waste accumulates against the fine screen. This layer of screening waste further ensures optimal fine sieving of the smaller solids. The screening acts to prevent the accumulation of debris within the system and help to prevent pipe and equipment blockages within the plant. Initial dewatering of the screening waste takes place in the dewatering zone of the fine screen and hence the process is self-cleaning. The screened waste will be automatically lifted up and out of the culvert and deposited into a covered receptacle for removal and disposal at landfill.

4.4.2 Treatment

CMG proposes a phased modular development to initially cater to MARPOL Annex I type waste (Oil and Oily Water Mixtures).

The different types of oil wastes/residues that CMG will be treating are:

- oily bilge water
- oil residues (sludge)
- oil tank washings (slops)
- scale and sludge from tank cleaning.

Oil residues consist mainly of oil which might be contaminated with water, whereas oil tank washings and bilge water consist mainly of water contaminated with a limited amount of oil. Sludge is a separate category, because of its high solid content, the fact that in most cases it is not easily pumpable and contains a considerable amount of oil (50-75%).

The reception of these wastes/residues at the Facility will be followed by their treatment. The prime objective of a treatment technology for oily wastes/residues is to remove oil from water and sediments in order to produce an oil stream that is suitable for reuse or recycling. The second objective is to generate an aqueous effluent that meets the effluent discharge standards of the WBG General EHS Guidelines. To achieve the effluent discharge standard, several treatment steps will be required. These are categorised as follows:

- primary treatment (gravity separation);
- secondary treatment (physical/chemical separation); and
- tertiary treatment (biological/chemical treatment).

Once the truck with the oil wastes/residues arrives, CMG's in-house Petro-chemist will take samples for analysis within the CMG laboratory prior to authorizing the discharge to the relevant holding tank as required. Test parameters for accepting oily water will include:

- Suspended solids
- pH
- Chlorides
- Sulphur
- Ammonia
- Water
- Oil

- Heavy metals
- Silica
- Phosphorous
- COD

The Plant will be restricted to the reception and processing of prior approved oil and oily water residues from ships such as oily bilge water, oil residues (sludge) and oil tank washings (slops). As long as the waste is as defined in the description of the Annex 1 waste streams and within the treatable parameters defined by the process there will be no refusal of liquid wastes. The waste will be tested for suspended solids by a centrifuge test as this will affect the price that CMG should charge their client. The plant is not designed to accept any solid waste. Lab testing will be used for all waste to determine suitability for acceptance and the charge.

From the resulting oil treatment process, it will blend a high standard, low-sulfur, reprocessed fuel oil that can be loaded into trucks and potentially utilized within the local economy, such as by power stations, with the main aim of reducing emissions to below existing standards whilst at the same time reducing the cost of electricity generation to boost the local economy. CMG has discussed the provision of fuel and criteria for the specification of the fuel with Grand Bahama Power (GBP). Should the specification not be to GBP's standard, the resultant fuel oils are a globally traded commodity and have an indexed commodity value.

4.5 PLANT DESCRIPTION

A one or two-story building will be required for the Administration Offices, Laboratory, Control Room and personnel welfare facilities. The building will conform to the Bahamas Building Code/GBPA Building Codes including the National Fire Protection Association (NFPA) requirements. Canteen and segregated toilet facilities for 6 people (one shift) will be included. A section of this building will be isolated and used for chemical storage with a roller shutter door for access using a forklift truck.

The main plant building will be approximately 5 metres in height. This is to allow the Tricanter to be positioned in such a way that waste solids will fall by gravity into the awaiting receptacles. Inside the main plant building, an overhead crane will be fitted to facilitate plant maintenance. A small Engineering workshop will also be part of the plant building. The staff and visitors will be provided with facilities in the main office and the control room/laboratory. There will be kitchen facilities where food preparation including microwaves to ensure food can be reheated to the appropriate temperatures. There will be male and female toilets provided including handicap accessible facilities. Showers will also be provided so that employees can cycle to the office or change out of coveralls and change into appropriate attire.

The plant boiler will be housed in a separate section of the plant building.

The Facility will store, on-site, all chemicals necessary for the operation of the plant.

These are expected to be:

- Lubrication oils and greases (for use within the Facility and resale in accordance with the CMG GBPA License)
- Water treatment chemicals
- Cleaning chemicals
- Laboratory chemicals
- SD-6081 Polymer.

All stored products will be housed within secondary containment bunding or approved storage cabinets as necessary. Safety Data Sheet (SDS) for all chemicals will be maintained in a bound book hardcopy at a common area accessible to all employees and online. Hazardous chemicals (if any) will be kept in controlled areas with the appropriate signage and access restrictions. PPE will be made available to all personnel handling chemicals in addition to safety showers and eyewash stations. Safety Data Sheets will be kept for all materials stored on-site and placed in multiple areas for easy access by employees.

4.5.1 Buffering and Equalizing

The discharge of oily wastes/residues to the Port Reception Facility will be a batch process and the composition of the batches can differ quite considerably in oil/water content. This, in general, is not a good process basis for treatment technologies. Separation techniques will be most efficient if their inflow is relatively constant. This can be achieved by the use of buffering/equalizing tanks. The use of buffering/equalization tanks will increase the efficiency of the treatment. The size of the tank is determined by the average inflow of the oily waste and by the capacity of the treatment plant. In this way, the process flows continuously by using the tanks as buffers and the composition of the oil waste/residues is equalized by the mixing of several batches of oil using mixers within the tank. The CMG Facility will comprise of three 5,172 m^3 (1,366,297 gallons) reception tanks that will be used to buffer the incoming waste streams. These tanks have the tag lettering RT (Reception Tank) on the process flow diagrams (PFDs).

4.5.2 Settling

CMG proposes to have three 5,172 m^3 (1,366,297 gallons) reception tanks, each with an agitator system. This is believed to be the optimum size for the throughput anticipated so that there will be no undue delay to any ship offloading to the Facility which is a MARPOL requirement. The screened waste streams will flow into a sump pump from where it will be directed into the covered reception tanks (tagged RT on the PFDs). Under the CMG spare capacity philosophy, RT3 will act as an emergency storage tank that will allow for additional storage of waste in the event of a temporary plant malfunction.

The tank to be filled will be selected by the control room and waste will be fed into the tank until it is full. All tank levels will be monitored remotely using ultrasonic level sensors. Once one tank is full, it will then be isolated for treatment as detailed below, and any subsequent waste fed into the second tank.

Retaining the oil/water mixture in the tank for a sufficient length of time will allow a stable oil/water interface so that the oil, water, and sediment separate through gravity. Each tank will be fitted with draw-off valves that will allow any separated clean water to be drained off and directed to the wastewater treatment plant. This will reduce unnecessary heating of volumes of water that will have separated by gravity, saving time and energy.

The isolated tank will then be agitated for a period before being sampled. The sample will be submitted to a series of tests with the laboratory aimed at establishing the best rate at which to process the waste to achieve optimum results.

Once the treatment rate has been set, the waste will be fed into the Pre-Treatment Tank (shown as TT1 on the pretreatment flow diagram in Appendix 3) for heating whereupon it will be tested for Oil/water emulsions. These are difficult to break with gravity separation alone and often require chemicals to be added in order to break the emulsions which are known as “de-emulsifiers”).

A large variety of chemicals are available for emulsion breaking (or coagulation), each of which has specific applications. Most frequently iron or aluminum salts and charged polymers (poly – electrolytes) are used for emulsion breaking. This is done under rapid mixing of the tank contents so as to get a good distribution of the coagulation chemicals; therefore, the Pre-Treatment Tank will then be mechanically agitated in order to provide a homogenous mixture of fluid to be treated through the next phase and to prevent settlement of solids within the tanks. Once again tank levels and all valves will be controlled electronically. Volume and storage capacity will be constantly displayed.

CMG through process optimization will try to reduce their reliance on chemical de-emulsifiers and by using the Mitton Cavitational reactor to break the emulsion via the force of cavitation. This will also have the added advantage of being extremely energy efficient.

To contain odor and prevent gas emissions into the environment, the tanks will be connected to an odor abatement system that will create a slight negative pressure within the tanks. The drawn off air will be passed through a series of activated carbon filters before discharge into the atmosphere. This Carbon Deep-bed Absorber will be designed for a maximum of 2,500m^3/hr. airflow with a dwell time of 2 seconds for treatment of predominantly Hydrogen Sulfide (H_2S) and other types of mercaptans. It will be fitted with carbon filter filling access hatches in the top. With prefilter sections to F7 grade standard for general ventilation air filters, provision has been made for the protection of carbon with high dust loading filter elements. The centrifugal fan unit handling 2,500m^3/hr. @ 2000pa approx. will be mounted inside the filter unit. The Unit will be ATEX rated to Zone 2. It is expected that flow through the centrifuge would be maximum 1,000m^3/hr. (if extracted through a 150mm duct) but a further 1,500 m^3/hr. is provided for in additional local extraction points around the area. Illustrations of the system are provided in Appendices 3-5 of this document. Carbon filters will be monitored (using a downstream particulate monitor) to indicate if they are becoming loaded and require replacement. Odor / Fume will not suddenly break through the carbon filter, rather it will slowly start to become less effective over time. Spent carbon will be regenerated onsite and ultimately returned to the supplier.

All tanks will be manufactured so as to be hurricane-proof with a minimum life of 25 years. They will be located within a raised secondary containment dyke to guard against flooding, which will contain 110 % of the volume of the largest tank. The project will abide by all GBPA building codes.

All equipment will be rated for use in ATEX Zone 2 (Cat 3).

All plant and equipment will be housed in a building for ease of access and maintenance. Again, as part of the spare capacity and redundancy strategy, standby equipment will be provided on all critical items including spare parts. Wherever possible and practical, heat recovery units will be added to reduce heating loads and energy use.

So far as possible, the whole operation will be automated and operated on a touch screen HMI located in in the Plant control panel, which will be housed in a control room safe area that can and will also be accessed remotely. Emergency stop/kill buttons will be located throughout the site which will isolate all valves and tanks in the unlikely event of an emergency. These will be identified on the P&ID drawings.

Minimization of environmental impacts is a top priority for CMG and, therefore, in all aspects of the plant design emissions will be treated in accordance with Good International Industry Practices.

4.5.3 Primary Treatment

The aim of the primary treatment system will be to provide a coarse separation of the various fractions of the oily water waste streams to allow more efficient downstream systems to function to their optimum performance. The first element of the system is an agitated tank, tagged (TT1), where the feedstock will be heated to a preset temperature of between 50ºC (122ºF) and 60ºC (140ºF). If necessary, demulsifiers can be added to (TT1). Tricanter feeding pumps tagged (TFP) will draw the heated liquid and deliver to the Tricanter via the Mitton Cavitational Reactor. This is a mechanical device that uses a small amount of mechanical energy to generate a high shear cavitational field of free electrons that is capable of splitting oil molecules away from water molecules to allow them to separate freely. This is a proprietary technology that will operate at low heat (therefore low electricity) and without the use of chemicals in most instances, thereby helping to reduce the environmental impact and costs of processing. It is designed to create a split of any emulsions that are not normally separated by heat and centrifugal force. This will lessen the use of chemical demulsifiers or make them redundant.

From the reactor, heated feedstock will then be fed through a GEA Westfalia Tricanter centrifuge that will remove the majority of solid particles above a 10-micron particle size and discharge them as a solid waste into a closed receptacle. At the same time, it will produce both a wastewater stream and an oil stream that will be further treated in the oil treatment section and the water treatment section of the plant. The solid waste will be disposed of at the regional landfill and is estimated at $1m^3$/day.

4.5.4 Oil Treatment

After discharge from the Tricanter, the oil phase will still contain a quantity of very fine solids and between 1% and 5% water that will need to be further reduced. The Tricanter light phase discharge will be collected in an agitated buffer tank where it will be temperature controlled. A pump will then feed this oil through a heat exchanger that will elevate the temperature to 90ºC (194ºF) – 95ºC (203ºF) and then into the high-efficiency disc stack separator.

This will be a 3-phase separator that will produce oil within moisture specification, and that will produce clarified water that will pass into the water treatment plant and a sludge that will be returned to the primary treatment plant heated tank.

4.5.5 Water Treatment

Clarified water from the Tricanter with coagulated particles will be collected in a balance tank, where flocculating chemicals may be added. These flocculants react with certain components in the wastewater stream, creating "flocs". These flocs agglomerate the destabilized emulsion particles to larger flocs, which makes it easier to separate them from water. This process is called flocculation. In the flocculation tank, very careful mixing is required (contrary to the coagulation process), to establish a gentle contact amongst the coagulated oil particles, whilst not putting too much shear on the flocs, so that the breakup of the flocs is prevented.

When used for treating wastewater, coagulation/flocculation is usually combined with a dissolved air flotation (DAF) unit. In this combination coagulation/flocculation is a pre-treatment for the flotation process, in which the actual separation takes place. Flotation is a unit operation used to separate solids from a liquid phase. Air bubbles are injected into the unit and the rising air bubbles will attach to the flocculated oil particles and increase their buoyancy. The combined particles and gas bubbles rise to the surface. The floating particles can then be skimmed off the top.

Alternatively, a Hydro Industries electrocoagulation unit may be selected, in which case coagulants and polymers will not be required. In either case, the mechanics of the system will be the same apart from the chemical dosing equipment. The theory of Electrocoagulation is that an electric current is passed through a body of water from a cathode to a sacrificial Iron or Aluminum Diode. This then dissolves the Diode into the water providing a dosage of Iron or Aluminum with the Sulphate Ion. The treated water is then passed on into the DAF unit for separation in the traditional way.

During the process optimization period, CMG will analyse the benefits of both technologies and benchmark it against additional Cavitational Reactors, to achieve the 10 ppm standard of effluent which will then discharge from the water treatment Facility to the deep well. The water directed to the deep well will be analyzed using an online measurement instrument that will provide real-time data. Should the water not meet the discharge standards of 10 ppm of oil, the water will be recycled for further treatment until it meets criteria and can be discharged to the well.

Wherever practical, heat exchangers will be used to cool treated water and recover heat which will be used to pre-heat the incoming feed. This may be made even more efficient through the use of Desolenator solar technology that harnesses the power of the sun to heat and cool water through the heat exchanger.

4.5.6 Deep Well Disposal

Due to the Freeport Harbour Rules, surface water discharges are not generally permitted into Freeport Harbour. Therefore, the treated wastewater will be discharged to a deep well. Before being discharged to the deep well the water will be checked for pH, petroleum hydrocarbons (oil and grease), and total suspended solids (TSS) by on-site analysis (see Section 7.2.2). The appropriate application for the Deep Well will be through Grand Bahama Port Authority. No water will be discharged to the well where the total amount of suspended solids (TSS) exceeds 50 ppm, or oil and grease exceeds 10 ppm, in line with the WBG General EHS Guidelines. Any effluent that does not meet the WBG General EHS Guidelines standard will be recirculated through the wastewater treatment Facility until such standards are met.

Deep Wells are used in the Bahamas usually for the disposal of treated wastewater. Currently, there are three 600 ft deep wells in use in Grand Bahama. These have surface casing to approximately 100 ft and injection casing to approximately 400 ft. The Grand Bahama Shipyard, GB Power and Polymers International have 600 ft deep wells for the disposal of treated wastewater. Other facilities such as the Bahamian Brewery and Beverage Company have disposal wells at moderate depths for disposal of treated water. The application and approval process for deep wells is through the Building and Development Services Department of the GBPA with consultation with the Grand Bahama Utility Company (GBUC).

An article by The Bahamas Water and Sewerage Corporation Water Resources Management Unit (WRMU) Deep Well Disposal for The Bahamas (2004) states the following: “Storm water, wastewater, and brine disposal is facilitated by the use of drainage or deep injection wells across The Bahamas. The Bahamas is however unique in the region in that it relies on disposal wells for the discharges of large volumes of treated and untreated wastewater effluent into the subsurface as opposed to the discharge of wastewater into surface water bodies.”

During operations, CMG will investigate reuse of the cleaned water as an alternative to the deep borehole discharge. Depending on the quality, the water could be used in industrial operations or for domestic purposes. This will be investigated when the Facility is in operation.

The final effluent discharge of the treated water will be continuously monitored using an in-line electronic sensor/alarm equipment and laboratory tests on-site. Online Oil Content in parts per million (PPM) measurements will be made using Fluorescence Spectrometry. The readings will be displayed in the control room on the HMI.

4.5.7 Sludge Treatment

Dry sludge (approximately 1 cubic metre per day), will be generated as a waste stream from the processing of oily liquid ship waste. The sludge may be disposed at the Pine Ridge Landfill following appropriate sampling and analysi (as confirmed by correspondence dated 13 October 2021).The preferred and proposed method of dry sludge management will be for CMG to adapt a known, patented, process which CMG has the license and the experience to perform, to treat the produced sludge for reuse. Known as Immobilisation, the process combines the sludge with a limestone/soil mix that can be excavated locally. The combined material is then passed through a crusher to homogenise the material to the optimum size before being passed through calibrated weighing hoppers where, if deemed necessary according to the specific qualities of the sludge, common Portland cement is added as an additional bonding agent. Once any bonding agent is added, it is then weighed again and its pH value is tested before being introduced through a screw-type mixer where a calculated quantity of both inert sodium silicate and fresh water is added into the mixing process. This treatment then produces a hard and inert glassy substance whereby all and any elutable pollutants are locked in for several thousand years. The material produced resembles fine gravel that once complete and tested on-site, will meet Florida EPA Standard 62-777 FAC. This material then becomes a valuable resource for use locally, for capping disused landfill cells, road building and/or constructing soundproofing barriers at, for example, airports.

4.5.8 Expected System Performance

CMG understands that the characteristics of waste streams accepted will vary, therefore, it is not possible to guarantee any particular process performance other than the adherence to the minimum acceptable standards. CMG has, between June 2020 and September 2021, carried out an extended period of assessment and investigation on site at the Grand Bahama Shipyard, working closely with UK based oil remediation specialists Cleansing Service Group (CSG) in testing and assessing the incoming waste streams received at the facility. This enabled CMG to optimize plant and equipment specifications, and the proposed process flow of the plant, before the final design and specification can be included in the procurement process. Assessment and testing such as this will enable CMG to meet stringent final product specifications and exacting water quality criteria including all WBG guidelines.

The key to a robust treatment system is the pretreatment system. CMG and CSG have worked together to design the plant to negate the effects of variation in the feed stock. Variations in waste stream will be managed by:

- Sampling and evaluation of incoming wastes
- Reception tank volumes
- Reception tank agitation
- Reception tank decanting facilities

The following are target figures that are normally achieved from similar systems.

<u>Recovered oil phase</u>

- Free oil content 96 – 98% v/v
- Free water content 1 – 3% v/v
- Sediment 1 – 3% v/v

The recycling options for the recovered oil comprise:

- Redistillation;
- Used as fuel in local power stations; and
- Applications in civil works (see section on Sludge)

<u>Recovered Water</u>

Laboratory scale electrocoagulation test work on representative samples is currently in progress in the United Kingdom, to ascertain the best methods of final effluent polishing before discharge to the deep well. Unfortunately, the situation with COVID-19 has seen a delay in testing but it is expected to resume imminently. Therefore, no results are included in this ESIA.

<u>Sludge or waste solid residue</u>

- Dry matter content 40 – 60% w/w

The oil content of any solid wastes is expected to have a TOC content of between 6 and 18% on a wet basis. Laboratory wastes will be disposed of as part of the liquid or solid waste stream, as appropriate. Liquid wastes will be treated onsite for disposal into the deep well. Sludge will be managed per the description provided above in Section 4.5.7. Solid waste will be added to the sludge waste for processing and disposal at the landfill if this method is utilized.

4.5.9 Secondary Containment (Bunding)

Secondary containment structures will be sized to hold to hold either 110% of the largest tank volume, or 25% of the total tank volume whichever is greater. The secondary containment structures will have a drain valve, normally kept closed, for the draining of rainwater to prevent the breeding of mosquitos, and to ensure maximum capacity of the containment structure. The rainwater will be tested for petroleum hydrocarbons before being redirected to the deep well. The discharge limit is < or = to 15 ppm petroleum hydrocarbons. High petroleum hydrocarbon water (> 15 ppm) will be transferred to the treatment plant for retreatment prior to discharge to the deep well.

4.5.10 Process Flow Diagrams

Process flow diagrams (PFDs) are a part of the process engineering discipline and will be developed through the Facility design program. These are matured with the design and along with the process narrative, alarm narrative, and interlock narrative, form the basis for process, environmental and safety controls. Below is a list of preliminary PFDs included in Appendix 2 of this Report.

- Oil Treatment Process Flow Diagram
- Pretreatment Flow Diagram
- Separation Flow Diagram
- Wastewater Treatment flow diagram

Process and Instrumentation Diagrams (P&IDs) articulate the instrumentation and mechanical system controls that are described in the PFDs. The preliminary P&IDs are contained in Appendix 3 of this Report.

Certain items of the plant have been given a TAG lettering as follows:

DAF	Dissolved Air Flotation
MIGF	Mechanical Induced Gas Flotation
NSF	Nutshell Filter
DP	Dosing pump
DR	Dry run protection
EC	Electrocoagulation
OT	Oil storage tank
PP	Polymer preparation
RT	Reception Tank
SP	Centrifugal separator
TC	Tricanter centrifuge
TFP	Tricanter feed pump
TP	Transfer pump
TT	Treatment tank
WT	Water storage tank

4.5.11 Plant Equipment

The treatment described above requires the procurement of certain proprietary and non-proprietary items. The main items of equipment to be used and their tag numbers on the Process Flow Diagrams (PFDs) and P&ID will be as follows:

- Process equipment and critical spares
- Reception/Inlet Screens
- Tanks
- # reception oil tanks 2,000 m^3 each
- # processed oil storage tanks 1,000 m^3 each
- # portable water storage tanks / 1,000 m^3
- Pumps / Valves / Alarms / Interlocks / Actuators
- Piping
- Electrical Gear
- Transformers (non-PCB)
- Switch Gear
- Motor Control Center (MCC)
- Process Logic Controllers (PLCs)
- Human Machine Interface (HMIs)
- Supervisory Control and Data Acquisition (SCADA).

A boiler system will be installed at the Plant for process heat. The exact steam loads have not as yet been concluded; however, it is anticipated that a packaged boiler plant, typically as manufactured by Byworth boilers in the UK will be used. Initial calculations indicate that a boiler producing 1,000 kgs per hour of steam will suffice. The boiler will be multi-fuel with the expectation to use some of the recycled oil produced within the plant as part of the fuel supply. The selection of type and size of the boiler will be made in the final design. The selected boiler will meet the WBG EHS Guideline limits for air emissions including low NOx requirements.

4.6 ROAD TRANSPORT

CMG employees and support services will have traffic movements along the Warren J. Levarity Highway and the Fishing Hole Road. More importantly, CMG tanker trucks will be entering and leaving the Facility full of oil or oily water. Traffic signage will be posted as needed for road traffic safety per the requirements of the Traffic Management Plan in the ESMP. An off-ramp road approaching the Facility may be warranted but this will have to be decided by the GBPA during the building permit phase.

The following transport routes will be used:

Shipyard to Basin 3 for oil and oily waste using the Warren J Levarity Highway over distance of 7km.

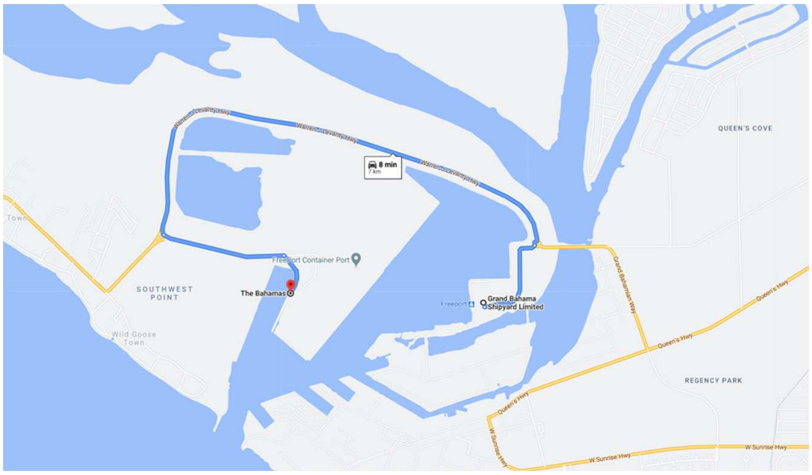

Figure 19: Truck transport along J. Levarity Hwy.

Basin 3 to GB Power Station for re-processed oil using the Warren J Levarity Highway, Queens Highway over distance of 9.3km.

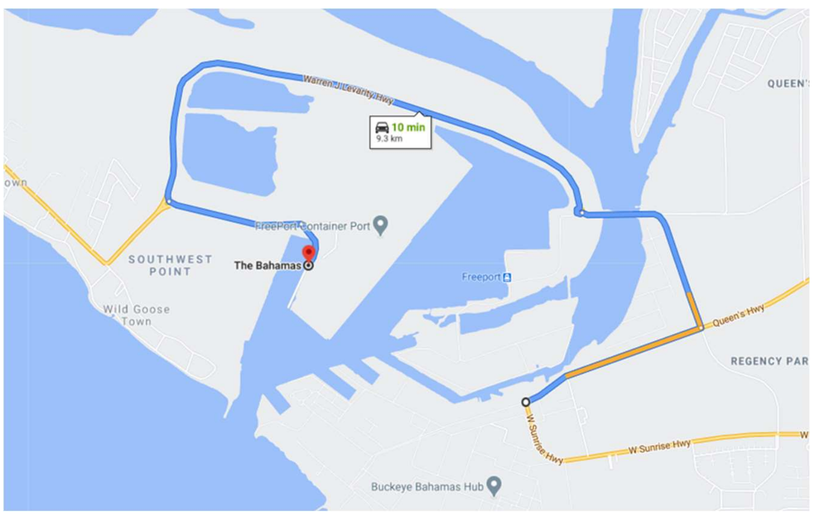

Figure 20: Transport route over Queens Hwy.

Basin 3 to Pineridge Landfill for solids using the Warren J Levarity Highway, Grand Bahama Highway over a distance of 15 km.

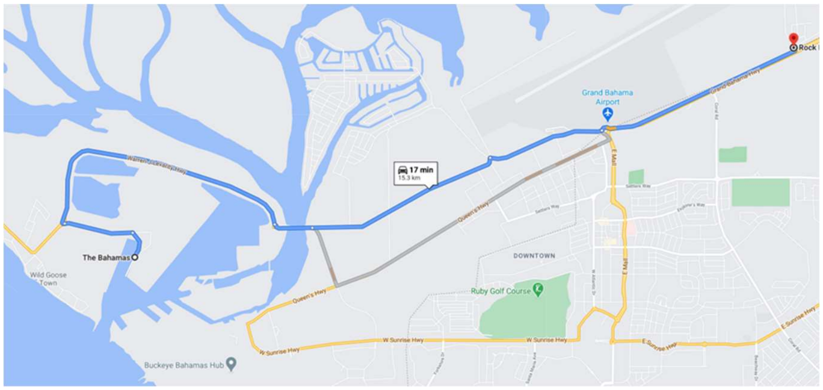

Figure 21: Transport route along Grand Bahama Hwy.

CMG will collect and transport waste in a responsible manner using best management practices and following all appropriate codes of conduct. Additionally, CMG will require proof of licenses, insurance and roadworthiness of all vehicles operating within or on behalf of the Facility. Any accidents or incidents involving CMG vehicles will require immediate drug testing of the operator.

5.0 POLITICAL AND SOCIO-ECONOMIC CONDITIONS

5.1 NATIONAL POLITICAL ASSESSMENT

The Bahamas is a parliamentary constitutional monarchy headed by Queen Elizabeth II in her role as Queen of the Bahamas. The politics of the Bahamas takes place within a framework of parliamentary democracy, with a Prime Minister (Hubert Minnis of the Free National Movement) as the Head of Government. The Bahamas is an Independent Country and a member of the Commonwealth of Nations with a population of 385,640 as of 2018. It is important to note that due to the impact of tourism, the non-resident population grows during the high season for travel with close to 2 million visitors per year. Legislative power is vested in the two chambers of parliament. The Judiciary is independent of the executive and the legislature and jurisprudence is based on English common law. The multi-party system is dominated by the Progressive Liberal Party (PLP) and the Free National Movement (FNM). The constitution protects freedom of speech, press, worship, movement, and association. The political capital is Nassau located on the island of New Providence.

The Bahamas has no history of politically motivated violence and, barring a few incidents leading up to the last general elections, the political process is typically violence-free and transparent. These incidents were minor and included damage to political party installations, signage, billboards, and a few reported altercations between opposing party members (U.S. State Department, 2020).

The Bahamas scored 64 out of 100 in Transparency International's Corruption Perception Index in 2019 (where zero is perceived as highly corrupt and 100 is very transparent). This represents a slight improvement of the year-on-year score following a stabilization in 2018 and a marked increase in perceptions of corruption between 2014 and 2016. The Bahamas still lacks necessary legislation to establish an office of the ombudsman to strengthen access to information, nor has it fully enacted its Freedom of Information Bill or appointed an independent Information Commissioner. Although the current government is pursuing legislative reforms to strengthen further its investment policies, progress on these efforts has been mixed (State, 2021).

5.2 LOCAL ADMINISTRATION

The City of Freeport is both a city and district as well as a 233 square mile Free Trade Zone on the island of Grand Bahama. The Grand Bahama Port Authority (GBPA) operates the free trade zone, under the Hawksbill Creek Agreement signed in August 1955 whereby the Bahamian government agreed that businesses in the Freeport area would pay no taxes before 1980, later extended to 2054. The area of the land grants within which the Hawksbill Creek Agreement applies has been increased to 56,000 hectares (138,000 acres). The Hawksbill Creek Agreement (1955) between the Bahamian government and the Grand Bahama Port Authority guarantees that the "special economic zone" can continue to exist until 2054. Businesses operating in Freeport are exempt from most central government taxes (real property, excise, import, and business taxes) and subject to licensing by the Grand Bahama Port Authority. The Bahamian government has made several efforts to regulate business activities and extract tax revenues from the free zone. Most efforts have been litigated to the Port's benefit and the FNM administration repealed legislation that differentiated between local and foreign licensees within the Port (State, 2021).

The main airport serving Freeport is the Grand Bahama International Airport, which receives domestic flights from various islands of the Bahamas as well as several international flights from the United States and Canada. Freeport is also served by domestic Bahamian ferry services to other islands. Grand Bahama has a population of approximately 52,000, of which, approximately one half live within Freeport. Population growth was over 2% per annum during the 1970-1990 time period but has fallen to slightly less than 1% since the year 2000.

5.3 NATIONAL ECONOMIC ASSESSMENT

Tourism is the country's largest economic sector in terms of both gross domestic product and employment, and economic growth is mainly driven by this industry and its related services. With few natural resources and a limited industrial sector, the Bahamian economy is heavily dependent on tourism and, to a lesser degree, financial services. These sectors have traditionally attracted the majority of foreign direct investment (FDI).

The Bahamas has the second highest per capital GDP in the English-speaking Caribbean with an economy heavily dependent on tourism and international banking. Tourism accounts for approximately 75-80% of GDP with financial services constituting the second-most important sector of the Bahamian economy, accounting for about 15% of GDP. Manufacturing and agriculture combined contribute less than 7% of GDP and show little growth, despite government incentives aimed at those sectors (Moody's Analytics, 2021).

Gross Domestic Product (GDP), (purchasing power parity [PPP]) for 2017 (estimated) was $9.339 billion with a real growth rate of 1.8% and a GDP per capita of $25,100 (est.), (Moody's Analytics, 2021). However, wealth distribution remains a concern. According to a *Tribune* article published by Lowe (2012), "The Bahamas' Department of Statistics' most recent Labour Force Survey, the income distribution has been declining since 1999 with data indicating that the total household income for the bottom 20 percent of the population has remained constant over this period." Original data sources for this article could not be located.

The Free National Movement (FNM) government, elected in May 2017, has sought to manage an economy dealing with the dual, unprecedented economic crises wrought by the impact of Hurricane Dorian in September 2019 and the effects of the global COVID-19 pandemic, projected to inflict combined losses of $7.5 billion or 60 percent of GDP. According to Standard & Poors April 2020 forecasts, The Bahamas' GDP growth was expected to fall by an unprecedented 16 percent in 2020 due to COVID-19. Full economic recovery is not anticipated until 2022, subject primarily to the buoyancy of the tourism sector and post-pandemic global economic recovery. Both the International Monetary Fund (IMF) and the Inter-American Development Bank (IDB) predict The Bahamas could suffer the most severe economic contraction of all Caribbean countries (State, 2021).

Other key economic indicators include the country's bond/debt rating. The current Standard and Poor's credit rating for the Bahamas stands at BB- with a negative outlook. The Moody's credit rating for The Bahamas is Ba2, also with a negative outlook (Economics, 2020). The overall Ease of Doing Business score for The Bahamas is 59.9 (ranked 16th in the region) with a slight improvement over the previous rating (the scale being 0 for the least and 100 for the best performance). Specific indicators include the ease of "starting a business" and "dealing with construction permits". Figure 22 is copy of the scores for The Bahamas (Bank, 2021).

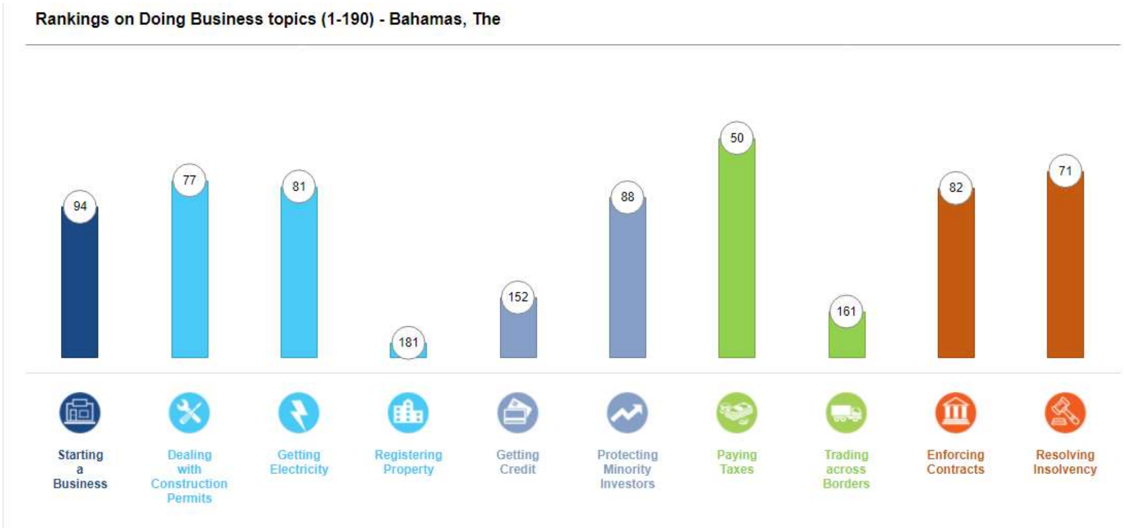

Figure 22: Doing Business Score (World Bank)

5.3.1 Labour and Unemployment

According to the Department of Statistics, the labour force for Grand Bahama Island in May of 2019 stood at 32,825 with a roughly equal split between male (16,020) and female (16,805). This division is more equal than the other two major islands (New Providence and Abaco). According to Statistica (2020 projection) the unemployment rate for The Bahamas stood at 11.27% however, this estimate did not account for COVID-19 impacts. The May 2019 official rate for the country stood at 9.5% with Grand Bahama at 10.9% (Statistics, 2019). The unemployment rates were higher for men (13.6%) than women (8.4%). A more recent estimate places the total unemployment rate at 20 to 23% (Rolle, 2021) as a result of the economic slowdown driven by the pandemic and its inordinate impact on the tourism industry.

5.4 SOCIO-ECONOMIC ASSESSMENT

This section of the ESIA establishes the baseline for the existing socio-economic conditions of The Bahamas in general, Grand Bahama Island specifically, and to the extent practicable, the area surrounding the Port and the city of Freeport. Socio-economic indicators include population, salaries, income distribution, employment, poverty, race, religion, education and health indices. In general, The Bahamas is considered a High-Income country with a median salary of 48,600 BSD per year (2021 estimate) with 25% of the population earning less than $27,200 BSD (€22,372).

5.4.1 Introduction and Human Development Index (HDI)

The Human Development Index (HDI) is a general measure of a country's achievement in key dimensions of human development which includes life expectancy, education and gross national income (GNI). These specific indices, and others, are more fully described in this section. As an overall gauge and comparison, the HDI is a useful general measure of a country's level of development as indicated by key metrics. It is represented on a ratio of 0 to 1.00 with a positive relationship. The HDI for The Bahamas was globally ranked 58, with an HDI of 0.814 as of 2019, increasing consistently from 0.797 in 2000, the first year of reported data. By comparison, Jamaica was 0.734 (2019) and ranked 101st, and the United Kingdom, 0.93 (2019) with a rank of 13. No value is provided for the Inequality-adjusted HDI (IHDI), but a Gender Inequality Index (GII) Value is provided (0.341) which is below the global average of 0.436 (Programme, 2021).

5.4.2 Demographics

The population of The Bahamas is approximately 389,486 with a slightly elevated number of individuals between the ages of 10-29 but a smaller base of youth (less than 10 years old) indicating a slowing population growth rate. Sex distribution is relatively even. Figure 23 identifies the population pyramid for the country. The average life expectancy at birth is 75.4 years with a global ranking of 71 (slightly higher than the average for Latin America and the Caribbean as a whole) but somewhat lower than the US that ranks 41st and much lower than the UK that ranks 20th.

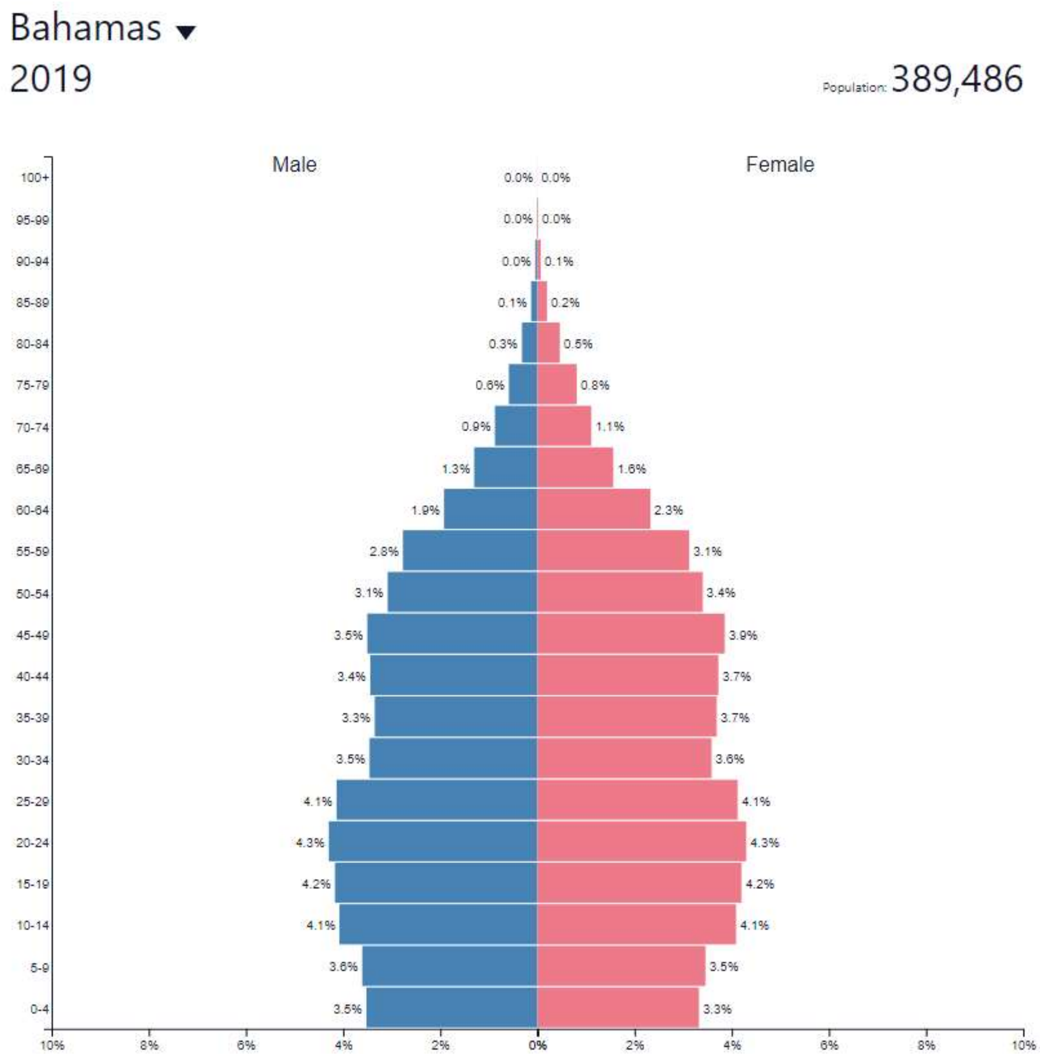

Figure 23: Population Pyramid - The Bahamas (2019)

5.4.3 Income Distribution

One indicator if income equality is the Gini coefficient (also referred to as the Lorenz curve). The country maintains an estimated Gini coefficient of 0.57 (Lowe, 2012). It should be noted that, consistent with many Caribbean countries, The Bahamas has no data reported on the World Bank Gini coefficient 2019 database (World Bank, 2021). However, the Bahamas Department of Statistics identifies a Lorenz curve value that has improved considerably since 1973 but fallen slightly from 2014 to 2017 (the date of the most recent report). The Gini coefficient is often used as an indicator of income or wealth distribution but in the case of The Bahamas, the estimated value may be skewed by non-representative data.2 For comparative purposes, the U.K. has a published Gini coefficient of 35.1 (2017) and the USA is 41.4 (2018) with 0 representing complete equality and one being complete inequality.

Specific household income was analyzed per data from the Department of Statistics. According to the most recent data available (May, 2019), the median household income range for The Bahamas in general, and the three major islands was B$20,000 to B$40,000 with a median value of B$33,352. Male head of households earned a median income of B$39,000 per annum whereas females eared B$26,720. For Grand Bahama Island, the median household income was considerably lower than the average at B$25,740 with male head of households earning B$26,500 and female headed households earning B$21,240 (Stastics, 2019).

5.4.4 Education

Educational attainment is closely related to the skills and competencies of a country's population and could be seen as a proxy of both the quantitative and qualitative aspects of the stock of human capital. It is important to note that this indicator only measures educational attainment in terms of level of education attained, i.e., years of schooling, and do not necessarily reveal the quality of the education (learning achievement and other impacts).

The Bahamas has a well-developed primary and secondary education system. However, according to UNESCO Institute for Statistics the per cent of the school-age population attending primary school has been declining since 2005 from 100% to 81.5% (2016) with the level of trained primary teachers at 90% (2018). The level of education, as compared to the United Kingdom, indicates lower attainment levels per Table 2 with both countries trending up (percentage of population ages 25 and over that attained or completed upper secondary education (UNESCO, 2020)).

Table 2: Education Attainment Comparison

Attribute	Year	Country	Results (per cent)
Per cent attending primary school	2018	The Bahamas	81.4
		United Kingdom	100.9
Adjusted net enrollment rate for primary school (female)	2017	The Bahamas	75.3
		United Kingdom	94.86
Source: UNESCO Institute of Statists 2020 data.			

2 In economics, the Gini coefficient, sometimes called the Gini index or Gini ratio, or the Lorenz curve is a measure of statistical dispersion intended to represent the income inequality or wealth inequality within a nation or any other group of people. A coefficient of zero is fully equal distribution of income whereas the closer to the number 1.0, the less equal the distribution.

5.4.5 Health Indicators

General health indices for The Bahamas include a range of conditions that are typically used for tracking and comparative analysis. These indicate a well-developed healthcare system with generally good access to services and outcomes in comparison to most developing countries but still lagging more developed countries.

Select health indicators are summarized below using the United Kingdom as a baseline comparison.

Table 3: Comparison of Selected Health Indices

Health Care Indicator	The Bahamas	United Kingdom
Life Expectancy at birth for women	76.6	83.0
Infant Mortality Rate (per 1,000 live births – 2021 data)	11.3	4.3
No. of Hospital Beds per 10,000 population	29.6 (2017)	24.6 (2019)
Households with basic sanitation	94.9%	99%
Estimated healthcare expenditures per capita/year (U.S. $ PPP 2018)	$2,005	$4,620
Overall Efficiency of Healthcare (global ranking)	94th	18th

Life expectancy at birth and infant mortality rates (IMR) are generally as overall indicators of the general health of a population and are inclusive of access to medical treatment, food security and quality and the health of the environment. They may also be indicative of negative social conditions such as war, social unrest, political insecurities, food insecurities, and other human health conflicts. The Bahamas reports a life expectancy consistent with many of its Caribbean neighbors but lagging more developed countries (as an example the U.K.). Consistent with many other countries, the life expectancy is improving. The IMR for The Bahamas is 11.3 which is considerably higher than most developed countries (as represented by the U.K.) which could indicate insufficient access to pre-natal care. The Bahamas has a reported number of hospital beds per 10,000 population of 29.6 (2017) as compared to the United Kingdom of 24.6 (2019 data). This metric is typically used as indication of access to healthcare. Households with basic sanitation is another general indicator of environmental health and infrastructure development. For the Bahamas, approximately 95% of the population has access to household sanitation as compared to 99% of the U.K. and only 87% for Jamaica. As sanitation is fundamental to human development, many international organisations use hygienic sanitation facilities as a measure for progress in the fight against poverty, disease, and death. Access to proper sanitation is also considered to be a human right, not a privilege. Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and feces. Estimated healthcare expenditures per capita per year is another indicator of the level of development of healthcare infrastructure but it is noted that it is not always positively correlated to health outcomes. Per WHO data (2018 at purchase power parity), The Bahamas spends less than half of the U.K. Data for this analysis is primary from (WHO, 2021).

Overall, the WHO ranks The Bahamas for healthcare delivery at 94th in the world (the U.K. ranks at 18th), and this low score is indicative of conditions that are not commensurate with the GDP of the country. This is perhaps another indicator of unequal income distribution. This ranking is based on five factors, including, improvement of health of the population, responsiveness of the health system to the expectations of the population, financial risk and fairness of healthcare costs (including protections against catastrophic financial loss from ill health).

Within Grand Bahama, and the Freeport vicinity in particular, healthcare delivery is provided by the Rand Memorial Hospital, along with nine other healthcare facilities identified by the Ministry of Health. However, a Google™ search identifies a total of 12 healthcare facilities within the greater Freeport area. The nearest emergency healthcare providers to the project site appear to be the Eight Mile Rock Clinic and Hawksbill Clinic, both located less than three miles by road from the Port. Figure 24 is a map of the regional healthcare facilities.

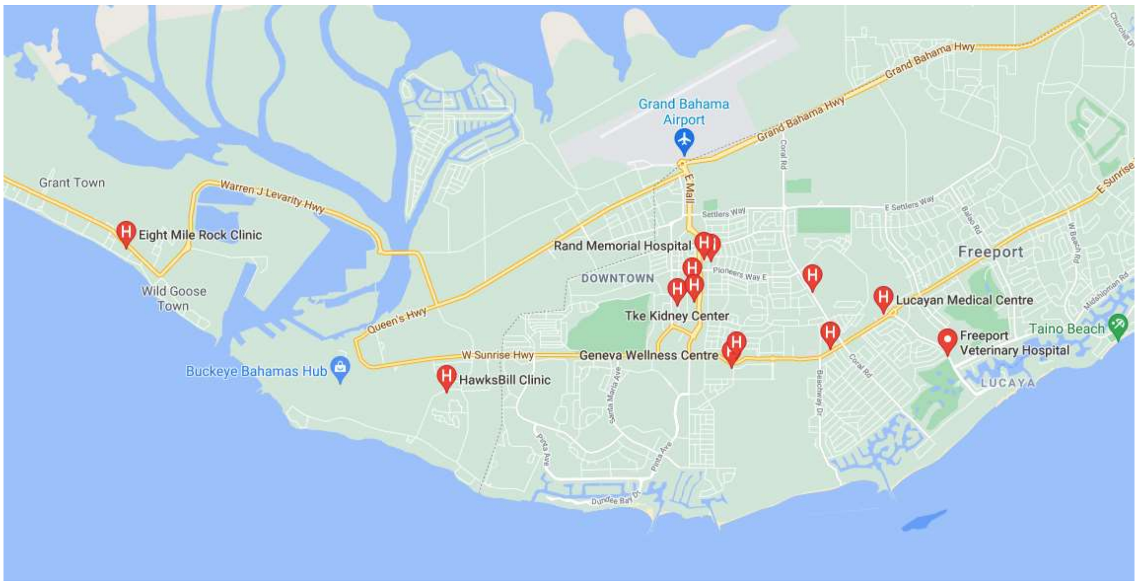

Figure 24: Access to healthcare facilities - Freeport

The Bahamas Ministry of Health publishes a listing of the services provided by the facilities on Grand Bahama Island. According to that document, both Eight Mile Rock and Hawksbill Clinics offer ambulatory / emergency services, and these will likely be the first response healthcare providers for any health emergencies. Major medical procedures, surgeries, and specialist care is only available at the Rand Memorial Hospital in Freeport (Health, 2021).

5.4.6 Public Safety

Crime represents the country's primary security threat. Royal Bahamas Police Force (RBPF) statistics for 2019 highlight an overall drop in non-violent crime from 2018. According to RBPF statistics that encompass the roughly 700 islands and 2,000 cays of The Bahamas the number of murders increased by 4% compared to 2018. The number of armed robberies increased by 12%, while the number of reported rapes, attempted rapes, and unarmed robberies decreased. There was an overall drop in property crime with decreases in incidents of burglaries and vehicle thefts. On Grand Bahama, the number of murders increased by 67%. Drug trafficking continues to be the major concern in the northern islands (OSAC, 2020). From a comparative viewpoint, The Bahamas has a murder rate per 100,000 population of 24 (Force, 2019) as compared to the U.K. at 117.

Although there was a 14% decrease in fatal traffic-related deaths in 2019, traffic fatalities are a major concern in The Bahamas. The Bahamian government introduced amendments to the Road Traffic Regulation and the Road Traffic Act in 2019. It is now a misdemeanor offense in The Bahamas to have an open alcohol container in your vehicle or to use a handheld communication device while driving. Additionally, it is now a law for all drivers to present their driver's license and proof of registration if a police officer requests to see it. Traffic moves on the left side of the road in The Bahamas. Cars have struck tourists who failed to check properly for oncoming traffic; vehicles have struck runners and cyclists. Traffic circles are common, and traffic in the circles has the right of way. Traffic congestion in Nassau is prevalent. Drivers occasionally display antagonistic tendencies and drive recklessly, passing on the right into oncoming traffic. Many motorists disobey stop signs, speed limits, and traffic signals (OSAC, 2020).

5.5 SUMMARY OF SOCIO-ECONOMIC CONDITIONS

5.5.1 Socio-Economic Context

The Bahamas has no history of politically motivated violence and, barring a few incidents leading up to the last general elections, the political process is violence-free and transparent. As a member of the British Commonwealth the country has maintained a stable political climate for many decades and is considered attractive for economic development due to liberal banking regulations. The City of Freeport, as a 233 square mile Free Trade Zone, offers distinct economic advantages for foreign investment. Tourism is the country's largest economic sector in terms of both gross domestic product and jobs and economic growth is mainly driven by this industry and its related services. This is obviously positive driver of foreign investment and job creation but is also subject to economic stress beyond the control the government. As a poorly diversified economy, The Bahamas is subject to economic shock from declines in the travel and leisure industry such as those observed by recent hurricanes and the global pandemic. As a result, unemployment spiked sharply, and GDP has fallen dramatically from the forced economic slowdown brought on by the COVID-19 closures. Projects, such as the Port Reception Facility, will play a much-needed role in economic diversification and job creation that is not as closely tied to the tourism industry as typical travel and leisure providers.

5.5.2 Health and Safety Context

The Bahamas provides acceptable health delivery, particularly in comparison to many of its Caribbean neighbors. However, as an economically developed country it still ranks much lower than expectations for overall health service delivery. Rates of infant mortality and healthcare expenditures are well below developed nation levels, but certain indices show comparable outcomes. In general, access to healthcare is acceptable and for the specific location of the project, it is deemed appropriate. Both emergency care (two facilities) and full-service care are within an easy drive of the proposed project location at the Port. It should be noted that the proposed Port Reception Facility will also have emergency first-aid facilities on-site.

6.0 STAKEHOLDER ENGAGEMENT

6.1 GENERAL OVERVIEW

Stakeholder engagement is a process of identifying parties that may be directly or indirectly impacted by (both positive and negative impacts) of a proposed program, plan or project and seeking their input into the development process in an effort to avoid and reduce negative impacts while emphasizing and exploiting positive impacts. Principles outlined in, *Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets* (Corporation, Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, 2007). Stakeholders typically may include affected communities or individuals, local governments, political leaders and institutions, religious institutions, civil organisations, labour organisations, academics and other special interest groups. In the case of this project, the primary stakeholders identified include:

- The GBPA
- Adjacent ongoing business interests
- Potential customers
- Local vendors and potential suppliers
- Local workers and potential workers

A key tenant in the successful implementation of stakeholder engagement is early and continuous involvement and dialogue as well as follow-up communications. The IFC identifies eight components of a Stakeholder Engagement Plan (SEP).

- Stakeholder Identification and Analysis
- Information Disclosure
- Stakeholder Consultation
- Negotiation and Partnerships
- Grievance Management
- Stakeholder Involvement in Project Monitoring
- Reporting to Stakeholders
- Management Functions

The EIA regulations of The Bahamas require in (Part 2) a public consultation process. Specifically, Section 7 includes an “Obligation to consult.” This is initiated after a successful completion of the application for preliminary review. Section 8 of the regulations includes the requirement for a public consultation administered, or at least confirmed, by the Department of Environmental Planning and Protection (DEPP). The period for public review is no less than two weeks and is initated with notices being placed in a local newspaper to inform the public of the project and by providing copies of the Environmental Impact Assessment (this document) for review and comment. It also requires a public meeting held during which comments are invited and the project is reviewed. DEPP will then provide the comments received to the project proponent (CMG) and allow a response and/or revisions to the project plan and/or the environmental documentation.

6.2 PRF PROCESS

CMG provided a proposed public consultation process to DEPP as part of their preliminary application for a Certificate of Environmental Clearance (CEC). DEPP approved the consultative process proposal and CMG is completing or has completed the following steps:

1. The project was advertised in *The Tribune* newspaper. The advert notified the public of the pending CEC application and of the public meeting to be held (including time and location and details on how to participate). It also included links to the CMG website for sourcing the ESIA and EMP reports that were made available.
2. CMG posted this information to their website (see page in Appendix 6) with the same information.
3. A public meeting was held on 14 October (see Appendix 6 for details and notes) during which the project proponents presented an overview of the project, and the environmental consultant provided a summary of the anticipated impacts. The public was invited to attend (via Zoom™) and the public comment period was held open through the 12th of November. A comment log was completed during the meeting. No comments were received subsequent to or during the meeting, nor were any received by DEPP.
4. DEPP was represented during the presentation.
5. The additional comment period was formally closed on 12 November 2021 and following a consultation with DEPP, the process was concluded.
6. The public engagement process was coordinated with DEPP and their representative presided over the process.
7. No changes to the ESIA or EMP documents were required as a result of the public review process.

6.3 PREVIOUS STAKEHOLDER ENGAGEMENT

Stakeholder engagement for this project was initiated prior to the involvement of CMG with the formation of a regional group to study the need for a PRF. The Regional Activity Centre / Regional Marine Pollution Emergency, Information and Training Centre – Wider Caribbean Region (RAC-REMPEITC Caribe), developed the *Feasibility Study on the Development of a Regional Reception Facilities Plan for the Small Island Developing States of the Wider Caribbean Region (Annex B)* in 2017 (RAC-REMPEITC, 2017).

Table 4: Details of Stakeholder Engagement by RAC-REMPEITC

Stakeholder Individual	Representing	Title
Daniel Murray	Overseas Marine	Captain
Capt. Makarios Rolle	Statoil South Riding Point LLC	Marine Manager
Kevin Miller	Bahamas Guard Enforcement	Officer
Erica Roberts	Bahamas Gout	Sr. Executive DH
Freddie Sands	Bahamas Gout	
Rico Cargill	GDPA – Environment Dept.	Sr. Environment Inspector

Kyle Smith	Harbor Launch Services	President
Jamaal Rolle	Harbor Launch Services	Captain
Tyrone Farquharson	Grand Bahama Ship	HSE Manager
Devan Williams	Reliance Maritime Agency	General Manager
Darrin Rolle	Elnet Maritime	Agent
Kent Ward	RMA	Agent
Marques Williams	Port Development	Assistant Port Controller
Anthony Ryan	DRHS	Public Analyst
Collin Cleare	Nassau Canton Port	PFSO

The following is a summary of the recommendations from this effort, including input by the stakeholders identified above.

- Recommend continued Stakeholder engagements to develop and implement guidelines for the receipt, disposal, handling, tracking, enforcement, and funding of SGW.
- Implement the necessary legal possibilities to enforce compliance of ships with the MARPOL Convention,
- Consider the implementation of a license system to control the different waste handling operations, with respect to: types of operations; requirements for obtaining licenses; applicable fees; public review; and industry appeal provisions.
- Identify funding sources to develop a national waste management plan and improve capabilities to adequately dispose of SGW.
- Utilize the data collected in this report to generate Waste Management Plans for ports in the Bahamas.
- Fully integrate the issue of ship-generated waste into the plans and policies for land-generated wastes.
- Consider alternatives to reuse, recycle and reduce impacts of SGW in the Bahamas which can be found in IMO guidebook: Port Reception Facilities – How to do it.
- Ensure there is a proper costs structure in place, with appropriate fees, that follows the polluter pays principle.
- Consider opportunities that may be available with a regional plan to best handle SGW, especially for passenger vessel food waste.
- Complete assessment and of all PRFs that may have been left out of the study, and ensure PRF data, and lists of all Service Providers, are entered into IMO's GSIS; and 11. Ensure robust market incentives for entrepreneurship are in place to encourage business opportunities for receiving, handling, disposing, and recycling SGW (RAC-REMPEITC, 2017).

6.4 ADDITIONAL NEWS AND SOCIAL MEDIA POSTS REGARDING THE PROPOSED PRF

A review of online media sources reveals a number of articles written about this project. These are general announcements of the new business with no negative articles identified. The first announcement did generate feedback on the website (no indication as to the origins of the commentors or their particular role). These are provided below:

birdiestrachan1 year, 6 months ago

It will be interesting to learn how this project works. There are very high incidents of CANCER in the Bahamas.

proudloudandfnm1 year, 6 months ago

Birdie, This is a service that takes used oil and waste water from ships and cleans them and re-sells them. That's all this is. Nothing insidious at all...

proudloudandfnm 1 year, 6 months ago

Well it's a positive move for Freeport but is it too late? Our Maritime industry has been in the doldrums now for 5 years thanks to PLP and FNM hunt for revenue. Rate increases and new charges for certain facilities added to oil prices plunging have literally killed the maritime industry in Freeport. And no one in government even knows...

Good luck to you Rob, this is a service we have needed for decades. I just pray the industry bounces back before you guys pull the plug and close it up..

realitycheck242 1 year, 6 months ago

Good move ...The widespread contamination of Grand Bahama industrial areas should serve as negative case study and not be allowed to be repeated in other pristine areas of the country (Kemp, 2019).

The *Tribune* newspaper (online version) also posted an article on the proposed project dated 01 October 2021, "Ships' Waste Processor In $15m Freeport Facility" that detailed information provided in the environmental documentation submitted to DEPP including a description of the proposed Facility. One online comment was identified after one week.

birdiestrachan2 days, 22 hours ago

This should be watched carefully what does Mrs Duncombe say about this.?.[3]

As of Friday, October 1, 2021

Other social media sites were scanned for potential concerns raised by the public. No significant comments or findings were identified.

[3] *Ships' Waste Processor In $15m Freeport Facility*, October 1, 2021. By Neil Hartnell, Tribune Business Editor. Comment posted on October 4, 2021.

6.5 STEERING COMMITTEE

Additional and ongoing stakeholder engagement via a Steering Committee has been initiated by the CMG team for this project. A Steering Committee (SC) has been formed to work with the project proponent and to assist in guiding development decisions as the project progresses. The stated goals of the SC are as follows:

- Provide Guidance and Assistance to CMG
- Ensure Stakeholder participation in development of the MARPOL framework
- Develop and maintain a work plan to accomplish goals of the project
- Assist with development an education and training program
- Monitor and ensure compliance
- Develop communication plans to share news and updates concerning the project.

The first SC meeting was held on 25 February 2021 and the following individuals were identified as stakeholders:

Table 5: Members of PRF Steering Committee

Individual	Representing
Rico Cargill	GBPA
Marvin Basden	GBSY
Jeremy Cafferata	FSS
Terry-Ann Segree	IDB
Mikia Carter	IDB

These individuals represent local interests, as well as funders of the project. Additional funding representatives have also been identified for inclusion in SC communications. These are:

- Althelia Funds / Mirova (United Kingdom)

Additional local stakeholders invited include:

- Freeport Harbour Company
- Freeport Ship Services
- Grand Bahama Shipyard
- Freeport Container Port
- CEMEX
- Bahama Rock

The stakeholders are supported by a full team of CMG representatives. Future meetings are planned on a monthly basis and will continue until such time as the project is fully operational. A decision will be made at that time to reduce the frequency of the SC meetings as appropriate. The continued input of the SC will be included in the development and execution of the Environmental and Social Management Plan (ESMP).

7.0 ENVIRONMENTAL CONDITIONS

7.1 PROJECT LOCATION AND LAND USE

The site location for the CMG Facility is located on the western side of Freeport Harbour on Parcel 2 of Basin 3 (Figure 25). The site more specifically is to the west of the Freeport Container Port offices and encompasses 4.12 acres. This site is zoned heavy industry by the Grand Bahama Port Authority's Freeport Land Use Masterplan (Figure 26). Therefore, this development is consistent with the current zoning designation. The survey drawing for the site is presented in Figure 27 in this Section of the report.

The CMG property is bounded to the east by the Freeport Container Port office building and parking lot. To the west by Basin 3, to the south by Parcel 4 (vacant land owned by Freeport Harbour Company) and to the north by vacant land. The closest residential structure to the proposed treatment plant Facility is located approximately 0.69 miles (1,102 meters) in a south-west direction in Hepburn Town. Harbour West Subdivision, located in Eight Mile Rock, the closest residence is located approximately 1.07 miles (1,726 meters) to the west. The Pinder's Point settlement is located approximately 0.81 miles (1,300 meters) to the southeast.

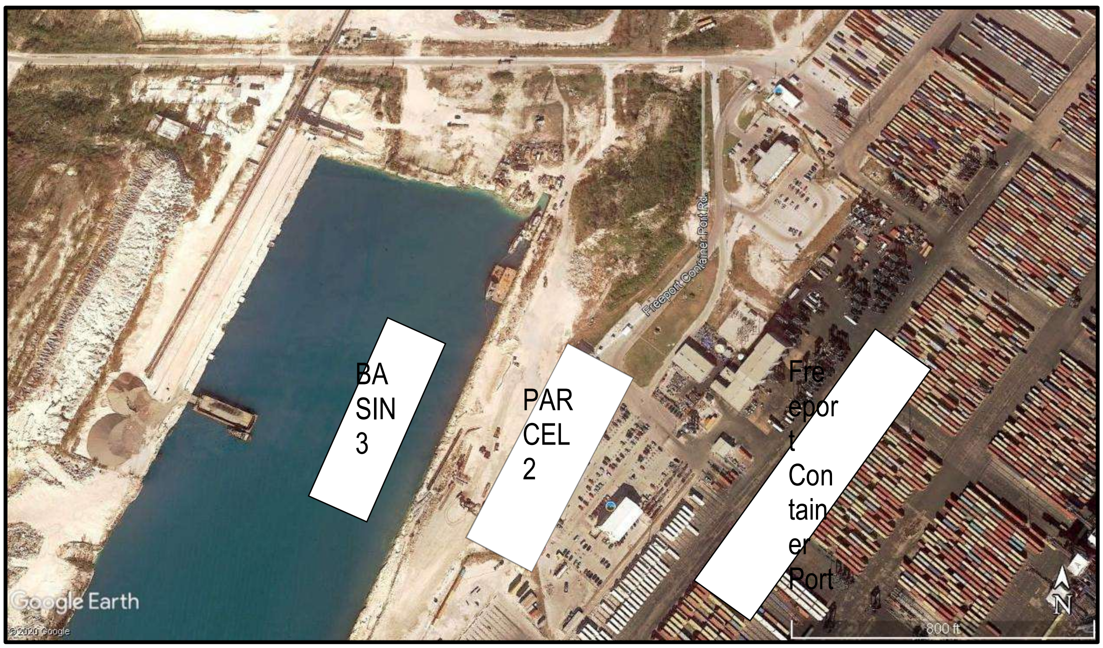

Figure 25: Project location

The future berthing area is directly west of the Facility along Basin 3. This area had been previously cleared during previous harbour expansion activities. The area currently has storage tanks and the pilot plant belonging to CMG on the property along with old conveyors from unknown origins.

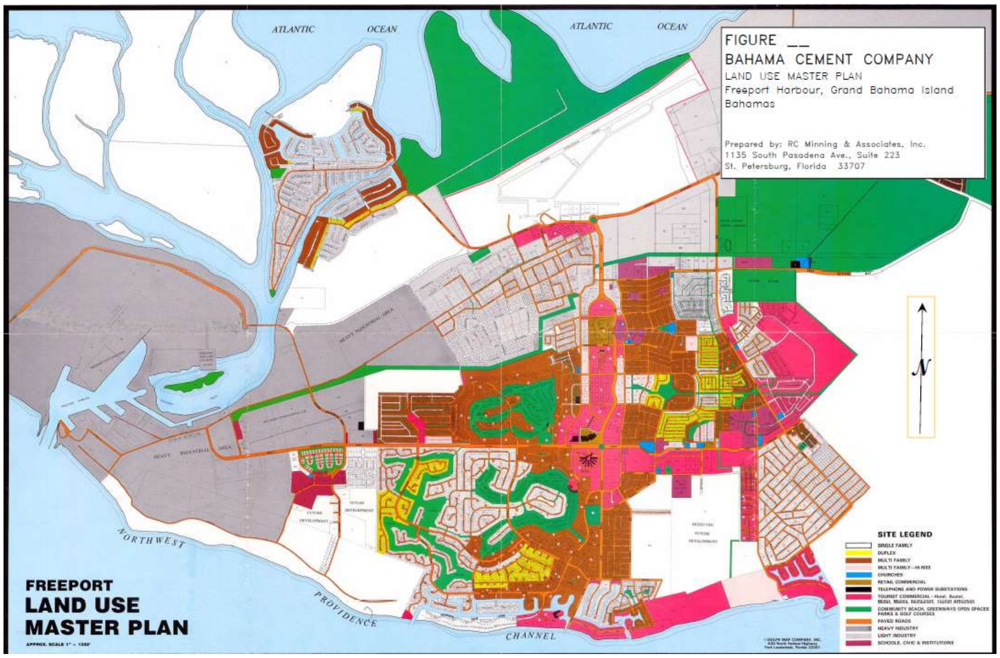

Figure 26: Land use and Master Plan for the Freeport Harbour

The storage and treatment Facility property is within the GBPA jurisdictional area. The site is part of the historic port development and is not considered a greenfield development. The location has been previously disturbed by port related activities and based on a Google Earth™ time-lapse sequence, the location was originally at the northern edge of the old harbour but as a result of expansion, it is now located in the central portion of the complex. Basin 3, located immediately to the west, was excavated during the port expansion in the 1990s. Currently, there are no buildings on the property. The photographs below show the most recent state of the property where equipment is stored largely on behalf of Freeport Harbour Company and Elnet Marine.

Figure 27: Photo of CMG site with empty ISO tanks (view to the south)

7.2 INFRASTRUCTURE AND PUBLIC SERVICES

The following section discusses the existing infrastructure and public services available in the vicinity of the Proposed CMG project site and surrounding areas with a particular emphasis on those utilities required to support the proposed project. Road access to the Facility will be primarily along Warren J. Levarity Highway (primary road) and then to Fishing Hole Road (secondary access road), to the treatment plant and berthing area. Currently, there is an unpaved road to the Facility. This road will be paved as part of the proposed development.

7.2.1 Potable Water Supply

The Grand Bahama Utility Company (GBUC) manages and operates the potable water supply for Grand Bahama. Currently, 4 wellfields exist, Wellfields 1, 3, 4, and 6. Wellfield 6 was impacted from Hurricane Dorian by saltwater intrusion. The GBUC has been working diligently to restore potable water to Grand Bahama. The current wellfield locations are as follows:

- Wellfield 1: Settlers Highway
- Wellfield 3: North Bahamia
- Wellfield 4: South Bahamia
- Wellfield 6: Lucaya Estates.

A water main and booster station exists along the south side of Fishing Hole Road. The main is 8-inch in diameter. This main provides potable water to the Grand Bahama Shipyard from Grand Bahama Utility Company distribution system and to settlements located from Freeport westward to West End. Due to the impacts of Hurricane Dorian, potable water for employees at the new Facility will be purchased water. Water quality tests for supply for the boiler will have to be conducted to determine if a water purification system is required. A water line will need to be installed to the Facility to provide fire protection with new hydrants located at locations designed to meet code requirements. Hydrant testing may be required to determine current water pressure. The requirements for an onsite booster pump or pressure tank have not yet been determined.

The groundwater at the site does not represent a potable water supply or source for fire flow protection. More recently, the GBUC announced the construction of a 3 million gallon/day (MGD) reverse osmosis (RO) plant to improve existing potable water quality for the Island. The reverse osmosis water will be blended with the higher salinity water from the impacted wellfields to produce water with a total dissolved solids of < 1,000 mg/L. The addition of this RO plant is not likely to impact the proposed development. There are no known potable supply wells located in the vicinity. No residences in this region are currently using groundwater or surface waters for domestic supply. Potable water is supplied by the GBUC plants and distribution system. CMG may elect to provide drinking water via private supplier. Water supply for eye-wash and emergency showers will be provided by the municipal authority.

7.2.2 Electrical Transmission Lines

Transmission/distribution lines carrying power, cable television, and telephone services will need to be installed along the entrance road to the Facility. Services will be provided by Grand Bahama Power Company, Bahamas Tele-communications Company (BTC), and Cable Bahamas. CMG is on the road to the existing container port where it can connect to water (underground), power (above ground) and telephone (above ground). Civil works design is preparing the appropriate engineering drawings to connect to the current power distribution system.

7.2.3 Sanitary and Industrial Sewer

No municipal sanitary or industrial sewerage is available to the subject property. The onsite sewerage will be managed by a seepage pit system (gravity fed) to be approved by the GBPA Building Department. As the anticipated sanitary flow volumes are low (<400 gal./day), the ability of the onsite soils to effectively treat the flow will be confirmed by the local authorities. There are no private or public drinking water wells in this area and thus no separation distance concerns have been identified. Periodic septic tank maintenance will be performed by outside contractors. The proposed development is constructing an industrial wastewater treatment system as part of the operations and thus all industrial wastewaters, including those received and generated as part of the process will be treated and released (via the deep well) on site (see description in Section 4 of this document).

7.3 CLIMATE

The climate of Grand Bahama is subtropical with a mean temperature range of 70°F (21°C) in January to 83°F (28°C) in August. The island is generally characterized by warm moist summers and drier cooler winters. Summer trade winds from the east bring warm humid air to the area. Winter high-pressure cells arriving from the North Atlantic and North America bring periods of cold, sometimes precipitating fronts. Summer rainfall peaks in June through September, with a yearly total averaging approximately 60 inches. For most of the year, Grand Bahama Island remains sunny. Cloudiness often indicates isolated rain showers and sustained overcast days are rare. A fairly constant breeze helps to alleviate the effects of the high humidity, yet most businesses and homes use air conditioning, especially in summer. Frost is unknown because any invading cold air mass must cross over the warming influence of the Gulf Stream. The island is approximately 6 kilometers wide (north to south) near the project site thus stale air masses are not likely to form. Additionally, due to the minimal diurnal temperature range, inversions are also not likely to occur. These conditions allow for a better ambient air quality as typical urban or industrial air pollutants do not concentrate. Dominant wind direction is from the east and to a lesser extent the northeast, southeast and south as part of the Northeast Trades. Figure 28 is a climograph for Freeport that demonstrates the average monthly temperatures and precipitation.

Figure 28: Climate data for Freeport

7.3.1 Climate Change

When considering climate change as it relates to The Bahamas it is important to note that the country is an archipelago of small islands, most of them uninhabited, and that more than 80% of the land surface is only a meter or less above mean sea level. The natural resources of the country are very limited. The economy is built on tourism and services. Bahamians, like other island peoples, have historically had a close personal relationship with the land and the sea. Until the advent of modern tourism and banking industries, most Bahamians relied on the resources of both land and sea for survival. Areas of concern for future climate change primarily relate to increased frequency and intensity of storms and resulting storm surge impacts. Data on climate impacts to hurricanes and tropical storms indicates more intensity, in both rainfall rates (10-15%) and wind speeds (1-5%), may be anticipated as a result of warmer surface water temperatures (Laboratory, 2021). Impacts to date have not been sufficiently strong enough to measure however attribution studies have made tentative links between storm intensity and climate change. Future increased storm intensity is considered a strong possibility and additional mitigatory measures should be considered in the design and operation of any marine facility (Laboratory, 2021). The extreme event analysis completed in 2014 shows that The Bahamas will experience a decrease in precipitation, suggesting future extreme high events would be less severe (Bahamas, 2014). However, when daily outputs of 12 GCMs are applied, the analysis shows that by 2050 (with A1FI-high), the return period for the current most extreme event will have dropped to 42 years (from 58), while the 1:100-year event increases to 622 mm (from 560 mm). This would mean that such events would become more severe and more intense. Design wind loading is recommended using the 50-year return period peak wind gust calculated at 120 MPH for Grand Bahama with appropriate safety factors applied (Vickery and Wadhera). Normal rainfall patterns may also be impacted by climate change. Previous estimates indicate lower yearly precipitation may be the result of climate change through 2050 including a 6.2 percent reduction for Grand Bahama (Bahamas, 2014).

Analysis of extreme or maximum temperatures shows a 5º C change from winter (DJF) and summer months (JJA). However, when projecting maximum temperature for 2050 by using a 21-GCM ensemble, and the A1FI emission scenario, with high climate sensitivity, the following changes for the daily maximum temperature are expected: (1) maximum temperature for The Bahamas will increase by 1.97º C while maximum temperature increases for individual islands will range from 1-2º C; (2) the average daily maximum temperature of winter months will be less than 2º C while the summer months will be just over 2º C; (3) the drier islands in the southeast will experience higher temperatures during the winter months (DFJ) than the central and northwest regions (see Figure 29). The range of daily average maximum temperature increase in The Bahamas is expected to be up to 2º C which is consistent with the expected increase of 2.7º C global average daily temperature with the moderating effect of the surrounding waters (Bahamas, 2014). This expected increase in temperature should be noted during the design process for material selection and cooling needs.

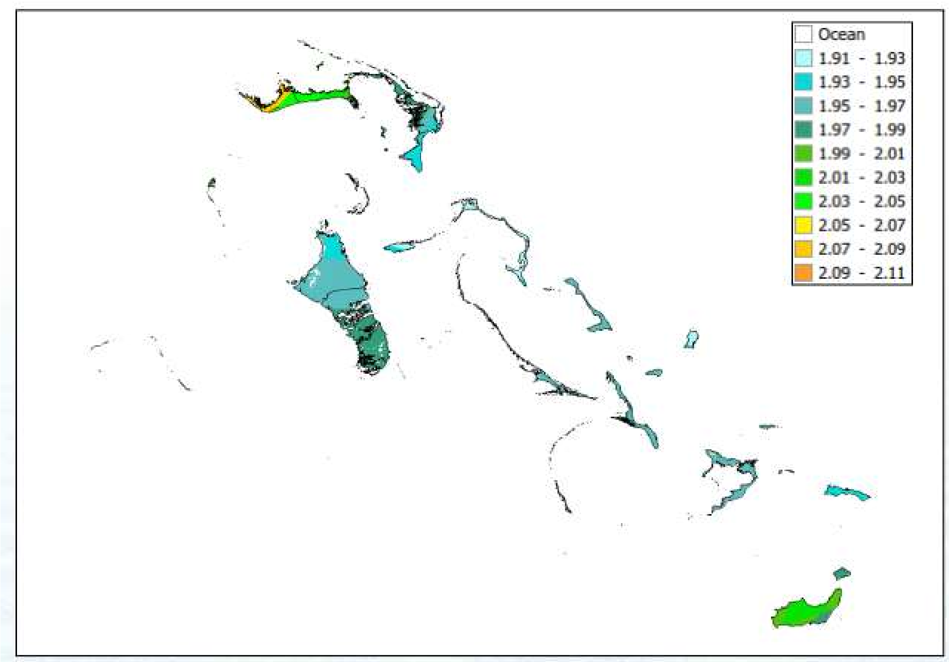

Figure 29: Average daily maximum temperature change for The Bahamas for 2050

7.4 TIDES & CURRENTS

According to tidal data recorded at Freeport Harbour the mean tidal range is approximately 3.1 feet. The mean spring tidal range increases to approximately 3.6 feet. Tides are diurnal, cycling every 12 hours and 25 minutes on average. The tide cycle for the north side of the Island lags the Harbour tides by approximately 5 hours. Currents have not been assessed as part of this report as no dredging operations or bathymetric changes are proposed. Basin 3 is a dead-end harbour with no freshwater input and likely low tidal mixing. The water/shore intersection is mostly hardened from previous development. No new piling, riprap, bulkheads, or other waterward improvements are proposed as part of this development.

7.5 GEOLOGY

The Bahama Islands are relatively recent geological formations consisting of various forms of limestone and coral. Geological investigations throughout the Bahamas indicate limestone has been encountered as deep as 18,906 feet (Cay Sal, 1959). Such data suggests that limestone in the Bahamas was once located at the surface (Sealy, 1995). Geographically the island, together with the Little and Great Abaco Island, make up the exposed portions of the Little Bahama Bank.

Grand Bahama like all other Bahamian Islands consist of limestone rock formed over time through the process of diagenesis. A typical Bahamian island consists of a sequence of late Pleistocene and Holocene carbonate rocks of subtidal, intertidal, and eolian origin. The limestone in this area is very porous and contains secondary mineral deposits of calcite and sparry cement. From sea level to a depth of approximately five (5) miles the geology is dominated by limestone and dolostone interbeds.

The surficial geological structure of Grand Bahama Island appears to have developed during the Quaternary period when sea level fell during periods of glaciation and rose again during interglacial periods. When sea level rose during an interglacial period, new carbonate sediments were deposited on the flat-topped banks forming shallow marine flats and tidal marshes. Grand Bahama was possibly then a series of smaller cays or shallow banks separated by deeper tidal channels, like those in eastern Grand Bahama. Most have since become infilled but are still marked by areas of swashland.

Past excavation of the earlier phases of Harbour construction suggests that limestone of varying density, porosity and permeability are present to a depth of 150 feet below grade. This lithologic sequence has been confirmed to a depth of 150 feet below grade via the lithologic logs for boreholes drilled in other harbour areas. The lithologic logs for deep disposal wells at the Grand Bahama Shipyard, Ltd. and Polymers International, Ltd. located just east of the area indicate that the limestone/dolostone sequence is present to a depth of 600 feet below grade.

7.5.1 Hydrogeology

No wells exist on the property and none were drilled yet as part of the Environmental Impact Assessment due to Corona virus related restrictions imposed by the Bahamas Government. Based on the location of Parcel 2 next to Basin 3 of Freeport Harbour it is likely that a thin brackish lens overlying seawater exists. As reported by Little et al. (1975), changes in groundwater levels as a result of rainfall may be classed as short-term or long-term. Short-term rises after individual storms are quite common. These contribute to a long-term seasonal rise of the water table during the wet summer months, followed by a slow decline throughout the drier winter months. The wet season begins in May and ends in October with a maximum rainfall period occurring around the month of September. Since the aquifer is recharged by local rainfall only, this maximum rainfall period always coincides with the yearly peak elevation of the water table in the aquifer. The upper 60 to 70 feet bedrock in Grand Bahama comprises the Lucayan Limestone Aquifer (LLA) which is the principal aquifer. Within the LLA, freshwater can occur as lenses depending on the amount of rainfall and the physical characteristics of the LLA such as permeability and porosity. At steady state, the freshwater lens receives an average of 12 inches of annual recharge.

Rainfall in the area averages 60 inches per year, of which about 48 inches infiltrates the subsurface and 18 inches returns to the atmosphere through evapotranspiration. There are no natural freshwater surface water bodies (i.e., ponds, streams, or creeks) in the area or on the adjacent land area. The physical location of the port and adjacent areas on Grand Bahama Island, together with the permeable limestone bedrock and climatological conditions, shape the overall hydrologic environment. The Harbour lies immediately south and east of the property. The subject property is not a known groundwater recharge zone for any actively used aquifer.

Three treated effluent disposal wells, one at the Grand Bahama Shipyard, Ltd. Facility, on at GB Power, and one at Polymers International, Ltd., penetrated limestone and dolostone of varying density to a depth of 600 ft. below grade. Existing data obtained from four core borings conducted prior to this study as well as data from other sources indicate that the East Harbour Expansion area is generally composed of limestone/dolostone sequence that is present to a depth of at least 600 feet below grade.

Historically, based on the Ground Water and Land Ownership Map 1A (1970's) there was <10 feet freshwater lens in the vicinity of the CMG properties. Due to the extensive development of Freeport Harbour since the groundwater maps were produced for the island the freshwater lens in that area has likely greatly diminished or disappeared. Groundwater resources in the centre of the peninsula migrated through the Lucayan Limestone aquifer and discharged to Hawksbill Creek and Northwest Providence Channel. The continued expansion of the port and, in particular, the previously discussed harbour deepening project together with limestone quarrying operations to the east, have effectively allowed for the northward and westward migration of the "shoreline." It is noted that due to Hurricane Dorian the Grand Bahama Utility Company have been making operational changes to improve water quality to the municipal supply. Currently, potable water is limited in Grand Bahama through the distribution system. The Grand Bahama Utility Company (GBUC) has reclassified drinking water as having total dissolved solids of < 1,000 mg/L. The past GBUC criteria for potable water was 600 mg/L (0.6 pp) salinity or less.

There should be no deterioration of ground water quality as a result of the proposed development unless there is a spill. The aquifer underlying the site (LLA) is not a potable water supply or potential supply based on the industrial nature of the Harbour and Industrial Park. A planned observation well will be drilled and a salinity profile will be performed for the site (anticipated in 2021). Moreover, samples will be collected to establish a baseline of groundwater parameters. Samples will be analysed for the following parameters:

- Volatile Organic Compounds (VOC's) - EPA Method 8260B
- Semivolatile Organics – Method 8270D
- Florida Petroleum Range Organics – FL PRO
- Total Organic Carbon (TOC)
- Chemical Oxygen Demand (COD)
- Total Dissolved Solids (TDS)
- Heavy Metals

The results will be forwarded to both the GBPA and FHC. This task will be performed before construction starts. CMG will establish a groundwater monitoring program with sampling bi-annually. The groundwater monitoring program will be incorporated into the Environmental and Social Management Plan (ESMP).

7.6 TOPOGRAPHY AND SOILS

Grand Bahama Island is relatively flat with the highest point being 60 feet above sea level, located in the central-southern portion of the island. A typical section of the island shows wetlands, tidal creeks and salt ponds near the southern sandy shore and a low ridge further inland from which there is an almost indiscernible slope down to the north coast followed by an extensive swashland before reaching the shallow open waters of the Little Bahamas Bank. Please refer to Figure 30 for a generalized cross-section which depicts the general topography and vegetation communities found on Grand Bahama Island.

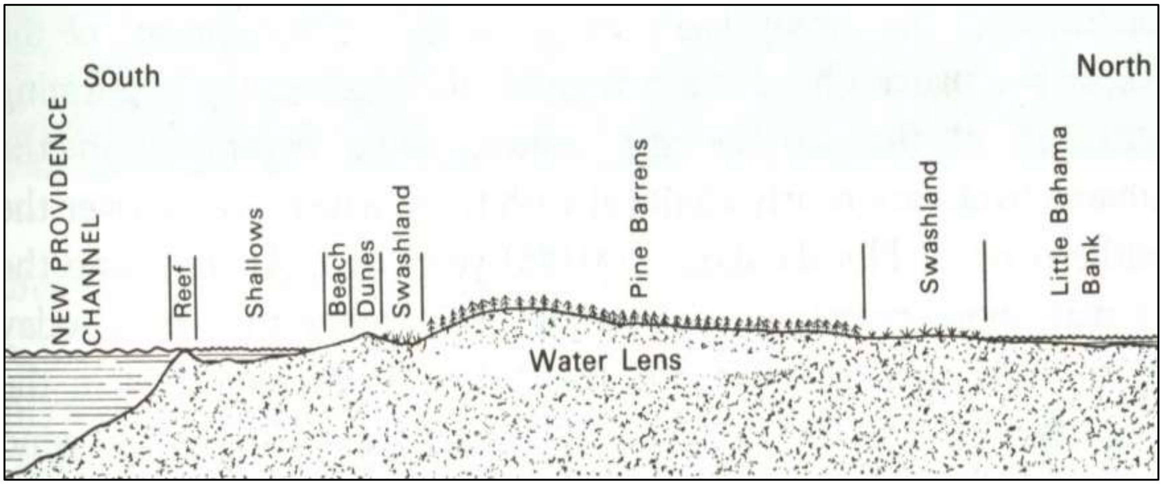

Figure 30: Generalized cross-section (Barrett, 1989 / citation pending)

Soils on Grand Bahama Island's south shore are composed of sand and/or limestone which are continually washed and further eroded by the action of the sea. The north shore is composed of calcareous muds and clayey limestone, also called marl beds. These white marl beds support thousands of acres of mangroves and other swamp-type vegetation. Further inland, beneath a canopy of pines and scrub vegetation, broken lime rock is ubiquitous and visible on the surface. Organic topsoil is occasionally found in the forested areas as a product of biological decay, but despite a thin cover of mosses and ferns, the rock is seldom more than a few inches below the surface. Infrequently sparse areas of lush vegetation is supported by rich organic loam found in the occasional "banana holes". Most of the agriculture since early times took place in the loamy coral sands slightly inland from the dunes of the south shore.

The project area has been cleared of almost all vegetation from previous harbour development. The area is flat and contains limestone fill material from previous dredging activities. Elevations range from a high of 13.5 feet above sea level in the south center of the site to sea level at the basin edge along the west. Figure 31 identifies the parcel boundary and topographic contours (0.5-foot contour interval). Two apparent soil stockpiles (no elevation provided) are shown to the south and north at the site. These will be removed as part of the site grading operations. Usable material will be retained for onsite fill.

Figure 31: Topographic survey of project site

7.7 BIOLOGICAL ENVIRONMENT

Both the marine and land area of the Facility are human disturbed areas due to dredging and vegetation clearance from past harbour development for the past 57 years. Since Freeport Harbour is a constructed basin, having been cut and dredged from the pre-existing estuary of Hawksbill Creek, the bathymetry of the harbour is substantially a product of ongoing excavation and maintenance dredging activities. In addition, the harbour has been, and continues to be expanded. The harbour was originally dredged to a depth of 30 feet (9 m) in 1963, but subsequent dredging activities increased the water depth to 47 feet (14.6 m). In 2003, dredging increased water depth to 52.5 feet (16 m), below MLW, throughout most of the harbour and the entrance channel. The entrance channel is excavated to a seaward extent up to the natural 52.5-foot depth contour. The marine environment along Basin 3 was created by the dredging of Freeport Harbour. As explained in Chapter 4.0 of this report Freeport Harbour is a manmade harbour created by the continuous dredging of the Harbour since 1955. Dredging is still on-going with the East Harbour Expansion.

Basin 3 was expanded to its current length between 1999 and 2003. The limestone bedrock was drilled, blasted and dredged to create the additional berth space along the basin. Therefore, the bottom of Basin 3 is likely limestone rock overlain with a layer of lime mud from the accumulation of fines from run-off. No near-shore habitats were identified during field surveys conducted in 2019. No areas of mangrove forests, submerged aquatic vegetation (SAVs), or rooted aquatic vegetation (RAVs) were identified at or near the subject property due to its industrial nature, existing water depths and previous disturbances. Therefore, the marine environment would not be classified as a sensitive area, particularly as the Harbour is industrial in nature and is zoned for heavy industry.

The terrestrial environment is human disturbed land as explained in this Section. The bare limestone rock represents a harsh environment to support any wildlife. Dredge piles are evident from the harbour dredging to the west and east. Further to the north the native vegetation at that time (1967) was pine forest. Most vegetation has been cleared from the Basin 3 area. A small area of herbaceous and small pine saplings is located in the northeast corner. It is possible that small populations of insect, avian and/or small reptiles could inhabit this vegetation. It is not likely that larger avian or mammal species inhabit this area given its small size and isolation. It is not part of any vegetated corridor or riparian edge. No faunal specimens were identified during site investigations. This ESIA has reviewed the following biodiversity databases to identify the likely existence of any rare, threatened, or sensitive ecological resources within the vicinity.

RAMSAR List of Wetlands of International Significance (RAMSAR, 2021). Only one resource was identified in The Bahamas; the Inagua National Park located on Inagua Island. This Island is the southern-most island of the Bahamas.

Alliance for Zero Extinction - These sites are based on species groups that have been globally assessed by the IUCN Red List, including amphibians, birds, cacti, cone snails, conifers, corals, cycads, freshwater crabs, freshwater crayfish, freshwater shrimps, mammals, mangrove plants, selected marine fish (blennies, groupers, pufferfish, wrasses), selected reptiles (chameleons, crocodiles, iguanas, tortoises, turtles), sharks and rays, and selected birches (Zero Extinction, 2018). One site (Long Island and Hog Cay) is identified as containing the only known population of *Zamia lucayana* (see Figure 32 for a photo). No specimens of this plant were identified during the field visits.

Figure 32: Photo of Zamia lucayana

> Birdlife International identified one Important Bird Area (IBA) located to the east of Freeport identified as the Grand Bahama Southern Shore. The entire island (Grand Bahama), along with much of the rest of the country is identified as an endemic bird area (EBA) due to the potential for marine species of importance. The site is not listed as in "Danger" for 2020.

The nearest sensitive areas are 1) the Grand Bahama Southern Shore, approximately one mile east of the Grand Lucayan Waterway and continuing east for about seven miles to Old Freetown, 2) Lucayan National Park, located about 25 miles east of Freeport, Grand Bahama. This 40-acre park encompasses the longest known underwater cave system in the world with over six miles of caves and tunnels already charted. Above ground it exhibits every vegetative zone found in the Bahamas, and 3) Peterson Cay also a National Park, located one and one-quarter mile east of the southern entrance to the Grand Lucayan Waterway. This windswept and sparsely vegetated limestone island is the only cay on the leeward side of Grand Bahama. These locations are located approximately 15 miles to the east of the project site.

Figure 33: Nearest protected areas

On Freeport Harbour website it is stated that there are no reefs or obstructions to the open sea from the harbour. To characterize the marine communities offshore of Freeport Harbour, a marine benthic survey was performed by the Oceanographic Center of NOVA Southeastern University (NOVA) in June and July 2003. The resulting Blue Marlin habitat map is represented in Figure 34 below. However, this mapping did not address the specific areas within the basin or the previously dredged shipping lanes, neither of which will be impacted by this project. The current water quality in Basin 3 has not been assessed as part of this study as no direct impacts to the harbour are proposed. It is likely that the water quality inside the basin is poor given the impeded tidal flushing created by the closed-end harbour and lack of mixing this creates. No point source discharges were identified as part of this assessment and none are proposed as a result of this proposed development. No construction along the shoreline Basin 3 is proposed at this time. No dredging of the basin is proposed at this time. Either of these activities would trigger a more specific assessment of proposed impacts and proper mitigation measures, if approved.

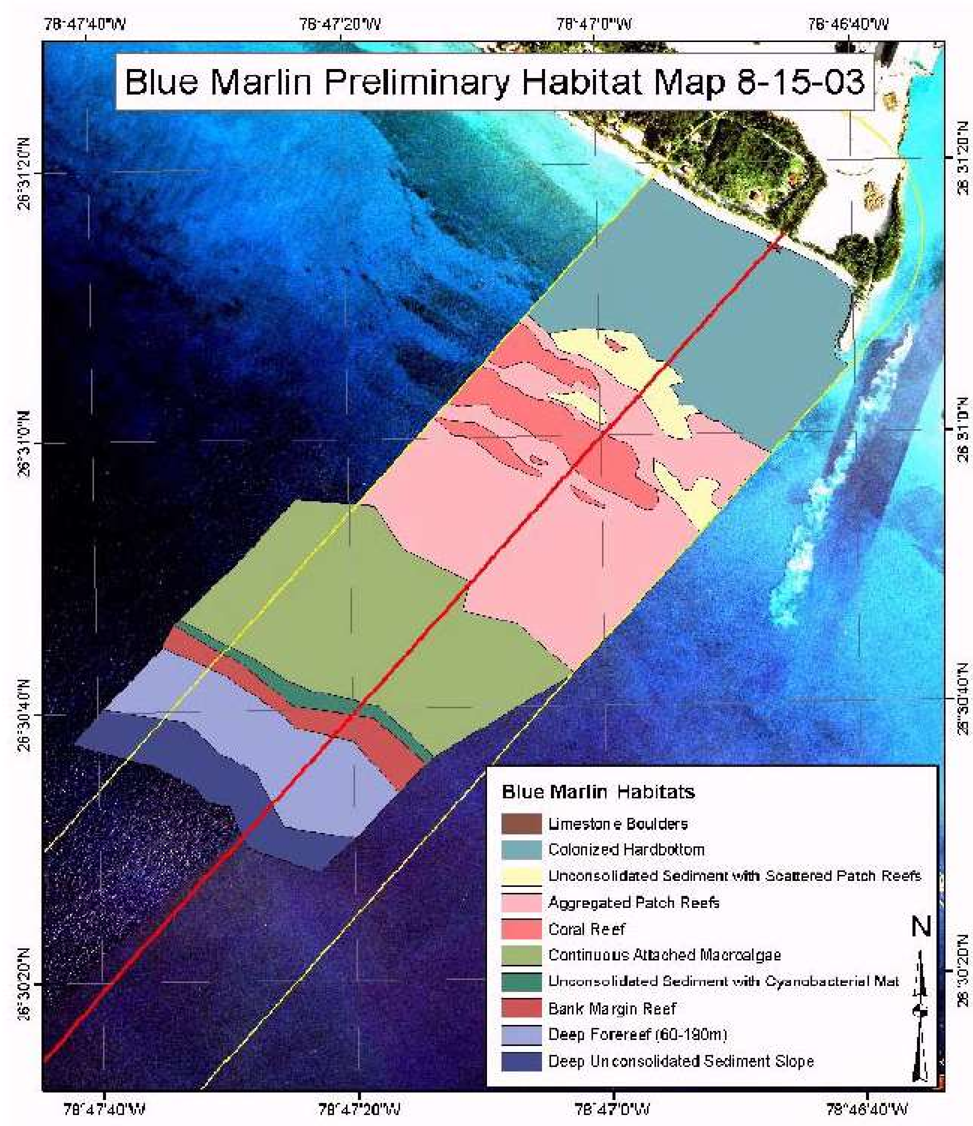

Figure 34: Preliminary marine habitat map offshore of Freeport Harbour

The area surrounding Freeport was investigated to determine if other marine sensitive areas have been designated. The Marine Protected Atlas developed by the Marine Conservation Institute was consulted and identified areas located to the north, south and east of Freeport as being designated as both "Less rotected / Unknown" and "Designated and Unimplemented" (see Figure 35). These locations are not adjacent to Basin 3 or its approaches. No areas of Regulation-Based Classification System Marine Protection areas (RBCS 1-8) were identified surrounding Grand Bahama Island[4].

[4] The Marine Protection Atlas website is located at: https://mpatlas.org/zones.

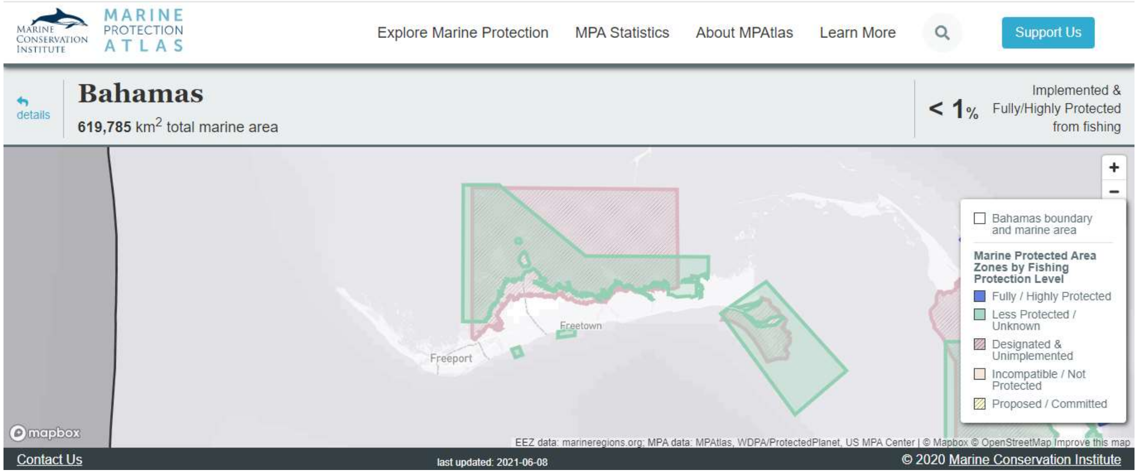

Figure 35: Marine Protection Atlas (2020)

7.8 AMBIENT AIR QUALITY

As per a 2015 UNEP5 research, ambient air quality in most of The Bahamas is relatively good for the following reasons (Vered, 2015):

> The local meteorology is dominated by strong easterly trade winds for the majority of the year, and multi-directional but still windy conditions in the remainder of the year. The strong winds will tend to transport emissions from sources located on the Islands out over water, rather than allowing them to accumulate and concentrate in ambient air over areas of population. This same effect will also preclude the chance for sufficient accumulations of ozone precursors that could lead to elevated levels of ambient ozone.

The density of industrial activity (and emission) on the islands is low. Areas of relatively low industrial actively tend to have acceptable concentrations of air contaminants. Due to its small industrial base and low population density, the Bahamas is not considered to be a major contributor to greenhouse gases (GHGs). Electricity generation and the transportation sector (through the burning of petroleum products) are determined to be the two most significant sources of GHG emissions in The Bahamas.

No recent emission reports from the harbour and industrial park are available and the cumulative impact is not known. CMG intends on operating a small boiler which will meet the WBG General EHS Guidelines air emission limits.

CMG is located adjacent to the Freeport Container Port. Grand Bahama Power Company Peel Street Plant is located approximately 1.43 miles (7,564 feet) to the south and east of the proposed CMG Facility. Grand Bahama Power also operates the West Sunrise Power Plant to the south of the Peel Street Plant, approximately 1.51 miles (7,972 ft.). Air emissions in the area are from the Grand Bahama Power Plant, Freeport Container Port, Grand Bahama Shipyard (application of paint), and cruise ships while in port. The emissions from the above facilities are unknown. The adjacent harbour areas and active excavation area emit air sources which include heavy equipment diesel engines.

Emissions from such machinery constitute a short-term impact from a mobile source and as such, it is not typical to carry out a quantitative impact analysis of these activities.

7.9 STORMS AND FLOODING

Grand Bahama Island is located within the Atlantic Tropical Cyclone Basin. This basin includes much of the North Atlantic, Caribbean Sea and the Gulf of Mexico. On average, six to eight tropical storms form per year in this basin. The formation of these storms, and the possible intensification into mature hurricanes, takes place over warm tropical and sub-tropical waters. Eventual dissipation or modification of these storms occurs on average seven to eight days later over the colder waters of the North Atlantic, or when the storms move overland away from the sustaining marine environment. The hurricane season extends from about June to November.

Hurricanes passed over Grand Bahama in 1926, 1957, 1995, 1999, 2004, 2005, 2012, 2016 and 2019 bringing by high winds and flooding. The most recent hurricane Dorian passed between September 1 - 3, 2019. Hurricane Dorian struck the islands of Great Abaco and Grand Bahama. Dorian was a very strong Category 5 hurricane based on the Saffir Simpson scale with sustained winds of 185 mph and gusts up to 200 mph. The storm lasted from September 1 – September 3, 2019, on Grand Bahama. Dorian hit Great Abaco from the east and continued on a westward trajectory hitting east Grand Bahama on Sunday evening, September 1st. The hurricane moved across the settlements of Sweetings Cay, McCleans Town, Pelican Point, and High Rock before turning northward on to the Northshore of Grand Bahama. Dorian was a very slow-moving storm travelling at a rate of 1.3 mph and at times stalled while moving along Grand Bahama.

Dorian was the most devastating natural disaster to hit the Bahamas. It has adversely impacted the second and third largest island economies of the Bahamas. Dorian caused widespread flooding on Grand Bahama, as the strong winds combined with a “king tide” resulted in waters from the Little Bahama Bank being pushed southward. Unprecedented flooding occurred from East Grand Bahama to Freeport and beyond. The storm surge was estimated to be 20 feet in places, the highest ever recorded on the island. This flooding also impacted the island’s water supply, particularly wellfield W-6 operated by the Grand Bahama Utility Company (GBUC). The flooding resulted in the loss of the city water supply for approximately two weeks and contamination of the wellfield with seawater. However, it does not appear there was flooding in the project area.

Hurricane Floyd passed Grand Bahama in August 1999 resulting in flooding of the north coast, including the Grand Bahama International Airport and the Queen’s Cove subdivision. Hurricane Frances passed and stalled directly over Grand Bahama Island on September 5, 2004. The storm had maximum sustained winds of 105 mph or 165 km/hr. Flooding mostly occurred on the northern shoreline but included West End, Hawksbill, Bahamia, the Lucayan Waterway, and other parts of Grand Bahama with a storm surge ranging between 5 to 12 feet above normal tide levels. Shortly following Frances, Hurricane Jeanne passed just north of Grand Bahama Island on September 25, 2004, accompanied by similar wind speed and storm surge as Frances. Jeanne was noted as significantly impacting the Eight Mile Rock community located just west of the harbour. The eastern portion of Grand Bahama Island was cut off to vehicular traffic by storm surge and flooding at the Fishing Hole Causeway crossing of Hawksbill Creek. Following Frances and Jeanne, Wilma was the next hurricane to impact Grand Bahama Island on October 25, 2005. Hurricane Wilma passed approximately 90 miles northwest of Freeport. Storm surge and rain caused significant flooding along the southwestern portion of the island particularly the coastal settlements along the south shore. In 2012, Hurricane Sandy passed over the eastern end of the Island causing considerable flooding in and around the project area as evidenced by the flooding again occurring across Fishing Hole Road and in and around the properties proposed for the Sea Air Business Center. There is a new bridge connecting Basin 3, but there are still flooding issues to the East of Hawksbill creek.

In the past, Hawksbill Creek has been the site of several flood events primarily resulting from hurricane-induced storm surges and high winds. Storm surge is associated with lowered barometric pressure of the hurricane, combined with the storms forward motion and wind field stress applied to the waters' surface. Depending on the location and direction of a tropical storm relative to open water and a landmass, a hurricane can cause a dramatic increase in sea level. This is primarily caused by the high winds forcing and trapping water against a landmass. This storm wind-driven tide combined with the overlying waves and wave run-up can cause significant flooding. Such circumstances have caused flooding along the north side of the Island during the hurricanes in 1999, 2004, 2012 and 2019 and the south side of the island in 2005.

7.10 AMBIENT NOISE LEVELS

The establishment of a new Facility will generate noise through machinery and increased traffic. The Facility is relatively small compared to its neighbors in the industrial park. CMG conducted a baseline noise study in February 2021. According to the study, "measurements were taken on the proposed site and two of the nearest local communities, namely Queen's Cove and Eight Mile Rock. Due to the 24hour operation of the industrial area, the sampling included a night-time reading. Although it is not planned for CMG to undertake construction during the night, it was prudent to ensure that baseline data is available to CMG.

The study took measurements during a 7-day period and the results indicate that the LAeq (equivalent continuous sound pressure level) does not exceed 65dBA (A-weighted decibels) within the industrial area. The noise levels are consistent with the movements of cranes and ships in the container terminal and Bahama Rock loading operations. The night-time noise confirms that there are lower levels measured in the residential areas however the levels recorded in the plot area (Locations 1-3) does not significantly drop due to the 24-hour operation of the container terminal and Bahama Rock. The LApeak is much below the general accepted limits of 110 dBA. The residential area is within the acceptable limits of 55 dBA, and the locations are the closest to the industrial area.

There are currently no regulations for noise limits issued by the Grand Bahama Port Authority nor Bahamian legislation. This report has benchmarked the results against European and World Bank limits. The baseline sound power levels measured at each of the locations are within the recommended limits for industrial and residential areas. The sound power level during construction and operation should be monitored to ensure that the noise levels do not exceed these limits. Monitoring is essential during these phases to allow CMG to take mitigation actions to reduce the noise should the allowable limits be exceeded.

Recommendations for noise limits and reduction methods, monitoring, and mitigation (including PPE where other measures are not appropriate or effective), training and reporting are provided below (see Table 6):

Table 6: Noise Control Levels (Source: WBG/IFC General EHS Guidelines)

Location	Noise level limits in Equivalent level (LAeq, 8h)	Mitigation / Control
At perimeter fence (outside)	45-50 dB(A) or ambient	Ambient readings indicated an average of 59.2 at the northern boundary. This is due to the existing industrial nature of the port area.
General indoor administrative areas	45-50 dB(A)	Interior noise survey to be completed once operations are ongoing. Mitigation measures will be retrofitted if needed (but unlikely).
Processing plant / During maintenance work, repairs or temporary construction	No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).	The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85 dB(A). All such areas shall have appropriate signage. Hearing conservation devices (ear plugs or ear muffs) shall be provided to all employees and visitors by CMG at no cost.

The closest sensitive receptors (in this case residential communities) to noise are the most likely to be impacted if noise levels are excessive to background and not properly mitigated. The nearest communities are, the Hepburn Town Community or the Harbour West Subdivision which are located roughly one and one-half miles from the site. No other potentially sensitive locations such as hospitals, day-care centers, nursing homes, funeral homes, libraries, schools, churches or other similar facilities were identified within one mile of the project site.

As part of the ESMP noise monitoring data will be collected before and during construction, and during start-up of the Facility to determine if there are any changes in sound levels. In absence of noise limits in the Health and Safety Act, the benchmark for acceptable noise levels is based on the WBG General EHS Guidelines on Noise Management (2007) (See above).

8.0 ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACT ASSESSMENT

8.1 INTRODUCTION TO IMPACT ASSESSMENT METHODOLOGY

This section of the report identifies the foreseeable potential environmental and socio-economic impacts of the Project. Impacts typically occur in three stages of the project life cycle. These are construction, operations and decommissioning. Since this project has an expected useful lifespan of 60 years for the buildings and 25 years for equipment, the decommissioning impacts will not be addressed in this document. In general, the construction phases has the potential for the highest level of biophysical impacts due to the associated land clearing and alterations to site hydrology, habitats and vegetation. As the project site has been almost entirely disturbed by previous human activities, these impacts are generally considered minor. Operational impacts, both in energy used, potential for environmental releases and in health and safety of workers and nearby occupants has a higher potential for adverse environmental and health and safety impacts. Socio-economic impacts are generally considered positive in the case of this project as the current land is vacant and no economic activity or income (including jobs and economic multiplier) is being generated. This section of the report will review the methodology utilized for impact assessment, the results of the review and potential mitigation actions to be considered to avoid, reduce and lessen the negative outcomes while emphasizing the potential positive outcomes. The guidance for risk and impact assessment is provided by the IFC Performance Standards, the IFC Guidance Notes (Corporation, Guidance Notes: Performance Standards on Environmental and Social Sustainability, 2012), Social Impact Assessment Guidance (al, 2015) and the World Bank ESIA standards. (World Bank Group, 2017).

An Environmental and Social Impact Assessment (ESIA) should be seen as a process that starts at the conceptual design stage of a project and continues throughout project construction, operation and decommissioning. During the process, several deliverables are prepared to guide the activities of the specific stage and these are often tailored to the needs and size of the project. The purpose of an ESIA is to identify the positive and negative impacts caused by project implementation. This is assessed through an analysis of the effects resulting from interaction between environmental and social components and the various activities of a project and its development, including temporary (for example, during construction) and operations. Decommissioning may be evaluated as well but in the case of this project it is not included. No specialist studies have been completed as part of this ESIA. Two environmental management plans are in development. These will include a construction-phase Environmental and Social Management Plan (ESMP, Part 1) and an operational-phase EESMP (Part 2).

8.1.1 Impact Identification and Assessment Methodology

This report has developed an impact identification and assessment methodology based on a risk-based analysis using expert environmental professional opinion. Appendix 5 identifies the principal environmental consultants involved in this assessment and provides their relevant experience. The assessment included extensive review of the owner proposed improvements and field investigations of the subject property and surrounding region. The assessment was initiated by Envirologic International in the spring and summer of 2020 with additional document review and report development in the fall of 2020 and early winter of 2021. Late spring of 2021, an additional consultant (Dr. Robert Jones) was brought on to assist with the revisions to the initially developed EIA, with additional document review being completed during the late spring and summer of 2021. As the project is still in the design/development stage, additional information is being developed with an increasing level of refinement. The principal reviewer for Envirologic (Lloyd S. Cheong) and Dr Jones are satisfied that the level of information available is sufficient to render a professional opinion as to the existing site conditions, the anticipated negative and positive environmental and social impacts and the potential mitigation options to be deployed. As additional detailed design is completed, the ESMPs (Parts 1 and

2) may be updated to reflect any needed revisions. If future development plans are significantly different than those evaluated as part of this ESIA, then a revision may be prompted by the GBPA and/or the project funders.

The potentially significant impacts of the project activities during construction and operation have been assessed utilizing Good International Industry Practice (GIIP) for environmental and social impact assessment. An impact is defined as a change to baseline conditions caused by project activities. This chapter discusses impacts to the existing baseline conditions caused by project activities. For the purpose of this ESIA, impacts were analyzed using two inter-related impact matrices. One matrix was used to identify anticipated impacts. The other was used to classify impacts with and without mitigation measures based on relative significance.

The assessment results identify insignificant impacts and impacts of significance that will be used to guide the development of mitigation measures that are of the appropriate nature and scale, and that are commensurate with the perceived significance of the impact. The significance of an impact is determined by:

- Consequence of the activity in terms of the degree of impact (ranging from Insignificant to Severe),
- Likelihood of occurrence of the activity identified as Probability; and,
- Calculating the product of these two parameters (see Table 7).

The Impact rating ranges from Insignificant to Severe with the following definitions applied:

- Insignificant: No lasting social or environmental effect and/or low-level impacts on physical or biological environment of low significance (not a unique habitat or locally significant). Compliance with environmental regulations and/or company policy at all times with impacts that are correctable in the near-term. In the case of Insignificant positive impacts, these will result in no measurable change in existing socio-economic conditions at the local level.
- Minor: Minor social or environmental effects. Minor short-medium term damage to small area of limited significance with full recovery in less than one year without intervention or rehabilitation required. Potential non-compliance with environmental regulations and/or corporate policies result in no or little financial impact to the company with corrective actions available with local resources. In the case of Minor positive socio-economic impacts, these will result in a measurable change to the local socio-economic metrics over the short-term and/or the measurable change does not alter local economic/social patterns of employment, consumption or health indices.
- Significant: Moderate social or environmental effects but not affecting overall system function. Moderate short-medium term widespread impacts but with potential for full recovery and limited or no intervention/rehabilitation required. Potential for short to medium term noncompliance with environmental regulations and/or company policy and short-term (one year or less) corporate financial losses as a result of environmental/social liabilities. In the case of Significant positive socio-economic impacts, these will result in a measurable change to the local/regional socio-economic metrics over the longt-term and/or the measurable change alters local economic/social patterns of employment, consumption or health indices.
- Major: Serious social or environmental effects with some impairment of system function (e.g. displacement of human or animal species). Relative widespread medium–long term impacts and substantial intervention/rehabilitation required. Potential for continuous non-compliance with environmental regulations and/or company policy as well as financial

liabilities due to impacts and remediation costs. Financial losses occur over a period of greater than one year but less than five years. In the case of Major positive socio-economic impacts, these will result in a measurable change to the regional socio-economic metrics over the long-term and/or the measurable change has the capacity to alter regional economic/social patterns of employment, consumption or health outcomes.

- Severe: Very serious effects with impairment of physio-chemical, biological or socio-economic function. Long-term, widespread effects on significant environmental resources such as a unique habitat or national park requiring extensive intervention and/or rehabilitation. Potential for very high financial liability and corporate losses due to environmental and social impacts and remediation costs (up to the point of potential corporate financial default and/or losses for greater than five years). In the case of Severe positive socio-economic impacts, these will result in a highly measurable change to the regional or even national socio-economic metrics over a long period of time (decades) and/or the measurable change has the capacity to result in major improvements to regional and/or national patterns of economic/social conditions and health outcomes.

The probability of an impact occurring is based on expert knowledge of the industry-specific activities, level of planning/engineering, experience and qualifications of the planned operators and potential safeguards and procedures aimed at reducing the likelihood of the occurrence. The assessment of the consequences and likelihood of impacts resulting from planned activities are discussed below. Changes in the planned activities for the proposed Project may affect both the impact assessment and also the planned mitigation activities. Material changes to the plans may require a re-assessment of these impacts if warranted. The Impact Identification Matrix is developed as follows:

- Project stages and individual project activities were arranged along the matrix's horizontal axis.
- Baseline categories and individual baseline conditions were arranged along the matrix's vertical axis.
- Cell interactions between project activities and baseline characteristics were assessed where an impact is anticipated to occur. Each potential impact is described and assessed below both with, and without mitigation measures deployed.

Table 7: Probability and Impact Matrix to determine Potential Impact Significance

		Impact Assessment				
		Insignificant (1)	Minor (2)	Significant (3)	Major (4)	Severe (5)
Probability	Almost Certain (5)	Medium (5)	High (10)	Very High (15)	Extreme (20)	Extreme (20)
	Likely (4)	Low (4)	Medium (8)	High (12)	Very High (16)	Extreme (20)
	Possible (3)	Low (3)	Medium (6)	Medium (9)	High (12)	Very High (15)
	Unlikely (2)	Very Low (2)	Low (4)	Medium (6)	Medium (8)	High (10)
	Rare (1)	Very Low (1)	Very Low (2)	Low (3)	Low (4)	Medium (5)

The significance of an impact are rated as *Very Low* to *Extreme* per the numerical score (product of the Probability multiplied by the Impact). This numeric score is used to provide a relative ranking of the potential for negative and positive changes to environmental and social conditions resulting from the project execution as follows:

- Very Low = 1-2
- Low = 3-4
- Medium = 5-8
- High = 9-14
- Very High = 15-19
- Extreme = 20-25

Very Low and Low significance impacts are typically acceptable as the impacts are either temporary or can be easily managed with mitigation. Medium impacts may be acceptable if they are temporary and mitigation can manage the consequences and/or if rehabilitation can reverse the impacts. High significance impacts may be acceptable if the positive benefits are sufficiently high enough to warrant the loss of system function or if rehabilitation can restore functionality at a later date. Very High and Extreme significance impacts, unless successfully managed through comprehensive mitigation are typically not acceptable. Projects with Very High and Extreme significance impacts may be modified, redesigned, or reduced in scope to a more acceptable level or even canceled depending upon the specific regulatory requirements of the jurisdiction and/or the funders.

8.2 ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS

8.2.1 Construction Phase

Impacts from construction are assessed in terms of their destruction to existing vegetative communities, soil, surface runoff conditions, adjacent properties, nearby communities, and for potential human-health impacts from the construction activities. Construction data was obtained from the civil engineering plans and data provided by CMG. The list of potential construction phase environmental and social aspects identified in this ESIA findings include:

- Site Clearing and Grading creating sediment laden runoff water discharge
- Construction Air Emissions/Air Quality, including dust (excluding greenhouse gas emissions [GhG] that are covered in the operations phase)
- Noise
- Construction Traffic
- Worker (Occupational) Safety
- Solid waste management
- Visual impacts
- Increased construction phase job creation and economic investment (positive impact)

<u>Potential Site Clearing and Grading Impacts from Sediment-laden Water</u>

The site preparation will consist of grading and building construction per the approved construction drawings (in development). Preparation will also include removal of existing abandoned equipment (conveyors and tanks). The site is generally devoid of vegetation (with the exception of a minor herbaceous layer in areas not actively used) and the topography is generally flat with some minor areas of soil stockpiles. The work will not disturb any sensitive habitats, mature vegetation, streams, wetlands, or marine environments. Grading operations do retain the potential for short-term environmental impacts from wind and rain generated soil erosion and sediment-laden runoff. This is typically managed by on-site best management practices (BMPs) for sediment and erosion control and includes silt fences, sediment ponds and vegetation stabilization of disturbed areas (temporary seeding). In addition, the construction drawing package will include a stormwater prevention and pollution plan (SWPPP) that controls the potential for unanticipated releases and disturbances including dust prevention and control. This includes proper identification and bunding of fuel containers for construction vehicles, dedicated refueling areas, designated laydown yards, etc. As the site is not exceptionally large (approximately four acres), and no significant amounts of cut and fill or steep slopes are involved, the amount of land disturbance will not be significant. The site should be a balanced grading operation with no major import or export of fill materials thus minimizing road transport.

The construction phase of the Project also includes the extension and connection of off-site utilities to the project site. These are primarily located to the east and north of the project site. Underground utilities including potable water, and electric will be connected to existing lines located to the east. The extension of these utilities will not cross any existing streams, wetlands or other bodies of water. They will not require the clearing of existing overstory vegetation. Buried utilities will be backfilled and the surface restored to their original condition (soil, paving, etc.). It is recommended that buried lines be well marked on the surface and subsurface metallic (aluminum-mylar foil) and all trench safety rules be enforced (see Construction Management Plan section of ESMP).

The civil works engineering design package will include the appropriate sediment control and stormwater provisions as required to mitigate the potential impacts. Best Management Practices (BMPs) may include a variety of soil stabilization measures such as drainage channels, stabilized construction entrances, vegetated swales, sediment basins, outlet controls, etc. The specific BMPs will be designed per the drainage area inclusive of slopes, soil types, and precipitation events (typically a two-year storm event is used for sizing of sediment control facilities). The BMPs will be identified on the Sediment Control Plan section of the civil works package and include the required design considerations, details, cross-sections, material specifications, maintenance and removal requirements (examples of these are provided in the ESMP Part 1 Construction Phase). Once the project transitions from construction to operations, these facilities will be removed and/or converted to permanent stormwater management features as part of the Stormwater Prevention and Pollution Plan (SWPP) described in Part 2 of the ESMP.

<u>Potential Noise Impacts</u>

Impacts can be anticipated from the operation of construction equipment. These impacts include noise (including back-up alarms), engine noise, and pile-driving for pier foundations (if utilized). CMG has committed to utilizing well-maintained and noise compliant construction equipment. The noise during construction and operation is not expected to exceed 70dBA. Monitoring during these phases will allow CMG to take mitigation actions to reduce the noise down to these limits. Noise levels measured are affected more due to local traffic than background noise from the industrial area which account for the peaks in the measurement. The study has taken measurements during a 4-day period and the results that the LAeq does not exceed 65 dBA. The noise levels are consistent with the movements of ships in the container terminal and Bahama Rock loading operations.

The ESMP (Part 1) will provide the requirements for independent inspections required, including noise readings, to demonstrate compliance to these appropriate standards. The following mitigation measures will be used to manage and reduce noise impacts during construction:

- Implement noise control measures at the source by ensuring all mufflers and spark arrestors are in place and functioning;

- Limit heavy equipment use to daytime hours only (0600 to 2100);
- Post signage warning of dangerous noise levels if levels above 70 dB are expected;
- Use noise attenuator shields if needed,
- Make sure all employees, workers and visitors have hearing protection devices available and that they are utilized per the occupational health standards; and
- Use noise attenuation booths for pipe cutting when possible.

Potential Air Emissions Impacts

The CMG PRF will generate air emissions during construction. Construction equipment emits exhaust emissions and generates dust from vehicle movements. The construction period is estimated to be twelve months. Diesel-powered construction equipment is the primary source of Greenhouse Gas (GHG) and exhaust emissions during the construction stage of a large infrastructure project. The equipment emits pollutants such as nitrogen oxides, carbon monoxide, and particulate matter (PM 2.5 and PM 10) endanger people's health and the surrounding environment (Fan, 2017). One major factor in construction equipment emissions is the type and condition of the equipment utilized, including the fuel quality. The use of low sulfur fuel and/or bio-diesel fuels can reduce emissions significantly (Fan, 2017) as well as newer engines that are more fuel efficient and meet current regulatory guidelines (such as the US EPA Tier IV and EU Stage V limits) for emissions. The Tier IV standards impose varying limits on PM, NOx, NMHC, and CO dependent upon the engine power rating.

In an effort to mitigate potential impacts during construction CMG will limit exhaust emissions by deploying the following procedures:

- All construction equipment will meet US EPA Tier IV standards (or equivalent) for non-road diesel engines and sulphur reductions in non-road diesel fuel for PM, NOx, NMHC, and CO as applicable for the engine rating.
- Only low sulphur fuels will be consumed for operated equipment.
- The GC will provide a construction plan that optimizes circulation on the site and minimize idling time for heavy equipment and vehicles.

The Tier IV standards impose varying limits on PM, NOx, NMHC, and CO dependent upon the engine power rating. CMG has committed to utilizing, to the extent practicable, newer construction equipment manufactured after 2008 and preferably after 2014 in order to meet the current exhaust emissions standards. While there are no regulatory requirements in The Bahamas for construction equipment emissions monitoring, CMG are committed to reducing this impact by incorporating the recommendations of the US EPA and IFC standards.

During construction, there is the potential for dust generation from the movement of vehicles on the dirt track road and site. The FHC has requested dust management be addressed a part of the ESMP. During construction, dust will be suppressed either through the use of a sprinkler system or water truck. Dust will be visually assessed daily and wetting will be adjusted as needed to maintain no visible dust plumes at the site perimeter. It is noted that the existing soil and underlying rock are of limestone origin and thus have a considerably lower risk for respirable silica dust generation. No quartz seams are known to exist in the underlying geology. It is further considered in this impact assessment that no existing concrete is slated for demolition and no rock blasting is proposed.

During construction, dust will be suppressed either through the use of a sprinkler system or water truck. Dust will be visually assessed daily and wetting will be adjusted as needed to maintain no visible dust plumes at the site perimeter.

Monitoring to the PM2.5 and PM10 dust concentrations will be completed on a routine basis to confirm compliance.

Specific mitigation measures include:

- Use a spray truck, buffalo or sprinklers to keep dust levels to a minimum with no visible dust plumes leaving the site as the minimum standard.
- Cover stockpiles with tarps.
- Do not allow transports hauling dirt to leave the site uncovered.
- Vegetate disturbed areas as soon as possible.
- Maintain a speed limit for vehicles traveling on unpaved surfaces.

Construction Traffic

Construction equipment and vehicles entering and leaving the site, along with internal traffic of heavy equipment can generate traffic conflicts, dust and exhaust emissions (addressed in the section on air emissions). In addition, according to industry publications the majority of construction transport accidents result from the inadequate separation of pedestrians and vehicles. This can usually be avoided by careful planning, particularly at the design stage, and by controlling vehicle operations during construction work.

Impacts as a result of construction traffic are somewhat mitigated by the location and isolation of the PRF site. It is located within the Port area, off of Freeport Container Road which is dedicated for port related traffic. In order to mitigate construction traffic impacts, the following actions will be implemented at the PRF during construction:

- Require contractors to minimize vehicle trips by using a central location and vehicle (van or equivalent) for workers to be transported to and from job site.
- Require proof of roadworthiness, insurance and licenses for all commercial vehicles used by contractors.
- Enforce safe operating speeds, use of back-up alarms, courteous driving behaviour, and random drug screening.
- Require immediate drug testing for any vehicular incident.
- Entrances and exits - provide separate entry and exit gateways for pedestrians and vehicles;
- Walkways - provide firm, level, well-drained pedestrian walkways that take a direct route where possible;
- Crossings - where walkways cross roadways, provide a clearly signed and lit crossing point where drivers and pedestrians can see each other clearly;
- All workers will be required to wear high visibility work vests or shirts;
- Visibility - make sure drivers driving out onto public roads can see both ways along the footway before they move on to it; and
- Obstructions – do not block walkways so that pedestrians have to step onto the vehicle route.

Good planning can help to minimise vehicle movement around a site. For example, landscaping to reduce the quantities of fill or spoil movement. For the PRF, if excess soil is located on site, CMG will consider during the design phase to retain the material onsite and use it for landscape berms if they can be properly sloped and vegetated. To limit the number of vehicles on site:

- provide car and van parking for the workforce and visitors away from the work area;
- control entry to the work area; and
- plan storage areas so that delivery vehicles do not have to cross the site.

CMG will take steps to make sure that all workers are fit and competent to operate the vehicles, machines and attachments they use on site by, for example:

- checks when recruiting drivers/operators or hiring contractors;
- training drivers and operators; and
- managing the activities of visiting drivers.

People who direct vehicle movements (signallers) must be trained and authorised to do so. Accidents can also occur when untrained or inexperienced workers drive construction vehicles without authority. Access to vehicles should be managed and people alerted to the risk.

Vehicle travel paths visibility and turning will include the following considerations and components:

- The need for vehicles to reverse should be avoided where possible as reversing is a major cause of fatal accidents;
- Site and area speed limits will strictly be enforced;
- A stablised construction entrance will minimise tracking dirt onto public roadways;
- Street sweeping will be completed as needed;
- One-way systems can reduce the risk, especially in storage areas; and
- A turning circle could be installed so that vehicles can turn without reversing.

The GC will be required to provide a traffic circulation and travel path diagram indicating how construction vehicles will enter, exit and operate onsite using the considerations in this ESMP. All workers will be required to wear reflective vests while onsite to aid in visibility. Visibility will be assessed for all vehicle paths and obstructions will be removed or mitigated. Traffic signs, including stops signs at intersections, cross-walks and other potential conflict points will be added. Traffic calming devices are not generally required but will be installed if necessary. Site speed limits will be strictly enforced.

Construction is not anticipated to be conducted after dark so traffic lighting requirements have not been established. During the 24-hr per day operations phase, exterior lighting will illuminate the common travel paths (see ESMP Part 2).

Potential Solid Waste Impacts

Solid waste impacts during construction will be managed through the municipal service provided by Sanitation Services Ltd. for garbage collection and disposal at the Pine Ridge Landfill. During construction, scrap materials such as wood, cardboard, plastics, and other solid waste will be recycled to the extent practicable or disposed of at the Pine Ridge Landfill. Once the Facility has been commissioned all solid waste will be disposed of using the collection and disposal services of Sanitation Services Ltd. CMG will ascertain that the recycling and disposal sites are licensed and operated to acceptable standards. Sites found to not meet the minimum standards for compliance will not be utilized. Portable ablution facilities will be required during construction.

Only a small amount of material is onsite that will require demolition (small metal tanks and a belt conveyor). The metal will be cut and scrapped to a metal salvage company. The old belt conveyor will likely go to the landfill. Packaging and other waste materials generated during construction will be staged in a central location. Liquid containers will be emptied prior to disposal. Bins/skips (with lids) will be placed on site to collect all refuse. No refuse will be permitted to lie unmanaged onsite. The property will be policed daily to ensure compliance. Portable ablution facilities will be provided by a licensed firm and maintained on a weekly basis (or more frequently if needed).

Potential Occupational Safety Impacts

Environmental health and safety impacts for the construction of the Facility exist as well. These include traditional employee construction safety risks, noise, vibration and traffic (in particular construction vehicular conflicts). Construction safety in the Bahamas is governed by the Health and Safety at Work Act (2002) which closely follows the UK EHS safety requirements. CMG will be responsible for ensuring compliance with all construction safety requirements. Periodic inspections by competent supervisors will be required and the specifications for inspections and safety will be incorporated into the ESMP under Construction Management. The site poses no individual risk that are higher or lower than what would be expected at any construction project. Building heights will require worker protection (working at height protocols), and the off-loading of equipment will require the use of cranes and crane safety protocols (see ESMP). An off-loading plan will be required for review prior to crane operations. Weather can sometimes play a role in construction activities (heat stress, lightning, high winds, etc.). These risks, while not unique to the project site, will be addressed in the Construction Management Plan section of the ESMP. Any on-site construction incident may be significant, or even major (in the case of a worker injury), but these are inherent in the industry and minimized by proper training and adherence to regulations and requirements. These industry-wide factors are not included in the analysis below.

The US OSHA identifies the "fatal four" leading causes of fatalities in the workplace and the top recordable injuries (lost-time) and safety violation notices for the industry. The "fatal four" are:

- Falls - A fall can be anything on your job that could cause you to lose your balance, resulting in a fall. Any working or walking surface is a potential fall risk. When working at heights of just four feet and above, you are at risk of a fall injury. In construction, The U.S. Occupational Safety and Health Administration (OSHA) requires employers to provide workers with fall protection at six feet.
- Struck-by - A struck-by hazard is when an object's impact causes harm. Any impact between a person and an object is considered a struck-by hazard or incident. It's common for struck-by hazards to be confused with caught-in-between hazards. For example, when an injury happens because someone is crushed between objects, that is a considered a caught in-between hazard, not a struck-by. An example of a struck-by accident is a tool falling from from an elevated work platform such as a scaffold that strikes a worker below causing harm.
- Electrocution - Electrocution, in this context, results when a worker is exposed to a lethal amount of electrical energy. An electrical hazard on a job site can cause burns, electric shock, arc flash or blast, fire, or even explosions.
- Caught-in-between: According to US OSHA, caught-in or – between hazards are injuries resulting from a person being squeezed, caught, crushed, pinched, or compressed between two or more objects or between parts of an object. A common example of this on construction sites is a collapse of a utility trench while a worker is laying pipe that crushes or asphyxiates the individual. When you get caught or crushed in operating machinery, between other objects, within a moving and stationary object, or between two or more moving objects, this is considered a caught-on or -between hazard.

A full industrial hygiene assessment of construction related risks is beyond the scope of this ESIA. The General Contractor (GC) for the project is responsible for identifying and mitigating all known and suspected occupational risks and a dedicated construction safety professional will be utilized for this task. Potential and common mitigation measures are provided in the ESMP for awareness and are not a comprehensive listing of all potential risks and control measures.

Potential Visual Impacts

Regional impacts to other adjacent land use from construction activities will be minimal. There are no residences nearby and the adjacent land uses are heavy industrial (Port related). These short duration impacts are not assessed in Table 8 but are addressed in the operations phase as these impacts will be more long-term.

Potential Positive Impacts from Construction Employment and Capital Investment

A potential positive socio-economic impact is the result of the capital investment into the local economy and job creation for construction workers and local suppliers. The socio-economic impact from capital investment is important but also minimized by the fact that the process equipment will be purchased and assembled overseas thus minimizing the direct impact that could be gained by local purchase. However, it is unlikely that local suppliers have the capabilities to produce this very specialized equipment and thus this is likely an unavoidable outcome. This impact is also further reduced by the current tax incentives offered by The Bahamas and the Hawksbill Agreement. However, job creation and local procurement are positive socio-economic impacts even if short-lived. The overall positive impact rating is considered High.

Table 8: Construction Phase Environmental Impacts

Construction Phase Environmental Impact Assessment					
Potential Impact	**Mitigation Assumption**	**Probability Score**	**Impact Score**	**Impact Significance Score**	**Justification**
Sediment-laden runoff during construction can lead to water quality impacts.	Without Mitigation	Likely (4)	Minor (2)	8 (Medium)	Frequent rainfall events and exposed soil will cause sediment-laden water to run off of the property and into the adjacent basin. Environmental impacts are Medium due to the violations of GBPA requirements.
	With Mitigation	Unlikely (2)	Minor (2)	4 (Low)	Mitigation requirements are provided in the ESMP Part 1. No adjacent downslope sensitive habitats (wetlands, streams, shallow water, etc.), were identified.
Air emissions from construction equipment exhaust and dust generation lead to reduced air quality at the site potentially impacting adjacent properties, and worker health.	Without Mitigation	Likely (4)	Minor (2)	8 (Medium)	If older equipment is used that is not capable of burning low-sulfur fuel, then exhaust emissions will likely be above US EPA and/or EU guidance creating a potential health hazard for operators. Without mitigation dust will be generated that can lead to poor air quality, clogged fresh air intakes at nearby downwind buildings and violations of GBPA requirements.

	With Mitigation	Unlikely (2)	Minor (2)	4 (Low)	Mitigation requirements are provided in the ESMP Part 1. All construction equipment should meet US EPA Tier IV standards (or equivalent) for non-road diesel engines and sulphur reductions in non-road diesel fuel for PM, NOx, NMHC, and CO as applicable for the engine rating. Use a spray truck, buffalo or sprinklers to keep dust levels to a minimum with no visible dust plumes leaving the site as the minimum standard. Cover stockpiles with tarps. Do not allow transports hauling dirt to leave the site uncovered.
Noise impacts to workers and adjacent communities will occur as a result of construction equipment operations at the site.	Without Mitigation	Likely (4)	Minor (2)	8 (Medium)	Workers could be exposed to excessive noise levels from equipment engines and exhaust as well as powered tools that could cause hearing damage. Nearby occupants could be exposed to levels of noise that are annoying (but not dangerous).
	With Mitigation	Unlikely (2)	Minor (2)	4 (Low)	Mitigation requirements are provided in the ESMP Part 1. Noise reduction measures and standards are included in the ESMP that will be protective of

					workers and nearby occupants.
Construction traffic will increase potentially causing conflicts with other local traffic and/or pedestrians.	With or Without Mitigation	Unlikely (2)	Minor (2)	4 (Low)	Mitigation requirements are provided in the ESMP Part 1. The site is located in an industrial zone and adjacent to high traffic volume operations. The road access is dedicated for this purpose. Beyond the industrial zone the area is not subject to high traffic volumes. Mitigation will be required as-needed and per acceptable industry practice to reduce risk.
Occupational (Construction Worker) Safety impacts to health and safety are a risk due to the nature of construction work.	Without Mitigation	Likely (4)	Major (4)	16 (Very High)	Construction workers are more likely to be harmed, injured, or even killed if proper occupational safety protocols are not followed. Construction work is inherently dangerous and it is the Project proponents responsibility to ensure that the General Contractor and all subcontractors are following industry standard safety protocols including those called out by the ESMP and site-specific Safety Officer.
	With Mitigation	Possible (3)	Significant (3)	9 (High)	Construction work has inherent risks but these are greatly reduced by using rigorous safety protocols with monitoring and full compliance. The ESMP Part 1 provides a partial list of

					safety protocols to be actioned in addition to strict adherence to all industry and regulatory standards. Documentation of strict compliance provides legal and reputational protection for the Project proponents even if an incident occurs.
Improper solid waste management practices during construction can impact the local environment and have reputational/regulatory impacts to the Project proponents.	Without Mitigation	Likely (4)	Minor (2)	8 (Medium)	Poor housekeeping practices, improper spill protection and other poor construction practices increase the risk of an incident that can cause local environmental impacts that require a response causing a reputational and/or financial impact to the Project proponents.
	With Mitigation	Possible (3)	Insignificant (1)	3 (Low)	Proper mitigation and oversight (see ESMP Part 1) will reduce the opportunity and impact of any incidents. Documentation of compliance is important to maintain reputational and legal integrity.
Job creation through the hiring of construction workers and the sourcing of local materials and suppliers.	With or Without Mitigation	Likely (4)	Significant (3)	12 (High – Positive)	Assuming the project is executed, and the "no-build" option is not selected, this project will have a positive socio-economic impact in the local economy. Mitigation can potentially enhance these impacts and the recommendations in the ESMP Part 1 should be actioned.

Summary of Construction Phase Impacts

Civil site works typically create opportunities for sediment laden runoff to enter adjacent waterways, therefore, best management practices for sediment and erosion control should be implemented into the construction plan. The local civil/site designer of record (DoR) should design the appropriate features into the project plan based on the appropriate and applicable design methods and local site conditions including slope, soil conditions, land cover, precipitation, and options for sediment controls based on site constraints. A construction management plan will provide details on the amount of cut and fill required for the site (anticipated to be minimal based on current topography), the laydown areas for staging and equipment storage, the dust suppression system to be used, site specific health and safety plan and demobilization.

A second opportunity for impacts is related to emissions and noise from construction equipment being operated on site. Using newer equipment that meets current emissions requirements from exhausts is recommended whenever practicable. Also, inspecting equipment is important, in particular to ensure that it is in compliance with all appropriate safety regulations (such as back-up alarms). Having a robust and site-specific construction phase health and safety plan (HASP) is also an important component of ensuring safety (this is also a requirement of the ESMP).

The most appropriate recommendation for any project that proceeds through implementation is that the appropriate recommendations (and legal requirements at a minimum) be adhered to. This can be done by inspections by local competent authorities however, these individuals are often constrained by resources and reliance upon their ability to ensure compliance is not always appropriate. This report recommends a third-party inspector be resourced and periodic, and unannounced inspections occur to confirm adherence to the appropriate standards. These inspections should be part of the construction and commissioning phase. Following start-up, future inspections may be completed by the relevant representatives from the standards Organisations that are applicable (for example, ISO 14001, etc.).

Proper and continuous communication is a key component of successful stakeholder engagement. The Steering Committee developed by CMG should continue to communicate project updates, upcoming events that may impact the local community, and good relations with neighbors and adjacent property tenants. A clear and transparent hiring process for workers, opportunities for internal promotions and recognition (especially for achieving safe work goals), and other incentives should be offered. The use of local contractors, suppliers and workers is recommended to provide the optimum economic benefits to the local community.

8.2.2 Operations Phase

The environmental impacts associated with the operations phase are more significant due to the industrial nature of the proposed use and the life cycle of the Facility being decades in length. The potential impacts are described and assessed individually below.

Impacts to Groundwater from the disposal of plant wastewater

Due to the Freeport Harbour Rules, discharges are not generally permitted into Freeport Harbour. Therefore, the treated wastewater will be discharged to a deep well proposed for the site (described below). Treated wastewater from plant processing of slops/bilge water will be treated to a maximum of 10 ppm of oil, before being discharged to the deep well. Levels of total petroleum hydrocarbons will be continuously measured by an in-line monitor. Monthly testing of the discharge will be completed per the methods described in Table 9 below and sent to the local onsite laboratory. This includes the monthly testing of the continuous monitoring system. Recalibration tests will be run every six months with duplicate samples. Additionally, samples will be sent to an independent laboratory for comparison testing every month for the first six months for correlation. Should the instrument results correlate to the laboratory results, the monthly testing could be reduced in frequency to once per year. CMG proposes 10 ppm of total petroleum hydrocarbon (TPH) in water as a discharge limit consistent with the marine discharge limit in addition to the other constituents identified in Table 9. This limit is consistent with the demonstrated removal efficiencies of the proposed treatment process. Testing protocols will be described more fully in the ESMP.

The discharge to the deep well will be monitored and controlled through indirect online measurement of oil and grease. If the measurement is above 10 ppm, the discharge valve to the well will close automatically and the water will be directed back to the wastewater treatment plant. Table 9 identifies the other constituents (excluding those continuously monitored), to be tested on a weekly basis and analyzed in the onsite laboratory and the proposed discharge limits. Methods provided will be utilized (or equivalent). Full compliance sampling protocols will be provided in the ESMP (Part 2).

The onsite monitoring well (drilled into the upper aquifer) will be tested on a bi-annual basis for the same parameters as listed in Table 9. Total petroleum hydrocarbons as diesel range organics (DRO) will be tested in place of Oil and Grease. PCB and metals analysis may be discontinued after one full year of operations (minimum three sampling events) with below detection limit results.

Table 9: Proposed monthly discharge monitoring and limits for deep well injection

Constituent	Sample / Laboratory Method	Proposed Discharge Limits (Max Daily)
Oil & Grease	Grab sample from discharge line / APHA 5520 B or equivalent – in addition to continuous monitoring	10 ppm (per IFC)
pH	Calibrated field probe	6.0-9.0 range (per (IFC)
Total Suspended Solids (TSS)	Grab sample from discharge line / Standard Method 2540D or equivalent	50 ppm (per IFC) †
Polychlorinated biphenyls (PCBs)	Grab sample from discharge line / Screening level EPA method 505 or equivalent or USEPA Method 508A, or USEPA Method 8082 or other as GCMS as appropriate.	0.0005 ppm*
Metals (US RCRA 8) or equivalent plus aluminum and copper	Grab sample / TCLP or equivalent	Mercury 0.0031 ppm** Aluminum – 0.2 ppm*** Copper – 0.84 ppm**

Note: **These discharge limits are per the ECFR.gov USEPA Title 40 Part 442 – Transportation Equipment Cleaning Point Source Category per the best practicable control technology available (BPT), Section §442.31 unless otherwise noted.

Note: *** limit is based on US Safe Drinking Water Act (SDWA) limit.

†Note the US EPA National Pollutant Discharge Elimination System (NPDES) program uses a daily limit of 58 and monthly average of 26 for TSS. Bahamas Building Code sets the limit at 30 ppm for public treatment works.

The testing protocol may be adjusted after 6 months of continuous results if levels are consistent (no deviation by more than 10%) and throughput has normalized. A minimum of yearly sampling will be conducted to demonstrate compliance. Total petroleum hydrocarbons (TPH) may also be considered as an analyte as it includes oils and other chemicals commonly found in oil production industries, and where gasoline is not a potential concern, the most appropriate analysis is for diesel range organics (DRO). The total suspended solids limit of 30 ppm is consistent with the Bahamas Building Code (2003) for sewage treatment plants and is below general water quality aquatic discharge limits of 50 ppm. PCBs are often found as a component of cooling fluids and while not suspected as a contaminant of concern it is recommended that a baseline be established to demonstrate compliance. Dissolved metals may be found in the oil/water mixture due to corrosion of systems and piping in ships and in oily bilge water. If levels are consistently below discharge limits then a reduction in monitoring to a yearly basis may be appropriate. CMG will constantly ensure their best efforts to improve the quality of water effluent to achieve the highest quality of effluent in the permanent design.

The groundwater at the site, due to its geographic location, is likely brackish water at or near the surface with increasing salinity with depth. This will be confirmed by observation well drilling before any site construction commences. The effluent from the deep well will be injected into the saltwater lens where it will be diluted and moved by underground water flow. Upper groundwater flow is expected to be in a general southerly to southeasterly direction per surface topography. No direct data on deep groundwater flow direction was obtained. CMG proposes to drill a disposal well to a depth of 600 ft with six-inch scheduled 40 PVC injection casing installed and sealed with grout to 400 ft. There will also be surface casing installed to a depth of approximately 100 ft, sealed with grout. The groundwater water is either brackish or seawater at this depth. Disposal wells for Grand Bahama Shipyard and Polymers International are similar in depth. The plant will have monitoring of the effluent, and any treated water that is out of specification will be retreated until specifications are met before discharging to the deep well. The well will be designed in accordance with Water and Sewerage Corporation specification and will be permitted through the GBPA, with Technical and Functional Specification submitted with the well permit application. CMG will also install a shallow groundwater monitoring well to the necessary depth to monitor water quality of the upper freshwater aquifer.

The levels established for discharge (Table 9) into the deep well are considered protective of human health and aquatic species. Additionally, the discharge will occur at a depth of 600 feet below surface or approximately 590 feet below sea level. The discharge will occur in a limestone layer aquifer well below the sea floor and hundreds of feet below the drinking water lens. No receptors are located at this depth. The calculated discharge rate for the deep well 5 m^3 per day. Preliminary geophysical data indicates no concerns with this rate of discharge. Well fracturing will not be required. Groundwater mounding is not a concern due to the confining rock layers above. Dilution of the plume will continue to dissipate the discharges with mixing of saltwater to non-detectable levels most likely within a few hundred feet of the well site. Treated water discharge will not create any thermal impacts as the temperature is expected to be at ambient levels prior to deep well injection. Deep well injection of liquid wastes is considered environmentally safe and practiced in many countries (include The Bahamas and the United States). This impact, assuming discharge limits are maintained is considered Medium. One potential alternative for this impact is the use of the local, municipal wastewater treatment plant. Given the discharge limits proposed and the available capacity of the local treatment works, the treated wastewater could be discharged to the local public treatment works.

Table 10: Groundwater discharge impact assessment

Operations phase - Groundwater discharge into the deep injection well could impact receptors				
Mitigation Assumptions	**Probability Score**	**Impact Score**	**Impact Significance**	**Justification**
Mitigation is the default assumption for this impact as the Project purpose is to reclaim and treat oil from the fouled bilge and wash slops along with treating contaminated water to a level that is protective of the environment per the standards identified in Table 9. This mitigation is inherent in the project scope.	Unlikely (2) The occurrence of a discharge above the limits identified is possible.	Significant (3)	Medium (6)	Impacts above the limits established will result in reputational loss for non-compliance and potential regulatory restrictions on operations until corrective action is taken. No specific environmental impacts are likely unless the excursion is prolonged or severe.

Impacts to surface waters from discharges and runoff due to Operations

Surface runoff from precipitation, washdown of equipment and surfaces and other sources (pump seal water, cooling water, etc.,) will occur at the site. Surface runoff from industrial sites is typically contaminated by low levels of chemical residues including oil, grease, coolants, grit, phosphorus, nitrogen, and potentially heavy metals (in solid or leached phases). Runoff is often warm by contact with impervious surfaces in the daytime. The uncontrolled discharge of these pollutants is deleterious to the environment, in particular, aquatic systems. Thermal loading and nutrients can increase eutrophication of receiving waters, and sediments and heavy metals, along with chemical residues such as oil and grease can create toxic buildup in soil and sediments (Agency, 2003). In order to avoid these types of impacts, and as part of the CMG commitment to sustainable development, the process buildings and site development have been designed to install a trench drain system around the building and tank perimeters. Runoff will be collected from the trench drains and along with the rainwater accumulating in the containment dyke from storms, will be diverted to the holding tank to make sure it is in compliance with the proposed oil and gas limit before being discharged to the well. The primary treatment will be the oil/water separator installed at the storm drain terminus. If necessary, the rainwater may also be directed to the treatment plant for treatment if it fails to meet the 10 ppm limit. This will help in reducing the threat from Mosquito-borne diseases, especially during the rainy season. The ESMP will provide additional guidance on the frequency of testing of runoff collection and determinations for treatment prior to discharge. Consistent results that are below detection limits may allow the runoff to be directly discharge to the ocean. Levels that are actionable will require treatment before discharge to the environment or deep well injection. Based on the controls established as part of the development plan (both site stormwater infrastructure as well as standard operating procedures in the ESMP, the probability of impacts to the environment, in particular the marine environment, is low. There are no adjacent sensitive habitats, streams, wetlands or other environmental receptors. The impact is therefore considered low.

Table 11: Operations phase impacts to surface waters from runoff

Operations phase - Impacts to surface waters from contaminated stormwater runoff				
Mitigation Assumptions	**Probability Score**	**Impact Score**	**Impact Significance**	**Justification**
No Mitigation	Likely (4) - The discharge of contaminated runoff will likely occur without mitigation.	Significant (3)	High (12)	Impacts above the limits established will result in reputational loss for non-compliance and potential regulatory restrictions on operations until corrective action is taken. No specific environmental impacts are likely unless the excursion is prolonged or severe.
Mitigation	Unlikely (2)	Minor (2)	Low (4)	Mitigation measures, including oil/water separators, bunding, treatment and monitoring will reduce the likelihood and severity of any release of oil contaminated runoff to the environment.

Impacts from a Catastrophic Release of Recovered Oil from the Containment System

The PRF will receive, and store ship generated waste, primarily waste oil, oily water and bilge water into three reception tanks with a combined capacity of 1.38 million gallons. No black water or gray water will be received at this Facility under the current proposal. These three large tanks, along with two cleaned oil storage tanks with a combined capacity of 144,238 gallons and three cleaned water storage tanks with a combined capacity of 73,968 gallons will be located in the onsite tank farm. The tank farm will be bunded with a capacity of 110% of the largest tank volume (460,000 gal.), for a total bunded capacity of 506,000 gallons. The tanks and liquid transfer systems will be designed and built per the ATEX directive of the European Union (EU), Dir. 114, for Equipment and protective systems intended for use in potentially explosive atmospheres. This directive requires that all equipment intended for use in explosive atmospheres, whether electrical or mechanical, including protective systems, be certified as fit for its intended purpose. These standards require, where appropriate, double-wall construction, interstitial leak detection, level controls, pressure monitors and alarms for critical systems. These are tied to a SCADA system for central operator monitoring and control. These industry best practice methods ensure a high level of safety and a reduced likelihood of an unplanned environmental release. However, system failure, including potentially catastrophic failures, do occur and these have to be properly planned for. The appropriate design phase planning is conducted via a process hazard analysis (PHA) wherein potential risks are identified and then either designed out the system or mitigated properly. The results of the PHA will help to inform the final operations phase ESMP and SOPs for the project. PHAs are typically conducted as a preliminary review and final review. Emergency preparedness and planning is another mitigation step for proper planning and operations, including training of personnel, testing of emergency systems and a process for continuous improvement. Stormwater for parking areas will be managed by grading the property so rainwater will flow to the storm drains and not into the harbour surface waters. Drainage into the harbour waters is prohibited. Storm drains will be constructed in accordance with the Grand Bahama Port Authority Building and Sanitary Code. Oil/Water separators will be an integral part of the storm drains as per GBPA Building Code specification. All recovered oil from separators will be diverted to the water treatment Facility for on-site processing.

CMG has committed that during the operational phase of the project, the stormwater management plan will be modified to include the following means and mitigation measures to minimize the potential for oil, chemicals, and other pollutants to contaminate stormwater runoff from the project area. Oil, chemical, and waste storage containers or vessels will be stored in adequate containers to contain spills and leaks. Discharges of oil, chemicals, or wastewaters will be prohibited to the ground or to drainage structures. Periodic inspections will be conducted to check for leaks from equipment, storage containers and vessels, and to observe the integrity of secondary containment structures. Preventative maintenance of equipment will be performed on a routine basis to reduce the potential for leaks. These procedures are also described in the ESMP for the project which is intended to be a living document that is periodically updated as new information (including lessons learned) are added.

The land-based Spill Prevention, Control and Countermeasure (SPCC) plan requirements are presented in the ESMP (Part 2). The marine-based SPCC will be developed in coordination with training provided by Marittima (proposed training vendor). Clean Marine Services Group will provide oil spill response training for its personnel at its oil treatment and recycling plant in Freeport. Under the International Maritime Organisation's (IMO) Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention, portside facilities which handle oil are required to maintain oil spill contingency plans. One component of this is to ensure their staff are adequately trained as first responders (OPRC – Level 1). This proposal comprises the provision of training to Nautical Institute standard accreditation to OPRC Level 1 at a suitable location in Freeport. The course covers:

- Overview of spill response
- Overview of contingency plans - Introduction to incident management systems
- Operational planning
- Fate and behavior of spilt oil
- Environmental & economic impacts of oil spills
- Spill assessment and surveillance
- Health and safety
- Response strategies
- Waste management
- Communications & documentation
- Equipment maintenance
- Contractors and managing volunteers

- Practical spill response.

Additionally, Level 2 Senior individuals and management may take the Level 2 course. This course is conducted over 4-5 days and builds upon the modules introduced in the Level 1 course. This training will be made available to other companies on the island that require Level 2 training. Clean Marine will procure all of the equipment necessary for oil spill response. Clean Marine proposes to use Marittima for training and contingency planning.

Given the industry best practices being employed, including the appropriate design-phase risk reduction strategies, the high level of construction standards to be followed, and the commitment of the operator, the probability of a catastrophic release of recovered oils is rated as Unlikely (2) with mitigation. Additionally, the impacts of such a release would be minimal due to the ability to impound a release by the bunding around the tank farm. If the bunding was not installed (no mitigation) or failed, then the impact would be significant due to the likelihood of contaminants entering the ocean. As it is also unlikely that there would be an occurrence with multiple safety system failures, the overall probability is still ranked at Unlikely (2) and the impact is Medium (6) with a total impact score of 12. A catastrophic release of contaminated waters into the harbour would trigger a major clean-up response and could impact waterfowl and aquatic species in the area. There would also be reputational damage and fines/penalties assessed to the operator as a result. These impacts are included in this assessment (see Table 12).

Table 12: Operations phase impacts to surface waters from catastrophic release

Operations phase - Impacts to surface waters from a catastrophic release of recovered oil or oily waste from the containment systems				
Mitigation Assumptions	**Probability Score**	**Impact Score**	**Impact Significance**	**Justification**
No Mitigation	Unlikely (2) - A catastrophic release of contaminated water is unlikely due to the system design even without mitigation.	Major (4)	Medium (8)	Impacts could include reputational loss for non-compliance and potential regulatory fines/expense for emergency response. Environmental impacts will not likely be significant as there are not sensitive ecological receptors.
Mitigation	Unlikely (2)	Minor (2)	Low (4)	Mitigation measures, including oil/water separators, bunding, treatment and monitoring will reduce the likelihood and severity of any release of oil contaminated runoff to the environment.

Impacts to the environment from solid waste management

Solid waste will be managed through the municipal service provided by Sanitation Services Ltd. for garbage collection and disposal at the Pine Ridge Landfill. During construction, scrap materials such as wood, cardboard, plastics, and other solid waste will be disposed of at the Pine Ridge Landfill. Once the Facility has been commissioned all solid waste will be disposed of using the collection and disposal services of Sanitation Services Ltd. CMG will ascertain that the recycling and disposal sites are licensed and operated to acceptable standards. Sites found to not meet the minimum standards for compliance will not be utilized. No specific quantity of domestic solid waste has been estimated but the volume is anticipated to be relatively small.

The current estimate of the sludge generation is one cubic meter per week (roughly 1.5 metric tonnes) which is generated through the oil treatment process. No screening of larger solids is required or anticipated. Sludge from the oil treatment process will have to be sampled and characterized as per the Sanitation Services Special Waste Profile Sheet. Sanitation Services also requires testing for Toxicity Characteristic and Leaching Procedure (TCLP) to be submitted before acceptance of the waste. TCLP is a soil sample extraction method for chemical analysis employed as an analytical method to simulate leaching through a landfill. CMG will submit the waste sludge for TCLP testing as per the Sanitation Services protocol. The testing methodology is used to determine if a waste is characteristically hazardous. All wastes generated on-site will be disposed of in an environmentally responsible manner. If any of the sludge fails the TCLP analysis and is classified as a hazardous waste, then it will be packaged for offsite disposal at a hazardous waste facility. This is considered highly unlikely. CMG may investigate the feasibility of a belt-filter press or other equipment to more efficiently manage sludge waste if deemed necessary. Liquids generated from this equipment, if utilized, will be directed to the plant treatment process.

An alternative method of sludge waste disposal may be utilized if deemed appropriate (either due to concerns with landfilling or as a result of commercial viability for re-use). Immobilisation of the sludge by blending with inert materials may be utilized. The final product can be processed and used as landfill cap or as sound proofing aggregate. Other potential alternative treatments for sludge are thermal treatment (either heat treatment to drive off volatile organics or even incineration). Either of these thermal treatment options are considered acceptable methods but both would require additional engineering/environmental review. This ESIA has assessed the sludge waste assuming landfill disposal.

Spent carbon from the carbon air filters used as part of the odor control systems will either be disposed of locally via Sanitation Services or shipped back to the United States.

Bathroom facilities will be constructed in accordance with the GBPA Building and Sanitary Code for septic tanks and disposal wells. These will be discharged onsite to an approved septic disposal system or to the local sanitary collection system (if available). Given the small number of employees on-site during any one shift, the volumes are expected to be low. The use of an onsite seepage bed is typically acceptable to the GBPA and there are no concerns for separation distances from incompatible land uses.

No specific environmental or human-health impacts are associated with sludge management. The volumes expected to be generated are low with respect to oily solids. The solids that will be encountered are small and will be emulsified through the treatment process. Spent carbon canisters will be recycled by the supplier as the preferred disposal method or potentially disposed of at the local landfill. The volumes of these canisters is also expected to be low. Domestic refuse is also assumed to be a small quantity due to the small number of employees and small input requirements for materials into the process. Domestic wastewater will most likely be treated onsite through the use of an onsite seepage bed. This method is also a locally acceptable treatment method with very low likelihood of impacts to groundwater quality.

Other than the waste management methods as described above, there are no specific mitigation measures proposed. The management methods will adequately dispose of the solid waste in an environmentally acceptable manner. In the event that these management methods are not available, potential alternatives can be provided but these will require additional engineering and environmental investigations. The management of solid waste streams will also be addressed through the PHA process which is designed to avoid, minimize and manage waste streams through the project design and operations.

Table 13: Operation phase impacts from solid waste

Operations Phase – Impacts to the environment from solid waste management				
Mitigation Assumptions	**Probability Score**	**Impact Score**	**Impact Significance**	**Justification**
No Mitigation	Rare (1) – Management methods for solid waste have been identified and are considered to be acceptable. Additional alternatives have also been identified. The potential for uncontrolled release of solid waste into the environment is Rare.	Minor (2)	Very Low (2)	Impacts could include reputational loss for non-compliance and potential regulatory fines/expense for improper handling of solid waste. Environmental impacts will not likely be significant as there are not sensitive ecological receptors.
Mitigation	Rare (1) – Management methods for solid waste have been identified and are considered to be acceptable. Additional alternatives have also been identified. The PHA process will be used to identify the most acceptable method for solid waste management. The uncontrolled release of solid waste into the environment is considered Rare.	Minor (2)	Very Low (2)	Mitigation measures, including PHA process and the identification of potentially acceptable alternatives will be included in the design/development process. The likelihood and potential impact from properly managed solid waste is Very Low.

Impacts from Processing Plant Air Emissions (Stationary Sources)

No ambient air quality study was performed for this assessment. As there are no regulations requiring companies to determine air emissions, it is unknown what the contributions are from companies operating within the industrial park area. Companies that may do testing or engineering calculations generally do not share such information. The area-wide ambient air quality is generally good due to persistent winds that disperse any pollutants and the lack of conditions that lead to an inversion layer in the atmosphere (see biophysical description).

Other facilities in the Industrial Park area surrounding the Harbour include BORCO Oil Terminal, Pharmaceutical Fine Chemicals, Polymers International, Grand Bahama Power (Peel Street and West Sunrise Power Generation Plants), Grand Bahama Shipyard, Freeport Container Port. Bahama Rock, BICHAM, Bradford Marine, and the Bahamian Brewery and Beverage Company. These facilities likely contribute air emissions but no quantifiable estimates or air quality monitoring has been established to determine the airshed characteristics or conditions.

The PRF will generate air emission from five general sources. These are described below:

- Process plant emissions: process plant emissions are expected to be negligible as the system is closed loop with minimal air discharges. Plant generated steam will be vented through pressure relief valves. Volatile organic compounds will be captured and treated through the vapor recovery system with substantial reductions anticipated. However, residual emissions are anticipated, specifically of the light-end hydrocarbons.
- Storage tank emissions: Petroleum storage tanks (both receiving and product storage) are expected to emit petroleum hydrocarbons of a similar nature to the process plant – post vapor recovery.
- Fugitive emissions: These emissions may occur from valves, joints, connections, meters, during loading/off-loading operations and are typically estimated as a percentage of processed volumes or through deductive inventory analysis as they are difficult to quantify.
- Boiler emissions: The boiler will most likely be HFO, diesel or natural gas fueled. The combustion of fuels will generate NOx, SO_X, VOCs, CO_2, CH_4, and PM.
- Other combustion engines: Using on-site equipment powered by internal combustion motors will generate emissions from the burning of hydrocarbons.

One source of emissions will be a small boiler, the size to be determined on the final design of the Facility. It is anticipated the prepackage boiler will utilize waste oil as a fuel source with “low-NOx” burners utilizing combustion control technology. Small boiler units of this size are presumed to be BACT compliance. Emissions are expected to be in the range of 50 ppm (±94 mg/m^3) for NOx. As part of the ESMP, an air quality specialist will review the equipment selected and conduct an assessment of total emissions and provide the findings to GBPA and FHC. Note the EU Tier 2 limit for Non-residential sources, medium sized, burning liquid fuels, is 100 mg/m^3 (per Directive 2009/125/EC).

The primary emissions from combustion exhaust sources are sulfur dioxide (SO2), nitrogen oxides (NOX), carbon monoxide (CO), particulate matter (PM), and greenhouse gases such as carbon dioxide (CO2). Greenhouse gas emissions are assessed below. Depending on the fuel type and quality, other substances such as heavy metals, unburned hydrocarbons and other VOCs may be emitted in smaller quantities but may have a significant influence on the environment due to their toxicity and/or persistence. These sources will primarily consist of truck and transport vehicles delivering the waste liquids and hauling the final cleaned oil product off-site. Additional vehicles include routine deliveries, passenger vehicles, the emergency backup generator and the oil-fired package steam boiler unit.

Impacts to these emissions will depend upon their location and proximity to potential receptors. As there are no residential communities or institutional uses such as schools, playgrounds, daycares, etc., in the vicinity, the only potential receptors are employees at the Facility and possible adjacent employees. Due to the anticipated low emission rates from the sources identified, coupled with the advantageous mixing qualities of the local air mass, the ability for air pollutants to concentrate in any one location is reduced. Pollutants heavier than air (CO), ground-level Ozone, and PM is an exception that can concentrate and potentially lead to health concerns for individuals in the immediate area. The maximum exposure limit has two time weighted average variations. The permissible exposure limit (PEL) is the maximum exposure allowed over an 8-hour period (per OSHA), while the short-term exposure limit (STEL) refers to the maximum exposure allowed over a 15-minute reference period. t is well established by the industrial hygiene profession that a workplace survey should be conducted in a facility to determine the potential for exposure(s) in excess of established exposure levels such as the PEL. The recommended PEL for these pollutants is as follows:

Total Dust in the respirable fraction - 5 mg/m3

Ground-level ozone - 0.1 ppm

Carbon monoxide - 50 ppm

Exposures to these pollutants can cause negative health outcomes. Personal air monitoring if employees are deemed to be at risk is appropriate and should be evaluated by the industrial hygiene review.

The following is a description of the mitigation measures to be deployed for control of process and exhaust emissions during operations. Mitigation measures should be developed as part of the final design process to meet the IFC/WHO Ambient Air Quality Guidelines per Table 1.1.1 (excerpted below).

Table 14: Portion of Table 1.1.1 from WHO Ambient Air Quality Guidelines

Pollutant	**Averaging Period**	**Guideline value in µg/m³**
Sulfur dioxide (SO_2)	24-hour 10 minute	20 (guideline) 500 (guideline)
Nitrogen dioxide (NO_2)	1-year 1-hour	40 (guideline) 200 (guideline)
Particulate Matter PM_{10}	1-year 24-hour	20 (guideline) 50 (guideline)
Particulate Matter $PM_{2.5}$	1-year 24-hour	10 (guideline) 25 (guideline)
Ozone	8-hour daily maximum	100 (guideline)

Notes:

1. Target limits for the PRF are established by the WHO "guideline" values.

Emissions from routine operations, including fugitive, loading/unloading, and storage, should be controlled through the deployment of the best system of emission reduction (BSER). The specific mitigation measures are to be designed to control emissions per the BSER standard and shall be included in the final design package and described in the final process narrative. Potential mitigation measures should consult the Final Subpart OOOOa Control Requirements (see exerts from Table 1-1 of the Standard below for reference).

Table 15: Specific Control Requirements from US EPA Standard

Potential Emission Source	Potential Control Requirements
Wet seal centrifugal compressors	95% reduction of emissions
Reciprocating compressors	Replace the rod packing on or before 26,000 hours of operation or 36 calendar months or route emissions from the rod packing to a process through a closed vent system under negative pressure.
Pneumatic controllers	Natural gas bleed rate no greater than 6 standard cubic feet per hour (scfh).
Pneumatic pumps	95% control if there is an existing control or process on site. 95% control not required if; • Emissions are routed to an existing control that achieves less than 95% or • It is technically infeasible to route emissions to the existing control device or process (non-greenfield sites only).
Equipment leaks at onshore natural gas processing plants	Leak detection and repair (LDAR) program reflecting the leak definitions and monitoring frequencies established for 40 CFR part 60, subpart OOOa.
Storage vessels	• Control VOC emissions using vapor recovery or combustion control device to reduce emissions by 95%, • Applies to storage vessels with a potential to emit (PTE) equal to or greater than 6 tons per year (tpy) of VOC.

Potential control measures to be employed will be designed as part of the air pollution control (APC) system and will likely include the following components:

- Wet/Dry Scrubbers
- Condensate control/return system
- Vapor recovery system (VRS)
- Organic filtration (activated carbon or equivalent)
- Induction fans / Compressors
- Continuous emissions monitoring systems (CEMs)

CMG will limit exhaust emissions during operations by deploying the following procedures:

- All equipment using combustion engines will meet US EPA Tier IV standards (or equivalent) for non-road diesel engines and sulphur reductions in non-road diesel fuel for PM, NOx, NMHC, and CO as applicable for the engine rating.

- Only low sulphur fuels will be consumed for operated equipment.
- The TMP will optimize circulation on the site and minimize idling time for heavy equipment and vehicles.

The Tier IV standards impose varying limits on PM, NOx, NMHC, and CO dependent upon the engine power rating. CMG has committed to utilizing, to the extent practicable, newer construction equipment manufactured after 2008 and preferably after 2014 in order to meet the current exhaust emissions standards. While there are no regulatory requirements in The Bahamas for construction equipment emissions monitoring, CMG are committed to reducing this impact by incorporating the recommendations of the US EPA and IFC standards.

Table 15: Operations phase impacts to air quality

Operations Phase – Impacts to the environment and/or occupational exposures from air emissions				
Mitigation Assumptions	**Probability Score**	**Impact Score**	**Impact Significance**	**Justification**
No Mitigation	Likely (4) – Without mitigation air emissions will occur from all four sources.	Minor (2)	Medium (8)	Impacts could include negative health outcomes to workers for prolonged or repeated exposures. Cumulative impacts could occur to regional air quality from combined air emissions within the industrial zone. No other sensitive receptors have been identified. Environmental impacts will not likely be significant as there are no sensitive ecological receptors.
Mitigation	Unlikely (2) – Appropriate industrial hygiene assessment, monitoring and mitigation will prevent air emissions above regulatory thresholds.	Minor (2)	Low (4)	Mitigation measures, including PHA process and the identification of appropriate assessment and monitoring will limit the potential impacts to human health and environment. Greenhouse gas emissions are assessed below.

Greenhouse Gas Emissions

Based on Guidance Note 3 of IFC PS 3, the potential environmental impacts associated with the emissions of greenhouse gases (GHGs) are considered to be among the most complex to predict and mitigate. However, project proponents are mandated to assess their potential contribution to climate change when developing and implementing facilities and develop a strategy to help reduce emissions. Various international lender organizations including the IFC give guidance on the scale of a project's GHG emissions based on thresholds of annual emissions that clarify requirements for quantifying, reporting and mitigating project GHG emissions. Emission factors provide a means of relating pollutant releases to the atmosphere based on an activity associated with the release of that pollutant. The U.S. Environmental Protection Agency's (U.S. EPA's) Compilation of Air Pollutant Emission Factors (AP-42)44 provide emissions factors that report the estimated individual pollutant contributions in pounds per million standard cubic feet (lb/MMscf) of fuel, and these factors may be used to quantify emissions once the number, type and specifications of the sources are determined. It should be emphasized that the actual emissions may vary considerably from the published emission factors due to variations in the operating conditions. According to the U.S. EPA (2019 estimates), emissions from the petroleum and natural gas production sector accounted for 117MMT CO_{2e}[6]. Emissions from the process, transfer and storage equipment will result in losses of oil and its constituents, in particular the lighter phase volatile compounds. These occur through fugitive, loading/unloading, and storage releases. The following is a description of the anticipated impacts generated during operations from fugitive and controlled GHG emissions.

Air emissions will occur as a result of fugitive emissions such as the irregular releases of gases or vapors from pressurized piping, valves and containment structures. The proposed PRF will receive, process, and store oil waste and related products with the goal of providing a reusable resource (cleaned oil) for use by local/regional industry. Due to the requirements to transfer products from the receiving unit to the final storage tanks, the likelihood for product losses due to the volatilization and release of gases, in particular where those processes are heated, is considerable. Fugitive source air emissions refer to emissions that are distributed spatially over a wide area and not confined to a specific discharge point (such as a stack).

The actual determination of the specific quantities for these losses will occur during the design phase of the project but given the size of the facility, and the high number of storage tank turnovers, the expected volumes are likely in the 10,000 to 20,000 gal/annum range. There are industry and national standards (for example the United States EPA "Final Oil and Natural Gas Sector New Source Performance Standards (NSPS), established in 2016) as well as American Petroleum Institute (API), for example, Publication 4589 "Fugitive Hydrocarbon Emissions from Oil and Gas Production Operations". Final estimations for fugitive emissions, by type and quantity, as well as per system component, will be provided by the final engineering process. The primary impact to the environment from the release of fugitive hydrocarbon emissions is from greenhouse gas (GHG) contributions to the atmosphere. These emissions, along with others generated during processing, will contribute to an increase in GHG that, without mitigation, will contribute incrementally to anthropogenic global warming (AGW). Resources to be consulted to assist in the estimation and for potential control options include the US EPA, "Small Entity Compliance Guide for Oil and Natural Gas Sector: Emission Standards for New, Reconstructed,

[6] MMT = Million Metric Tonnes / CO_{2e} = Carbon dioxide equivalent

and Modified Sources" (US EPA 2016). According to the U.S. EPA, petroleum bulk storage facilities should consider point source air emissions from tanks that store petroleum liquids. *AP-42 (Chapter 7)* provides detailed information on the calculation of air emissions during the storage and transfer of liquids. Total emissions from storage tanks are equal to the sum of the standing storage loss and working loss. Variables such as tank design, liquid temperature, and wind velocity are taken into account when determining standing storage loss and working loss. The emission equations for fixed-roof tanks in AP-42 were developed for vertical tanks; however, the equations can also be used for horizontal tanks by modifying the tank parameters as specified in AP-42. Many of these equations have been incorporated into computer models such as TANKS 3. These should also be consulted.

Emissions from the process, transfer and storage equipment will result in losses of oil and its constituents, in particular the lighter phase volatile compounds through fugitive, loading/unloading, and storage. Given the relatively high volume of turnover in the storage tanks, emissions from that system will likely be larger than the other system components such as pumps, valves and transfer lines. Impacts from all of these releases include the following.

- Generation of VOCs and potentially SVOCs;
- Generation of NOx;
- Generation of CH_4;
- Generation of CO_2; and
- Generation of odours

The specific quantities of these operational releases will need to be determined based on the specific system throughput, configuration, and mitigation systems deployed. Assuming a 0.04 percent loss (DeLuchi, 2012), and the using the estimated annual throughput, the loss of product (13,886 gal/year), converted to GHG (100% per IPCC) is approximately 313,500 lbs/year of GHGe emissions. Mitigation in the form of vapor recovery systems are very effective and can yield a reduction of 95 percent versus open vented systems (Picar, 2010). Vapor recovery systems (VRS) are routinely used in the commercial storage of petroleum products and should be considered in the design of this Facility. A general schematic of a typical VRS is shown below. Mitigation in the form of leak detection systems, VRS, inventory control and reporting is recommended best practice for this project. Final engineering estimates of emissions should be included in the project design and addressed as part of the PHA process. Final recommended actions should be carried into the construction specifications and addressed in the ESMP Part 2. Additional GHG offsets should be considered to reach net zero emissions if practicable. Offsets may include the use of solar heating for domestic hot water, photovoltaic solar for grid-tied or stand-alone generation. It may also be possible to use it for battery charging for onsite vehicles (such as electric golf carts to use onsite). Offsets may also be purchased to reduce the carbon footprint of the project.

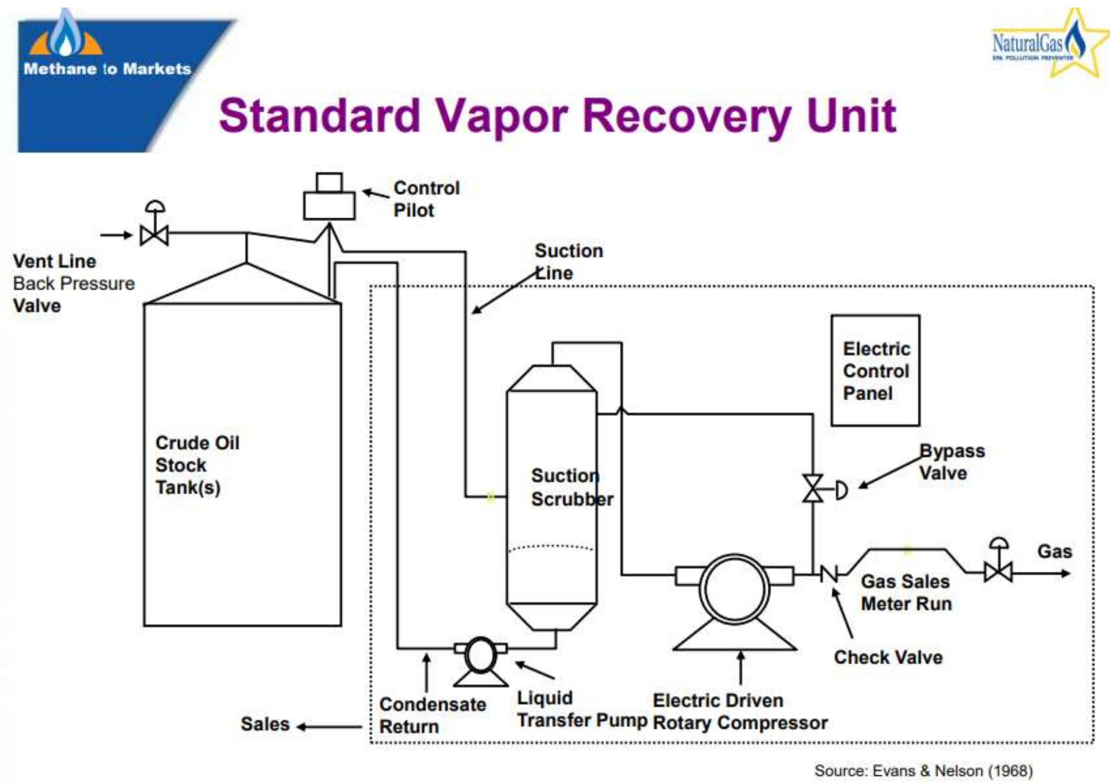

Figure 36: Vapor recovery system diagram

Table 16: Operations phase GHG emissions impacts

Operations Phase – Impacts to the environment from greenhouse gas emissions (GHGe).				
Mitigation Assumptions	**Probability Score**	**Impact Score**	**Impact Significance**	**Justification**
No Mitigation	Almost Certain (5) – Without mitigation GHG emissions will occur from all four sources but primarily the final oil storage tanks.	Minor (2)	High (10)	Environmental impacts are negligible in respect to total GHG emissions for the region due to the industrialized nature of the port. Not mitigating the emissions would be out of line with industry best practice resulting in reputational impact to the project operator and funders.

Mitigation	Almost Certain (5) – Appropriate vapor recovery will substantially reduce emissions.	Insignificant (1)	Medium (5)	Mitigation measures, including VRS will reduce emissions by approximately 95% over pre-mitigation levels and meet industry best practices.

Noise

Noise Impacts can be anticipated from the normal plant operations including process equipment, pumps, motors, valves, air actuators, power tools, steam actuators and bleed-offs, combustion motors for generators and vehicles and alarms and other intercom announcements. CMG has committed to utilizing well-maintained and noise compliant equipment. The noise during operations is not expected to exceed 70dBA. Monitoring during these phases will allow CMG to take mitigation actions to reduce the noise down to these limits. Noise levels measured are affected more due to local traffic and background noise from the industrial area which account for the peaks in the measurements per the baseline study (see Appendix B). The baseline study has taken measurements during a 4-day period with the results indicating the LAeq does not exceed 65dBA. The noise levels are consistent with the movements of ships in the container terminal and Bahama Rock loading operations. Requirements for noise reduction methods, monitoring, and mitigation (including PPE where other measures are not appropriate or effective), training and reporting are provided below.

Noise limits for the PRF will be set as follows (see Table 17):

Table 17: Noise control levels (Source: IFC General EHS Guidelines)

Location	Noise level limits in Equivalent level (LAeq, 8h)	Mitigation / Control
At perimeter fence (outside)	45-50 dB(A) or ambient	Ambient readings indicated an average of 59.2 at the northern boundary. This is due to the existing industrial nature of the port area.
General indoor administrative areas	45-50 dB(A)	Interior noise survey to be completed once operations are ongoing. Mitigation measures will be retrofitted if needed (but unlikely).
Processing plant / During maintenance work, repairs or temporary construction	No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).	The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85 dB(A). All such areas shall have appropriate signage. Hearing conservation devices (ear plugs or ear muffs) shall be provided to all employees and visitors by CMG at no cost.

The Facility will be designed to house the processing equipment inside a plant building. This building will be secondary attenuation of the noise from the rotating equipment and process piping. The primary attenuation will be the design of the equipment to meet 75 dBA maximum by way of local treatment to individual machines. The sound level outside of the building will be less than 70 dBA. Noise from tanker truck movements delivering waste to and removing re-processed oil will be infrequent. The number of tanker movements will be much less than the number of trucks hauling containers from and to the container port.

The following mitigation measures will be used to manage and reduce noise impacts during operations:

- Implement noise control measures at the source by ensuring all mufflers and spark arrestors are in place and functioning;
- Limit heavy equipment use to daytime hours only (0600 to 2100);
- Post signage warning of dangerous noise levels if levels above 70 dB are expected;
- Use noise attenuator shields if needed,

- Make sure all employees, workers and visitors have hearing protection devices available and that they are utilized per the occupational health standards; and
- Use noise attenuation booths for pipe cutting when possible.

Table 18: Operations phase noise impacts

Operations Phase – Impacts to the environment/occupational safety from excessive noise.				
Mitigation Assumptions	**Probability Score**	**Impact Score**	**Impact Significance**	**Justification**
No Mitigation	Almost Certain (5) – Without mitigation noise levels will exceed recommended levels.	Significant (3)	Very High (15)	Unmitigated impacts to the environment are low due to the industrial nature of the port. Unmitigated occupational impacts could be high with irreversible hearing damage and legal liability for not following a duty to protect employees from known hazards.
Mitigation	Unlikely (2) – Appropriate risk reduction and mitigation is employed.	Minor (2)	Low (4)	Exposure assessment, risk reduction and mitigation will effectively manage this impact to low significance.

8.3 SUMMARY OF ENVIRONMENTAL IMPACTS

The construction phase of the project is a short duration activity and was assessed separately from the operations phase for impacts. A total of six impacts were assessed for the construction phase, five of which were determined to potentially have negative impacts (with or without mitigation) and one (job creation) determined to have positive benefits. All of the potential negative impacts from construction are reduced through mitigation. The assessment identified five Medium impacts without mitigation that all reduced to a Low impact with mitigation. One Very High impact without mitigation was identified for occupational injuries which is reduced to a High impact with mitigation. This score reflects the potential for loss of life or injury with a severe incident even with a low likelihood of occurrence. Table 8 above provides a summary of the construction phase impact assessment.

The potentially negative environmental/occupational impacts were assessed for this project. A total of seven impacts were assessed with and without mitigation. These are summarized in Table 19 below. It should also be noted that CMG has agreed to execute mitigation measures as identified in this ESIA and as such, the impact assessment, with mitigation, should be considered the default assumption for project execution. Post-mitigation impacts result in four Low impact ratings, two Medium impact ratings and one Very Low impact rating. These ratings are indicative of a project that is well situated for its intended use. Utilizing available land at the existing port, that has been previously disturbed, is the least damaging alternative location for this project as opposed to constructing a Facility at a greenfield site which would likely require substantial dredging and terrestrial impacts.

Table 19: Summary of operations phase environmental/occupational impacts

Impact	Rating w/o Mitigation	Rating with Mitigation
Groundwater discharge into the deep injection well could impact receptors	Medium	
Impacts to surface waters from discharges and runoff due to Operations	High	Low
Impacts to surface waters from a catastrophic release of recovered oil or oily waste from the containment systems	Medium	Low
Impacts to the environment from solid waste management	Very Low	Very Low
Impacts to the environment and/or occupational exposures from air emissions	Medium	Low
Impacts to the environment from greenhouse gas emissions (GHGe).	High	Medium
Impacts to the environment/occupational safety from excessive noise.	Very High	Low

8.4 ASSESSMENT OF POTENTIAL SOCIO-ECONOMIC IMPACTS

This assessment has evaluated the potential for negative and positive social impacts associated with the operational phase of this project. Two negative social impacts were identified and one positive impact has been identified as described in section 8.4.1 below.

Impacts resulting from vehicular traffic generated by Operations

Operational equipment (primarily forklifts and vehicles) moving about the facility, and commercial delivery and transport tankers and trucks entering and leaving the site will generate traffic with potential for vehicular, operations and pedestrian conflicts. Exhaust emissions is also another potential impact (addressed in section on air emissions). In addition, according to industry publications the majority of construction transport accidents result from the inadequate separation of pedestrians and vehicles. This can usually be avoided by careful planning, particularly at the design stage, and by controlling vehicle movement during operations. Average daily trips (ADT) for the site is estimated as follows and totals 78/day:

- Employee trips (9/shift at 2 shifts/day) 36 Passenger vehicles
- Visitor trips (5/day) 10 Passenger vehicles

• Standard Deliveries (5/day)	10	Commercial delivery trucks
• Process deliveries (11/day)	22	Tanker trucks (11,000 gal. capacity)
• Process shipment (6/day)	12	Tanker trucks (11,000 gal. capacity)

As the site is planned to be operational 24 hours/day, the heavy tanker trips will likely be spread over the full period whereas commercial deliveries and visitors will be across normal working hours. Workers will enter and leave primarily during shift changes.

This number of trips for an industrial site is considered minimal and is likely relatively small in comparison to adjacent existing operations (Container Port and Cemex specifically). The transport routes identified in Section 4 of this report will be used (see Figures 19-21).

According to a review of the existing potential traffic conflicts the following is noted:

1. There are no current pedestrian access or crossing locations within or adjacent to the project site.
2. There are no school crossings located in the vicinity.
3. There are no bike paths or crossing locations at or in the nearby vicinity.
4. There is no signalization at the nearest intersection to the project site.
5. There are no rail crossings at or near the project site.
6. There is no anticipated reduction in level of service for the existing road network and nearest intersection.
7. The existing public access road is industrial in nature with nominal 11 foot wide travel lanes and two-way flow without centre line or edge striping (see Figure 37 below for photograph of typical road section).

Figure 37: Street level view of WJL Highway looking east (Source is Google Earth™)

Impacts as a result of operational traffic are somewhat mitigated by the location and isolation of the PRF site. It is located within the Port area, off of Freeport Container Road which is dedicated for port related traffic. In order to mitigate operational traffic impacts, the following actions will be implemented at the PRF:

- Require proof of roadworthiness, insurance and licenses for all commercial vehicles used by contractors.
- Enforce safe operating speeds, use of back-up alarms, courteous driving behaviour, and random drug screening.
- Require immediate drug testing for any vehicular incident.
- Entrances and exits - provide separate entry and exit gateways for pedestrians and vehicles;
- Walkways - provide firm, level, well-drained pedestrian walkways that take a direct route where possible;
- Crossings - where walkways cross roadways, provide a clearly signed and lit crossing point where drivers and pedestrians can see each other clearly;
- All workers and visitors will be required to wear high visibility work vests or shirts;
- Visibility - make sure drivers driving out onto public roads can see both ways along the footway before they move on to it; and
- Obstructions – do not block walkways so that pedestrians have to step onto the vehicle route.

Good planning can help to minimise vehicle movement around a site. To limit the number of vehicles on site:

- provide car and van parking for employees and visitors away from the work area;
- control entry to active operations areas;
- Provide a golf cart or other vehicle that is operated by a CMG employee to taxi visitors around the site (so that they do not use their personal vehicles to access areas that are dangerous or not appropriate); and
- plan for a material/supply receiving area that is proper directional signage at the entrance so that delivery vehicles do not have to cross the site or other active operations.

CMG will take steps to make sure that all workers are fit and competent to operate the vehicles, machines and attachments they use on site by, for example:

- checks when recruiting drivers/operators or hiring contractors;
- training drivers and operators; and
- managing the activities of visiting drivers.

Vehicle travel paths visibility and turning will include the following considerations and components:

- The need for vehicles to reverse should be avoided where possible as reversing is a major cause of fatal accidents;

- Site and area speed limits will strictly be enforced;
- One-way systems can reduce the risk, especially in storage areas; and
- A turning circle could be installed so that vehicles can turn without reversing.

CMG has developed a Traffic Management Plan (TMP). This is included in the ESMP.

Traffic signs, including stops signs at intersections, cross-walks and other potential conflict points will be added. Traffic calming devices are not generally required but will be installed if necessary. Site speed limits will be strictly enforced.

During the 24-hr per day operations phase, exterior lighting will illuminate the common travel paths.

Table 20: Impacts from additional traffic generated by Operations

Operations Phase – Socio-economic Impacts to the from increased traffic.				
Mitigation Assumptions	**Probability Score**	**Impact Score**	**Impact Significance**	**Justification**
No Mitigation	Likely (4) – Without mitigation increased traffic could cause conflicts and potentially increase risk for an accident.	Significant (3)	High (12)	Unmitigated impacts from increased traffic increases the likelihood for conflicts and possibly accidents. The volume of traffic will not be mitigated but the controls will reduce the potential for conflicts.
Mitigation	Possible (3) – Appropriate risk reduction and mitigation is proposed.	Minor (2)	Medium (6)	Mitigation will reduce the potential for conflicts but not entirely eliminate the risk.

Impacts to the view from adjacent recreational area as a result of the development

The project's location is conducive to the proposed development and thus visual impacts will be substantially minimized. The nearest residential neighborhood (Wild Goose Town) is approximately one mile to the west and the nearest recreational area (ocean beach to the west of the Hawksbill Creek outlet) is located to the southwest approximately 0.6 mile from the site (see Figures 38). The view from the public road and the nearest public beach access is obscured by existing vegetation and the intervening land is being used for bulk storage and port services (Figures 39 and 40). There is very little to any view from the public beach to the project site.

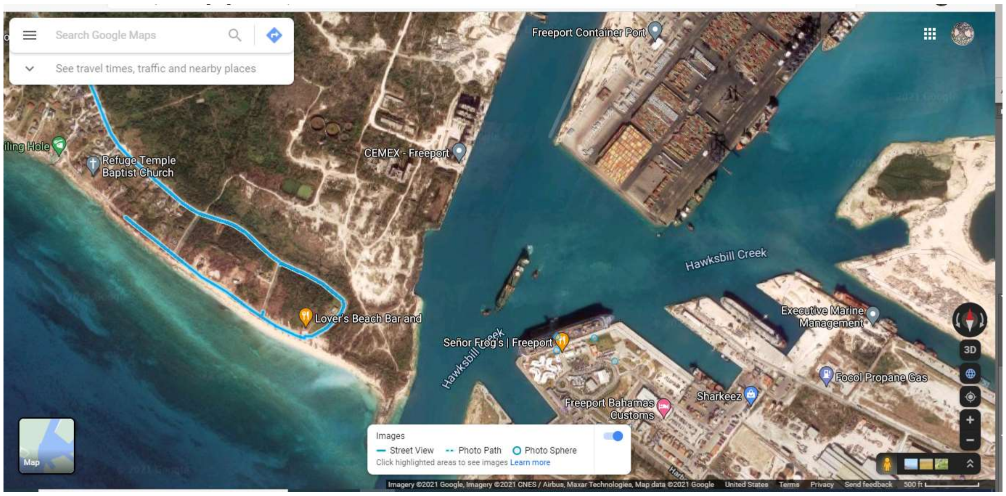

Figure 38: Google Map™ image of nearest residential roadway

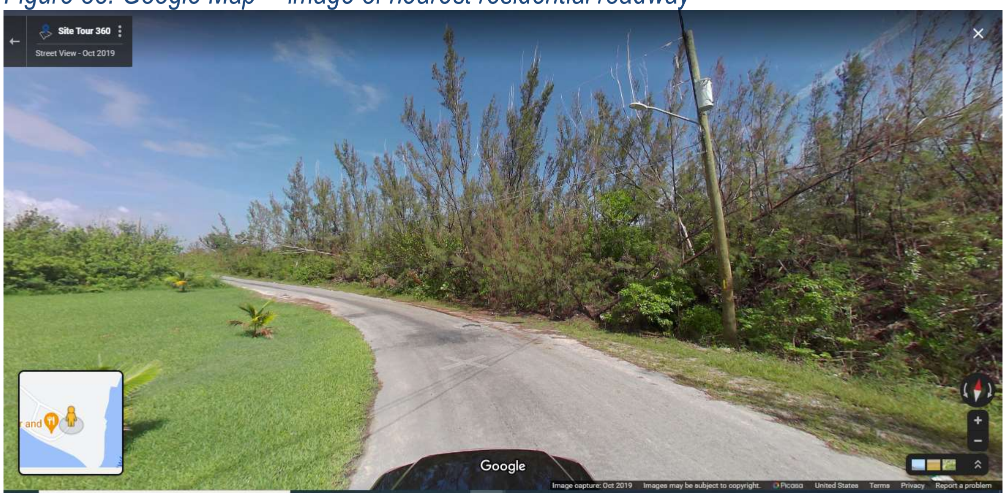

Figure 39: Google Map™ street level view from nearest residential roadway looking northeast toward project site

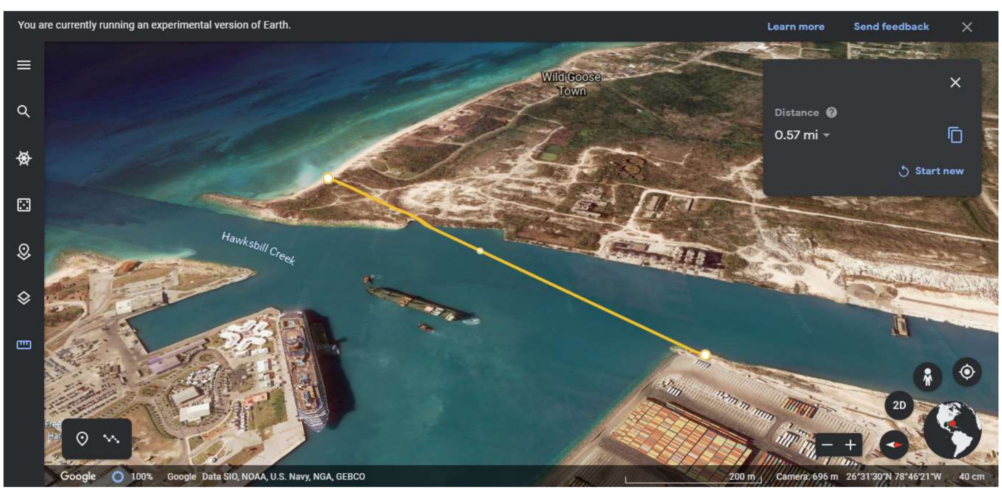

Figure 40: Sight line from nearest public beach to project site (Google Earth™)

The likelihood of visual impacts to adjacent non-compatible land uses is unlikely given the distances, elevations and intervening development conditions. Given the distances between the potential conflicts (greater than 0.6 miles), the impact is unlikely and insignificant. For these reasons this social impact is rated at Low (see Table 21). Note that no mitigation is proposed or recommended for this impact.

Table 21: Visual Impact Assessment Results

Operations Phase – Visual impacts to nearby residents as a result of the proposed PRF.			
Probability Score	Impact Score	Impact Significance	Result
Unlikely (2)	Insignificant (1)	2	Very Low

8.4.1 Potentially Positive Social Impacts Resulting from the Project

This ESIA has evaluated potential positive social impacts resulting from specific aspects of the proposed project. These include:

- Reduction of ocean pollution resulting from the enhanced Freeport Harbour services for treatment of MARPOL waste.
- Reduction of the potential for improper disposal of industrial waste oil within Grand Bahama Island as a result of increased support services for other industrial park companies, such as the Grand Bahama Shipyard.
- Reduction of the potential for improper disposal of domestic used oil due to the additional opportunity for collection and treatment at the proposed Facility for Grand Bahama Island if the logistics of this opportunity can be realized.
- Increased employment opportunities for workers, in particular, unemployed workers resulting from the recent economic slowdown in the tourism industry.
- Increased economic diversification in the economic base for Grand Bahama Island away from the heavy emphasis on tourism.

The first three positive impacts are co-related and stem from the additional services for oil recovery provided by the proposed Facility. The Freeport Harbour is the largest man-made harbour in the region and is known as a major maritime centre and is undergoing expansion. The Harbour is home to a container port, ship repair Facility, luxury yacht repair Facility, and cruise ship terminal. The proposed CMG MARPOL Facility will enhance Harbour services, as there will be a Facility to collect, receive, and treat oily water/slops and used oil from ships and the local community using best management practices. This Facility will help close the loop of services offered within the Harbour; services will now range from ship and luxury yacht repair to environmentally responsible liquid waste disposal. The CMG Facility will offer support services for existing businesses within the Industrial Park as well. Businesses like the Grand Bahama Shipyard, Bradford Marine and others can rely on CMG for treatment of oily water/slops and used oil. Ship agents will be able to offer the CMG treatment Facility to their clients. With the long-term development of the Harbour, the CMG Facility may become an essential service for ships using Freeport Harbour. Additionally, shipping agents in the future may offer this service to their clients.

No data currently exist that quantifies the potential reductions in improper oil disposal that may currently exist as a result of the lack of access to these services. Impacts to marine resources from the improper disposal of waste oils have been well documented thus this impact may also be assessed as a positive environmental benefit as a result of the Project. However, no quantifiable estimates or locally specific environmental impacts from the improper disposal of these wastes have been reported. The need for the Facility at this location has also been well documented and the logical assumption is that if the need exists, then the reduction of improper waste oil disposal will likely occur as a result of the need being met. This impact is thus rated as a Likely probability and a Significant change to current conditions with an overall rating of High positive impact (see Table 22). Note that no mitigation is included this assessment as the project itself will serve to mitigate the current assumed conditions.

Table 22: Positive impacts from a reduction of illegal/improper waste oil disposal

Operations Phase – Positive impacts from a reduction of improper oil disposal as a result of the additional services offered by the PRF operations			
Probability Score	**Impact Score**	**Impact Significance**	**Justification**
Likely (4)	Significant (3)	High (12)	The project need has been established and having the opportunity for other local businesses and potentially even the public to utilize proper waste oil treatment and recycling is seen as a High significance positive social impact.

The final two bullet points are also related in that they define potential positive outcomes from increased economic opportunity and diversification. Increased employment is a defined need in The Bahamas, in particular, as a result of the significant job loses brought on by the decline in tourism resulting from the global pandemic which have further exacerbated previous declines resulting from hurricane Dorian. The addition of 40+/- jobs (inclusive of construction) to the Harbour will generate added revenue from employment wages to the local community. Total economic impact as a result of capital investment will be reduced due to the acquisition and fabrication of major equipment overseas. It is also further reduced by the current tax structure that exempts operations within the Free Trade Zone from paying certain taxes until after 2037. This includes, no real property tax or real property levy, no personal property tax and no capital levies or taxes on capital gains or capital appreciation, and no taxes of any kind on the earning of the Port Authority or the earnings of its licensees (Commerce, 2015). The tax-free exemption can be considered an effective inducement for new investment but it does come at a price of decreased government revenue which could be used to fund social programs. However, construction spending can still be expected to have a close to double impact from direct and induced labor use.

Using U.S. based standard economic multipliers for the transportation/warehousing sector indicates a combined economic impact of 2.76 times for employment wages and up to 4.18 times for technical services (a smaller sector of the proposed employment profile for this project) including direct, supplier and induced employment impacts (Bivens, 2019). These downstream benefits increase the economic impact of the proposed employment of 20 full-time and part-time individuals to approximately 63 as a result of economic multipliers. The non-construction economic impacts will be a net positive for the region. These impacts are Likely and Significant given the current economic conditions of Grand Bahama. This social impact has a net High positive rating (Table 23).

Table 23: Positive economic impacts as result of the PRF operations

Operations Phase – Positive impacts from increased employment related to the creation of jobs and economic multipliers (excluding construction) as a result of the PRF operations			
Probability Score	**Impact Score**	**Impact Significance**	**Justification**
Likely (4)	Significant (3)	High (12)	Job creation in the non-tourism related sector is important as an economic diversification tool.

8.5 SUMMARY OF NEGATIVE AND POSITIVE SOCIAL IMPACTS

This ESIA has evaluated potential negative social outcomes as a result of the proposed development. Only two impacts have been noted, the potential for increased traffic which is rated as a post-mitigation impact significance of Medium and for visual impacts which is rated at an impact significance of Very Low (with or without mitigation). Both of these impacts are consistent with the nature of the proposed development and are generally mitigated by the scale of the project and its location relative to other land uses. Traffic management will be part of the ESMP document which includes a Traffic Management Plan (TMP). No mitigation or additional management provisions are recommended for visual impacts.

This assessment has evaluated the potential for positive socio-economic impacts as a result of the PRF project. The first impact is the result of an expected reduction in illegal/improper disposal of waste oil products as a result of having access to the PRF services. The problems of marine contamination from this occurrence has been well demonstrated and the local need for this use has also been documented. It is not possible within the scope of this report to assess the quantitative positive impact but a qualitative assessment indicates a High positive impact should be expected.

A second generalized positive socio-economic impact is the result of the capital investment into the local economy and job creation. The socio-economic impact from capital investment is important but also minimized by the fact that the equipment will be purchased and assembled overseas thus minimizing the direct impact that could be gained by local purchase. However, it is unlikely that local suppliers have the capabilities to produce this very specialized equipment and thus this is likely an unavoidable outcome. This impact is also further reduced by the current tax incentives offered by The Bahamas. However, job creation is a major positive socio-economic impact from operations and these impacts will be continuous throughout the lifecycle of the project. The overall positive impact rating is considered High.

8.6 ALTERNATIVES AND THE "NO DEVELOPMENT" OPTION

This document, supported by previous investigations (RAC-REMPEITC, 2017), have demonstrated a need for the proposed Facility. Alternatives are different means of completing the proposed project while still meeting the purpose and need for the Facility. This section assesses at a high-level proposed alternatives that have the potential to reduce impacts while still accomplishing the project need. Alternatively, the "no development" option is also reviewed.

Alternative 1: Construct the Facility at an existing location or expand existing capacity.

The Morgan Oil Marine (MOM) Facility located at the GBPA attempted to develop a hydrocarbon recovery plant that was capable of receiving oil slops sand sludge. The Facility began limited operations in 2013 with a reported throughput capacity of 300 gallons per minute and also utilizing a barge and tug to receive oil waste. Shortly thereafter the original location for this Facility was abandoned due to a new development (Billy Cay project) and no new suitable locations were identified. Processing ultimately dropped to 2,500 barrels per day. (Hartnell, Habour Expansion Makes Oil Recovery Plant Site 'Unsafe', 2014) and then ceased altogether. The MOM project does demonstrate the need for this service as well as the requirement for proper Facility citing.

No other potential sites were identified for this Facility. As demonstrated by the current Port Master Plan and existing land uses, no vacant property is located within the Facility that has the capability of providing this service.

Alternative technologies for the treatment of oily ship waste have been identified. The industry provides a number of differing technologies and systems for the separation of oil from water at an industrial scale. These typically include:

- Dissolved Air Flotation (DAF)
- Gravity Separation Method
- Coagulation Separation Method
- Filtration Separation Method
- Chemical Treatment (various methods)
- Adsorption Method
- Magnetic Separation
- Electrochemical Oxidation Method
- Biological Treatment (various methods)
- Cavitation

A review of the various treatment methods and their respective positive and negative factors including technical challenges and constraints is beyond the scope of this report. The proposed method (screening, filtering and cavitation) is a combination approach designed to maximize efficiency and contaminant concentrations to a level that meets all appropriate emission requirements. This approach is consistent with many commercial-scale operations, and industry best-practice (Han et al., 2019). Additionally, CMG have in the past year developed a prototype treatment system and operated it successfully achieving both environmental and operational performance metrics.

8.6.1 Alternatives and No Development Option Summary

The review of the various sites potentially available for this service has yielded no suitable alternatives. The proposed location is a brownfield site that has been previously disturbed, complies with the land use provisions of the local authority and is suitable based on engineering and infrastructure analysis. The various treatment technologies have been reviewed by the developer’s technical team, including CMG, GEA and CSG and they have concluded that the proposed combination treatment methodology will achieve the most acceptable results both operationally and environmentally. The demonstration of need for this service indicates that the “no development” alternative will not meet the socio-economic and environmental benefits associated with the planned execution of the project.

Upon closing of the Facility CMG will be responsible for and remediation and dismantling of the Facility. CMG will be responsible for any necessary remediation of the effected environment during the closure or decommissioning phase of the termina to include; the safe removal and correct disposal of the product, cleaning and removal of the storage tanks, elimination of any remaining structures. Groundwater samples will be collected and analyzed to determine groundwater quality.

8.7 CUMULATIVE IMPACT DISCUSSION

IFC Performance Standards on Environmental and Social Sustainability (IFC, 2012), recommend projects assess the cumulative impacts that result from the incremental impacts on areas and resources used or directly impacted by a project. This includes assessing other existing and planned developments at the time of the assessment. This may also include an assessment of associated facilities that are not funded as part of the Project, but which would otherwise not exist or have been constructed if the proposed PRF were not constructed. Cumulative impacts are generally limited to those impacts recognized as important on the basis of scientific concerns and/or concerns from impacted communities. Examples of cumulative impacts may include: incremental contribution of gaseous emissions to an airshed; reduction of water flows in a watershed due to multiple withdrawals; increases in sediment loads to a watershed; interference with migratory routes or wildlife movement; or more traffic congestion and accidents due to increases in vehicular traffic on community roadways.

For the purposes of this ESIA, cumulative impacts could result from the incremental increase in air emissions, specifically, greenhouse gas emissions from the Facility. Other cumulative impacts could result from increased traffic on roads currently used by other commercial and port-related facilities. These impacts have been evaluated in Section 7 as individual impacts with discussion of regional context. For GHG emissions, the Facility will increase CO2e emissions to the airshed and contribute to the country's total GHG inventory. Mitigation measures are proposed that will substantially reduce these GHGs, for example, vapor recovery systems will capture approximately 95 percent of gases released from the oil storage tanks. Other measures, such as leak detection and inventory control will reduce fugitive emissions. The proposed PRF will store, at any one time, approximately one million gallons of processed oil in two storage tanks. From a regional standpoint, this represents a small percentage of the fuel stored within the Port. The adjacent Buckeye Global Marine Terminal has a storage capacity of 1.1 billion gallons of oil (see Figure 41). The PRF will represent a very minor incremental increase in GHGs emissions from this source. Regardless, the Project proponents have committed to working towards a net zero project to the extent practicable in order to reduce cumulative impacts.

Figure 41: Global Marine Terminal in foreground with project site in background (yellow arrow)

Cumulative impacts for increased traffic flow are addressed. The estimated average daily trips (ADT) for the project are also very minor in comparison to the current traffic generated by the adjacent container port. Regardless of this minor incremental increase, it is important to manage all traffic flows for the purposes of efficiency, safety and as a method to reduce incremental cumulative impacts. A traffic management plan (TMP) has been developed by CMG and is incorporated into the operations phase environmental and social management plan (ESMP, Part 2).

Given that the PRF will be constructed as infill in an existing brownfield location within the current Port, no additional cumulative impacts were identified in this ESIA.

9.0 SUMMARY AND RECOMMENDATIONS

9.1 SUMMARY OF FINDINGS

This report has followed the current best practices for social and environmental impact assessment according to the WB/IFC guidance. It has described and evaluated the existing socio-economic conditions of The Bahamas, and where practicable, Grand Bahama and Freeport specifically. It has also described and evaluated the geologic, hydrogeologic and biophysical conditions of the area to determine a baseline of conditions from which to assess impacts. Using the project description, this assessment has evaluated the potential environmental and social impacts, both negative and positive, that might be expected from the development. The environmental impacts are primarily related to the operations of the Facility. Construction impacts are largely ameliorated by the location selected by the developers. The site is part of an active harbour development that has been previously disturbed. Impacts typically associated with construction, such as clearing of vegetation and changes to drainage patterns are not applicable in this instance due to the previous disturbances at the site. Additionally, no dredging, piling or shoreline or other marine impacts are associated with this development.

The proposed operations, recycling of oil contaminated liquids, by its very nature increases the risk for environmental contamination at the site from uncontrolled releases, while simultaneously reducing this impact by providing a state of the art receiving Facility for these types of wastes streams that are currently not provided in the region. This demonstration of need has documented that the net value of the Facility in reducing marine contamination from ship generated wastes will far exceed the overall low risk of an environmental incident and any resulting contamination that might occur. Furthermore, the Facility will be outfitted with emergency response procedures and equipment to deal with any such release thus lowering the risk even further.

Social impacts for this project are generally positive vis a vis the economic benefit largely resulting from job creation. This is particularly useful in the Bahama context in that economic diversification is needed due to the inordinate reliance on the tourism economy. A review of the IFS PS below demonstrates the appropriate assessment and results, along with proposed mitigatory actions that have been developed to demonstrate compliance with these provisions.

Table 24: Summary of IFC PS Compliance

Performance Standard	Assessment	Compliance / Mitigation
1. **Assessment and Management of Environmental and Social Risks and Impacts**	Existing social and environmental conditions have been assessed (ESIA).	1. ESIA 2. ESMP/ESMS 3. Stakeholder Engagement
2. **Labour and Working Conditions**	Employer will commit to fair, non-discriminatory employment policies, worker training and advancement, safe working conditions and grievance procedures.	1. ESMP/ESMS 2. Employment Act of 2001 3. Fair Labour Standards Act. 4. Minimum Wages Act 5. Industrial Relations Act 6. Health and Safety at Work Act 7. Immigration Act 8. International Labour Organisation
3. **Resource Efficiency and Pollution Prevention**	CMG will deploy technically and financially feasible resource efficiency and pollution prevention principles.	1. Project plan is to reduce marine pollution through advancing oil recycling technology per MARPOL PRF requirements. 2. Project will complete a Hazardous Operations Planning to identify, eliminate and reduce EHS impacts through the project life cycle.
4. **Community Health, Safety, and Security**	CMG commits to a good-neighbor policy for adjacent land uses. In addition, emergency procedures and plans will be implemented to protect the surrounding community from adverse environmental impacts.	1. GBPA confirms project is consistent with Land Use Master Plan and Zoning. 2. GBPA approves project EIA with conditions. 3. ESMP/ESMS to execute approval conditions.
5. **Land Acquisition and Involuntary Resettlement**	CMG to obtain a long-term lease for the subject property.	1. No current tenants, or occupants on the subject property. No further actions required for compliance.
6. **Biodiversity Conservation and Sustainable Management of Living Natural Resources**	CMG is committed to protecting and conserving biodiversity including ecological goods and services.	1. ESIA has identified no sensitive ecological sites at the subject property nor any in the vicinity likely to be negatively impacted. 2. ESMP/ESMS will provide management requirements to provide for safe management of wastes. 3. The proposed development will reduce the occurrence of marine pollution from improper discharge of pollutants.
7. **Indigenous Peoples**	Not applicable to this project.	Not applicable to this project
9. **Cultural Heritage**	CMG will comply with all international norms for identification and protection of any discovered archeological findings during the construction	1. No known concerns for archeological resources. 2. The site is a brownfield development with previous disturbance.

	of the Facility.	

CMG has developed a Policy Statement for that defines the environmental and social objectives and principles for achieving sound environmental and social performance. Through the Policy, CMGC accepts the responsibility to comply with IFC Performance Standards, EHS Guidelines, ESIA/ESMP, local laws and regulations, and permits and standards. In addition, CMG agrees to ensure compliance at the project for any contractor, subcontractor, or supplier providing services at the PRF. With regard to improving socio-economic conditions in the vicinity of the Project site, CMG is committed to the generation and implementation of plans to foster harmonious development and trade, employment relations and good-neighbor policies with respect to adjacent and local businesses and communities.

9.2 SPECIFIC RECOMMENDATIONS

9.2.1 Recommendations to Avoid and Minimize Environmental Impacts

All projects have the potential for negative environmental impacts, especially those that are adjacent to marine environments. The proposed PRF will accept, treat and dispose of oily liquid waste streams, and if improperly managed, the potential for a release or spill, including a catastrophic event, albeit remote, does still exist. For these reasons it is critically important to deliver and operate Facility that meets or exceeds all general international industry practice (GIIP).

Construction Phase

Civil site works typically create opportunities for sediment laden runoff to enter adjacent waterways, therefore, best management practices for sediment and erosion control should be implemented into the construction plan. The local civil/site designer of record (DoR) should design the appropriate features into the project plan based on the appropriate and applicable design methods and local site conditions including slope, soil conditions, land cover, precipitation, and options for sediment controls based on site constraints. A construction management plan will provide details on the amount of cut and fill required for the site (anticipated to be minimal based on current topography), the laydown areas for staging and equipment storage, the dust suppression system to be used, site specific health and safety plan and demobilization.

A second opportunity for impacts is related to emissions and noise from construction equipment being operated on site. Using newer equipment that meets current emissions requirements from exhausts is recommended whenever practicable. Also, inspecting equipment is important, in particular to ensure that it is in compliance with all appropriate safety regulations (such as back-up alarms). Having a robust and site-specific construction phase health and safety plan (HASP) is also an important component of ensuring safety (this is also a requirement of the ESMP).

The most appropriate recommendation for any project that proceeds through implementation is that the appropriate recommendations (and legal requirements at a minimum) be adhered to. This can be done by inspections by local competent authorities however, these individuals are often constrained by resources and reliance upon their ability to ensure compliance is not always appropriate. This report recommends a third-party inspector be resourced and periodic, and unannounced inspections occur to confirm adherence to the appropriate standards. These inspections should be part of the construction and commissioning phase. Following start-up, future inspections may be completed by the relevant representatives from the standards Organisations that are applicable (for example, ISO 14001, etc.).

Operations Phase

The Operator of the Facility will develop and maintain a Waste Management Plan as well as spill prevention, control and countermeasure plans that are included in the site-specific Health & Safety Plan. Mitigation and management for storage, transport and disposal of solid waste and Small

Quantities of Hazardous Waste (as defined in the IFC General EHS Guidelines) should be conducted in a manner to prevent or control accidental releases to air, soil, and water resources. In addition, the ISO certifications being sought, in particular, ISO 14001 will dictate a high standard of environmental and worker protection, including yearly independent audits. Measures to be incorporated into these standards for this site should include:

- Workers will be trained in the handling, storing and disposal of hazardous and non-hazardous materials;
- In the event of an accidental release of hazardous materials, emergency procedures, equipment, and management plans will be in place so that any spills or leaks can be contained immediately;
- Emergency drills and refresher training should be mandated;
- Any potentially contaminated runoff waters will be adequately managed and treated on site before release, and any clean run-on waters will be diverted away to areas where they may potentially become contaminated (this includes storm events and tidal surges);
- Storage of potentially hazardous materials will take place on hard surfacing and within appropriate containers. Where necessary, these would be covered and incorporate spill or leak containment measures; and,

With regard to off-site disposal of solid and hazard wastes generated during the operation phase, it is expected that municipal disposal site will be utilized. In order to mitigate the impacts to natural resources from waste all materials to be disposed of off-site should be properly containerized prior to transport and disposal at the municipal disposal site, if possible, using leak proof and secure containers or receptacles. Due diligence investigations of the municipal and any other disposal or receiving sites should be conducted on a periodic basis to ensure proper compliance and permitting is achieved.

Based on the IFC General EHS Guidelines (Noise Management), noise prevention and mitigation measures should be applied where predicted or measured noise impacts exceed the applicable noise level guideline at the most sensitive point of reception. The preferred method for controlling noise from stationary sources is to implement noise control measures at the source. Other impacts to the surrounding community will be mitigated based on the distance to the nearest incompatible land uses, along with the measures previously described. If implemented and effective, these measures will protect the community from the most common types of impacts resulting from Operations (dust, air emissions, runoff, traffic, etc.). The greatest significant risk to the surrounding community would be a fire, explosion or environmental release resulting from oil storage tanks and piping. In order to mitigate these risks, the Operator is required to generate and maintain emergency response plans as part of the site-specific Health & Safety Plan in order to direct response actions at the PRF. The Security Management Plan and the Operator's emergency response plans will serve to establish the responsibility for handling emergency situations promptly, minimizing hazards, and disseminating information to all plant personnel and regulatory authorities (as required). Appropriate mitigation measures include:

- Ensure Facility will be manned 24 hours per day, 7 days per week and that the perimeter of the Facility be secured to permit only authorized access to the site;
- All site security personnel will be equipped with communication equipment to maintain contact with construction and operations management personnel and/or the local emergency responders; and,
- Document in the Security Management Plan the Organisational structure of who will implement emergency preparedness and response actions;

Occupational Health and Safety Impacts

The Operator will adhere to all appropriate occupational health and safety guidelines to assist in protecting workers during the operation of the plant. This includes proper training, oversight, safe equipment, and provision of all necessary personal protective equipment (PPE) at no cost to the employees. Occupational health and safety guidelines will follow the requirements of the Health and Safety at Work Act (Bahamas), and the General EHS Guidelines published by IFC. The Health and Safety at Work Act shall represent the minimum legal requirements for workers employed during the construction and operation of the Facility. Additionally, the General EHS Guidelines of IFC covers various OHS aspects including General Facility design and operation and these are also incorporated by reference.

9.2.2 Recommendations to Enhance Potential Socio-Economic Impacts.

Proper and continuous communication is a key component of successful stakeholder engagement. The Steering Committee developed by CMG should continue to communicate project updates, upcoming events that may impact the local community, and good relations with neighbors and adjacent property tenants. A clear and transparent hiring process for workers, opportunities for internal promotions and recognition (especially for achieving safe work goals), and other incentives should be offered. The use of local contractors, suppliers and workers is recommended to provide the optimum economic benefits to the local community.

Decommissioning

Environmental and social impacts during decommissioning of the Project, including infrastructure, have not assessed due to the long life-cycle of the Facility. Additionally, a number of options will likely be available to future users of the project or the site if decommissioning is required. These options will largely drive the type and level of decommissioning required. Regardless, if the plant is to be decommissioned, the Project Owner will be required to GBPA to dismantle any standing structures and provide the site back to a re-usable condition, free of any hazards or contamination.

The recommended decommissioning process will unfold in three key phases as follows:

- Pre-decommissioning activities: includes the detailed planning (development of a Decommissioning Plan, Site Closure and Restoration Plan) and identification of permit and approval requirements
- Decommissioning activities: removal of all infrastructure (including piping, cables, pylons, footers and erections for the connection to the existing utilities). Machinery, steel and dismantled materials will be recycled where possible and disposed of at licensed disposal sites; and any hazardous substances properly contained and managed according to regulatory authority directives
- Post-decommissioning activities: site survey, close out report and field monitoring as necessary.

During decommissioning, the mitigation and monitoring requirements detailed in the Construction ESMP regarding requirements to meet applicable performance standards and the engagement with stakeholders will be addressed in the incorporated in the Decommissioning Plan. As the development process of the site is yet to fully begin, detailed decommissioning plans have not yet been formulated; however, the initial plant life will be designed for a minimum of 25 years. Upgrades during the life of the plant can increase the design life to 50 or more years. A Decommissioning Plan will only be developed during the latter stages of the production life of the Facility. The assessment of the significance of the environmental and social impacts associated with decommissioning will need to be conducted by the ESMP Management Unit once the Decommissioning Plan is finalized. In general, the level of impacts and risk posed by decommissioning activities will be commensurate with those during the construction phase and the standard mitigation measures outlined should be sufficient.

9.3 CONCLUSIONS

The CMG port reception and treatment Facility is properly cited on a brownfield within the industrial zone of Freeport Harbour. As such, potential negative impacts are minimized. The potential for negative operational impacts does exist, but these should be easily managed to low levels by standard operating procedures (SOPs) utilized by responsible organisations. Significant positive outcomes are possible due to the reduction in marine pollution that this new service will provide. Additional positive economic impacts can be assumed due to the non-tourism related employment and multipliers. These positive benefits and avoided/mitigated negative impacts are dependent upon adherence to the proper regulations, professional codes of conduct, and responsible oversight and management. Properly operated, this project could yield significant environmental and health benefits to the populations that reside in or depend on ocean-related activities for their well-being, in the Bahamas, as well as the other Caribbean countries that are affected by the improper disposal of marine waste and pollutants that are dumped into the ocean.

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APPENDICES

Appendix 1: EIA Approval Letter

THE GRAND BAHAMA PORT AUTHORITY, LIMITED

March 4, 2021

Mr. Lloyd Cheong
EnviroLogic International Limited
#6 West Atlantic Drive
P.O. Box F-40163
Freeport, Grand Bahama

Dear Mr. Cheong:

RE: SECOND ENVIRONMENTAL IMPACT ASSESSMENT RESPONSE REVIEW & CLOSEOUT OF DOCUMENT REVIEW – CLEAN MARINE GROUP MARPOL PORT RECEPTION FACILITY USED OIL STORAGE & RECYCLING FACILITY, FREEPORT GRAND BAHAMA REVISION 1 DECEMBER 2020

Please be advised that the Environmental Department of The Grand Bahama Port Authority, Limited has completed the review of the noted document and offers this note as a notice of completion of the process with the approved status.

Please be mindful that the following items has to be adhered to in the immediate future

1. File all relevant development and construction permit applications at the Building and Development Services.

2. Provide an annual update on the development and construction schedule and operation activities for a twelve-month period. Ensure to document all operation and processing activities which would used in the auditing process for the overall project.

3. Remittent of application review fees for the project which would be reconciled and invoiced for March 12, 2021.

Please contact the office if you have any questions or concerns via email at rcargill@gbpa.com or via at 727-2127.

Sincerely,
THE GRAND BAHAMA PORT AUTHORITY, LIMITED

Rico C.E. Cargill
Senior Environmental Inspector

CC: Mr. Michael Fitton, Clean Marine Group
Mr. Rob Speller, Clean Marine Group

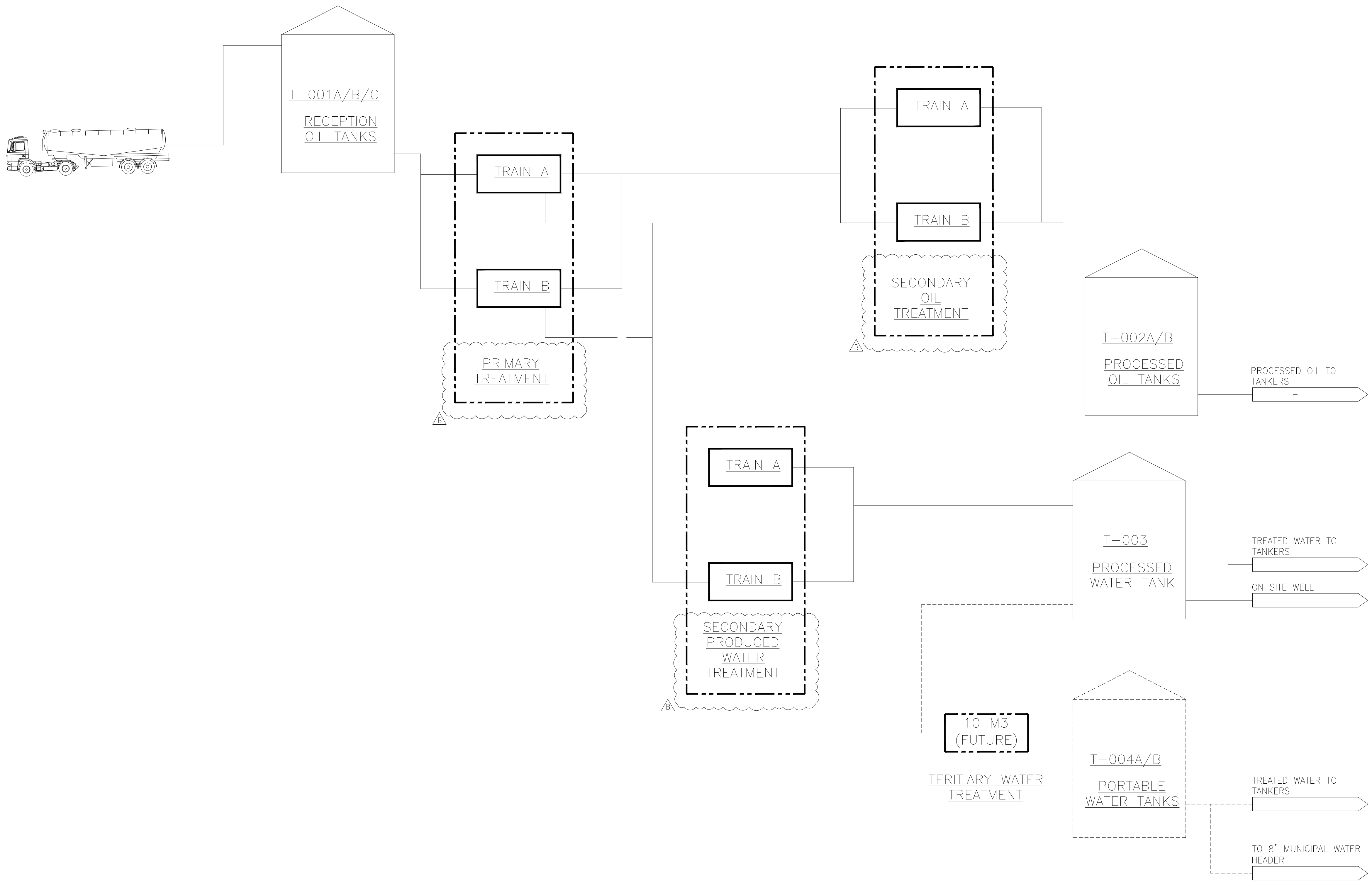
Mr. Charles Rolle, Freeport Harbour Company
Mrs. Nakaria Wilchcombe, BDS-GBPA
Mr. Dudley Francis, BDS-GBPA

Appendix 2. Process Flow Diagram

ITEM NO.	T-001A/B/C	Z-101A/B	Z-102A/B	T-002 A/B	Z-103A/B	T-003	Z-104 (NOTE 2)	T-004A/B
SERVICE	RECEPTION OIL TANKS	PRIMARY TREATMENT PACKAGE	SECONDARY OIL TREATMENT PACKAGE	PROCESSED OIL STORAGE TANK	SECONDARY WATER TREATMENT PACKAGE	PROCESSED WATER STORAGE TANK	TERTIARY WATER TREATMENT PACKAGE	PORTABLE WATER STORAGE TANKS
DESIGN PRESSURE barg	ATM	FV / 10 (VTC)	FV / 10 (VTC)	ATM	FV / 10 (VTC)	ATM	FV / 10 (VTC)	ATM
DESIGN TEMPERATURE (MIN/MAX) °C	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65
OPERATING PRESSURE barg	ATM	VTC	VTC	ATM	VTC	ATM	VTC	ATM
OPERATING TEMPERATURE (MIN/MAX) °C	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35
CAPACITY	2000 M3 (EACH)	10 M3/HR (PER TRAIN)	10 M3/HR (PER TRAIN)	2000 M3 (EACH)	5 M3/HR (PER TRAIN)	1000 M3 (EACH)	10 M3/HR	1000 M3 (EACH)
DIMENSION (OD X T/T)	50' X 36'	VTA	VTA	50' X 36'	VTA	36' X 36'	VTA	36' X 36'

GENERAL NOTES:

1. PROVISION FOR FUTURE TERTIARY PORTABLE WATER TREATMENT PACKAGE



REV	DATE	DESCRIPTION	DRN	CHK	APP
B	16.07.2021	ISSUED WITH BID	VK	TRK	DPC
A	02.03.2021	ISSUED FOR REVIEW	VK	TRK	CHL

CLIENT

VENDOR

PROJECT

OIL AND OILY WASTE RECEPTION FACILITY

TITLE

PROCESS FLOW DIAGRAM

DRAWING No CMG-BA3-P-DW-001 | SHEET 1 OF 2 | REV B

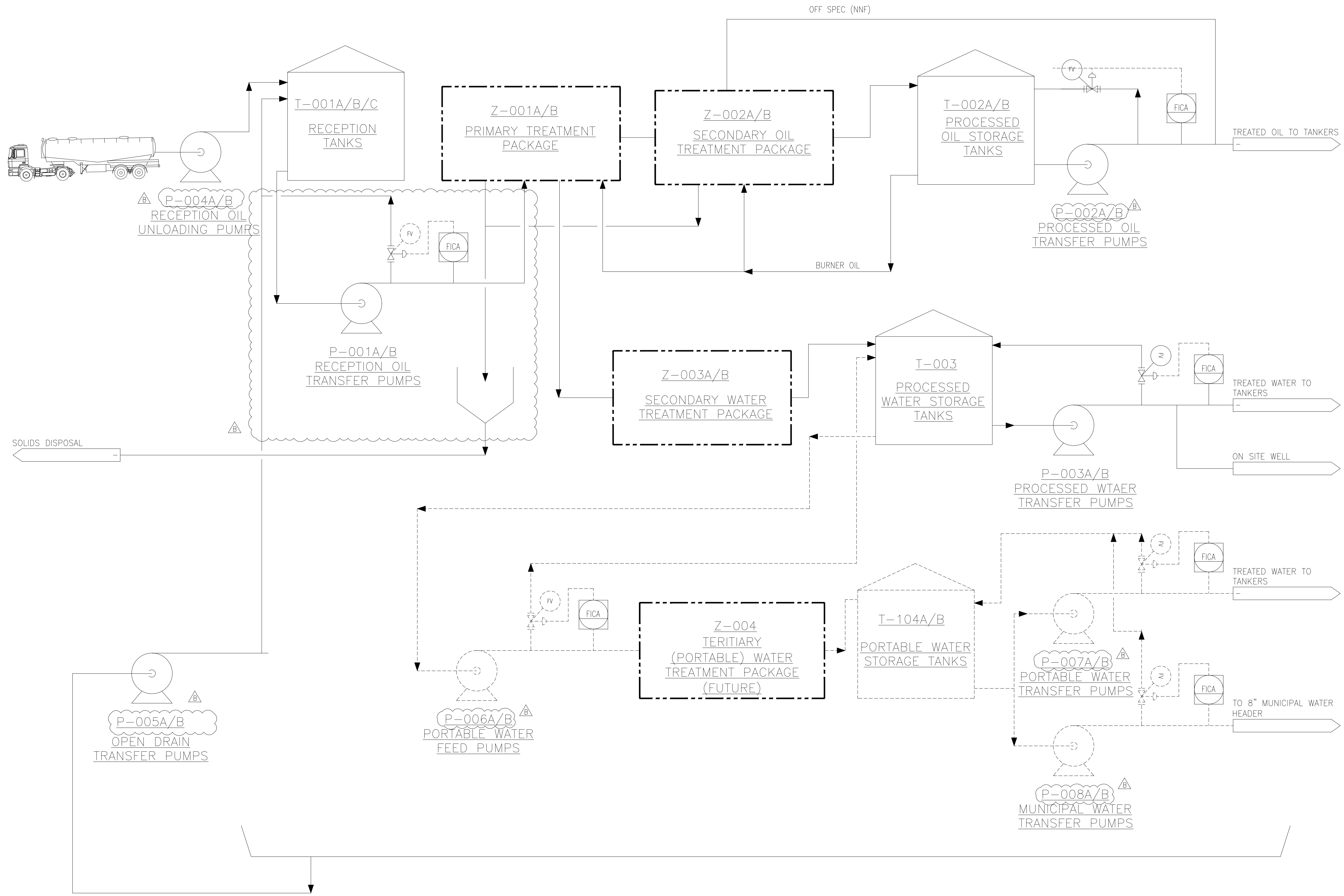
SCALE NTS | SIZE A3

ITEM NO.		T-001A/B/C	Z-101A/B	Z-102A/B	T-002 A/B	Z-103A/B	T-003	Z-104 (NOTE 1)	T-004A/B
SERVICE		RECEPTION OIL TANKS	PRIMARY TREATMENT PACKAGE	SECONDARY OIL TREATMENT PACKAGE	PROCESSED OIL STORAGE TANK	SECONDARY WATER TREATMENT PACKAGE	PROCESSED WATER STORAGE TANK	TERTIARY WATER TREATMENT PACKAGE	PORTABLE WATER STORAGE TANKS
DESIGN PRESSURE	barg	ATM	FV / 10 (VTC)	FV / 10 (VTC)	ATM	FV / 10 (VTC)	ATM	FV / 10 (VTC)	ATM
DESIGN TEMPERATURE (MIN/MAX)	°C	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65
OPERATING PRESSURE	barg	ATM	VTC	VTC	ATM	VTC	ATM	VTC	ATM
OPERATING TEMPERATURE (MIN/MAX)	°C	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35
CAPACITY		2000 M3 (EACH)	10 M3/HR (PER TRAIN)	10 M3/HR (PER TRAIN)	2000 M3 (EACH)	5 M3/HR (PER TRAIN)	1000 M3 (EACH)	10 M3/HR	1000 M3 (EACH)
DIMENSION (OD X T/T)		50' X 36'	VTA	VTA	50' X 36'	VTA	36' X 36'	VTA	36' X 36'

ITEM NO.		P-004A/B	P-002A/B	P-003A/B	P-003A/B	P-006A/B (NOTE 1)	P-007A/B (NOTE 1)	P-008A/B	P-005A/B
SERVICE		RECEPTION OIL UNLOADING PUMPS	RECEPTION OIL TRANSFER PUMPS	PROCESSED OIL TRANSFER PUMPS	PROCESSED WATER TRANSFER PUMPS	PORTABLE WATER FEED PUMPS	PORTABLE WATER TRANSFER PUMPS	MUNICIPAL WATER TRANSFER PUMPS	OPEN DRAIN TRANSFER PUMPS
DESIGN PRESSURE	barg	10	10	10	10	10	10	10	10
DESIGN TEMPERATURE (MIN/MAX)	°C	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65	0 / 65
OPERATING PRESSURE	barg	3	3	3	3	3	3	3	3
OPERATING TEMPERATURE (MIN/MAX)	°C	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35	21 / 35
CAPACITY	m3/hr	5	10	5	5	10	10	10	5

GENERAL NOTES:

1. PROVISION FOR FUTURE TERTIARY PORTABLE WATER TREATMENT PACKAGE



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B	16.07.2021	ISSUED WITH BID	VK	TRK	DPC
A	02.03.2021	ISSUED FOR REVIEW	VK	TRK	DPC

CLIENT

CleanMarine

VENDOR

PROJECT

OIL AND OILY WASTE RECEPTION FACILITY

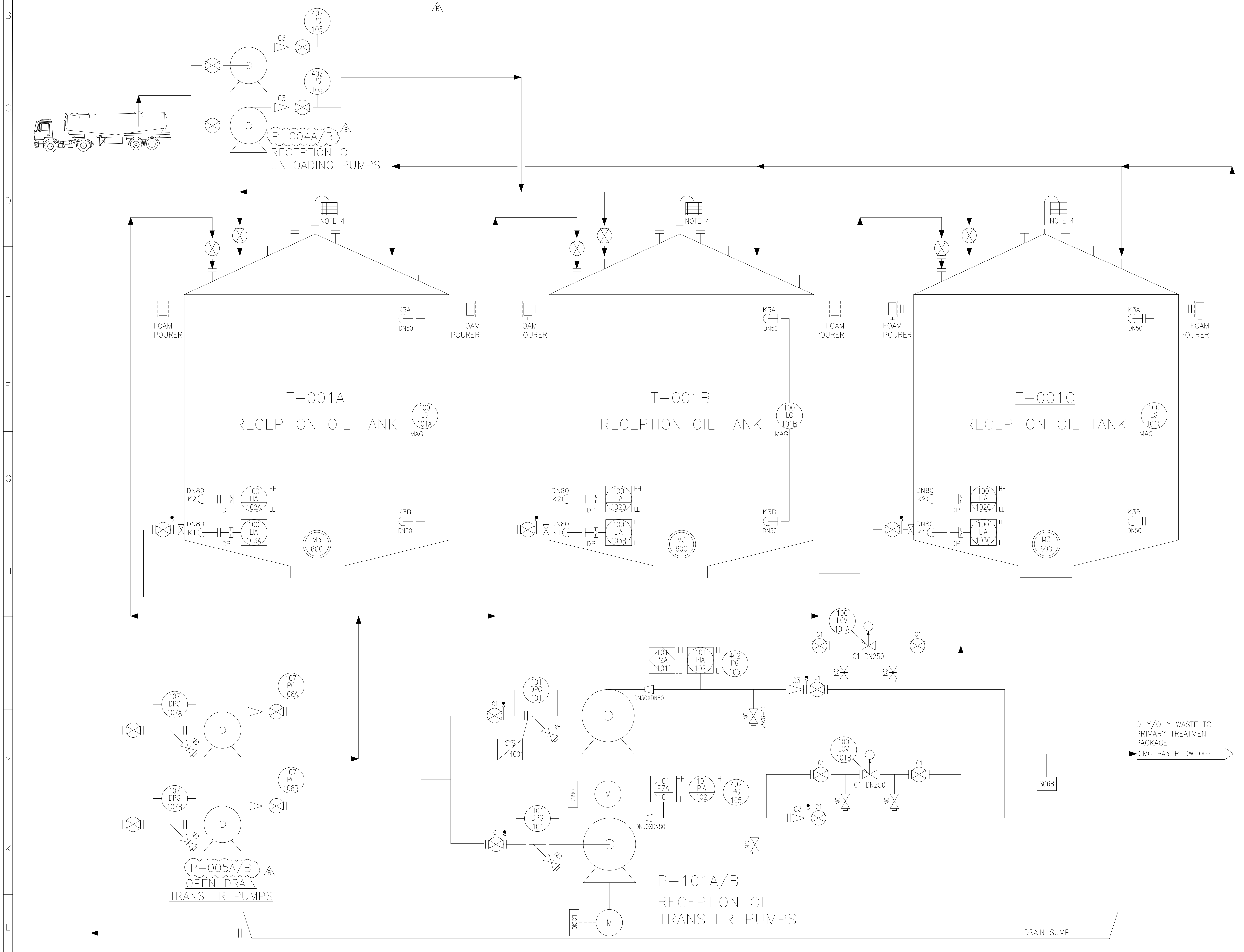
TITLE

PROCESS FLOW DIAGRAM

DRAWING No	SHEET	REV
CMG-BA3-P-DW-001	2 OF 2	B
	SCALE NTS	SIZE A3

Appendix 3. Process and Instrumentation Diagram

ITEM NO.		P-004/B	T-001A/B/C	P-001A/B	P-005A/B
SERVICE		RECEPTION OIL UNLOADING PUMPS	RECEPTION OIL TANKS	RECEPTION OIL TRANSFER PUMPS	OPEN DRAIN TRANSFER PUMPS
DESIGN PRESSURE	barg	10	ATM	10	10
DESIGN TEMPERATURE (MIN/MAX)	°C	0 / 65	0 / 65	0 / 65	0 / 65
OPERATING PRESSURE	barg	3	ATM	3	3
OPERATING TEMPERATURE (MIN/MAX)	°C	21 / 35	21 / 35	21 / 35	21 / 35
CAPACITY		5 m3/hr	2000 M3 (EACH)	10 m3/hr	5 m3/hr



GENERAL NOTES:

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B	16.07.2021	ISSUED WITH BID	VK	TRK	DPC
A	29.03.2021	ISSUED FOR REVIEW	VK	TRK	DPC

CLIENT

CleanMarine

VENDOR

PROJECT

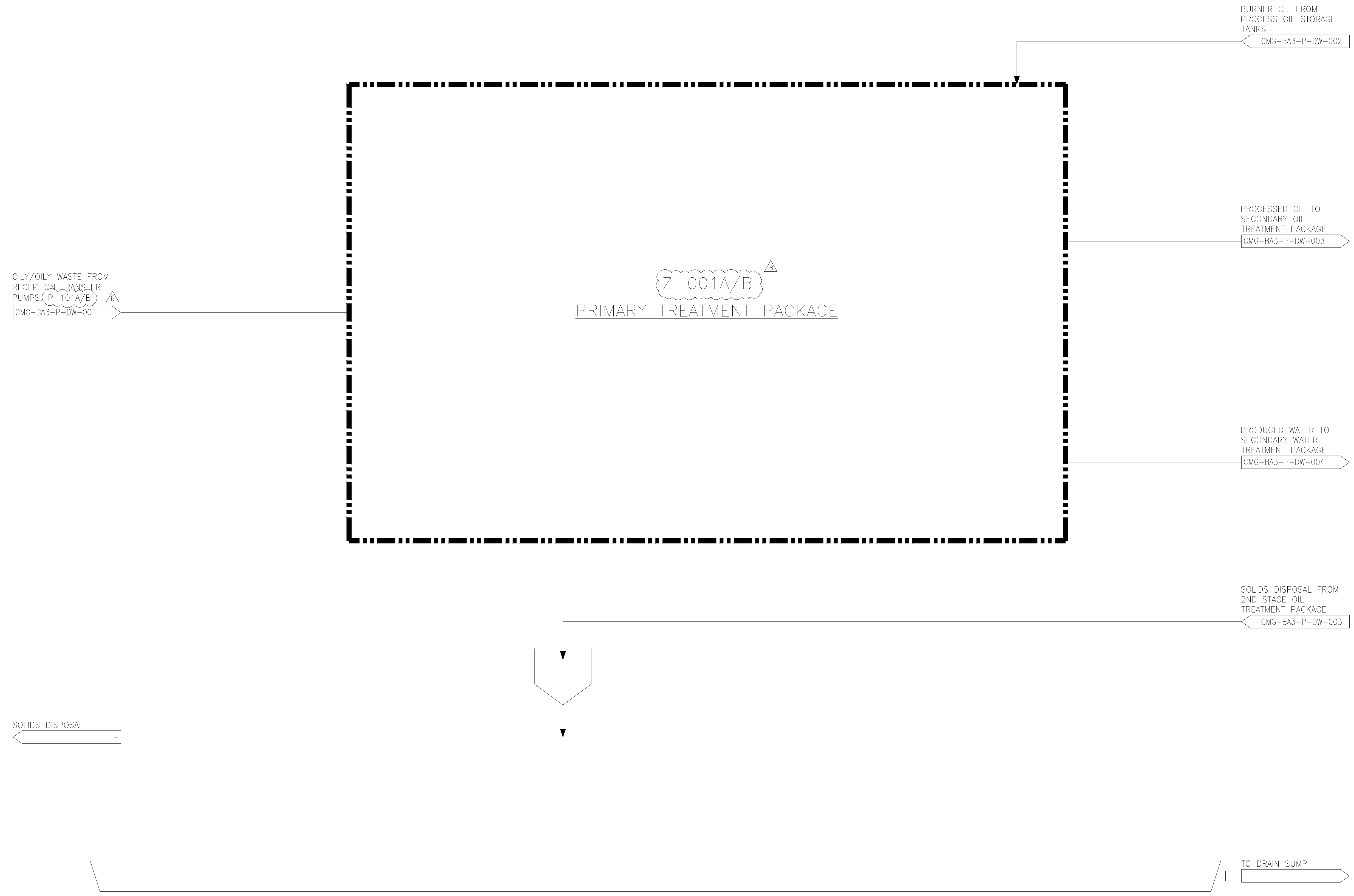
OIL AND OILY WASTE RECEPTION FACILITY

TITLE

PROCESS & INSTRUMENTATION DIAGRAM

DRAWING No	SHEET	REV
CMG-BA3-P-DW-001	1 OF 6	B
THE ORIGINAL AND ALL COPIES OF THIS DRAWING TOGETHER WITH THE COPYRIGHT ARE THE SOLE PROPERTY OF MONTROSE SOLUTIONS.	SCALE NTS	SIZE A3

ITEM NO.		Z-101A/B
SERVICE		PRIMARY TREATMENT PACKAGE
DESIGN PRESSURE	barg	FV / 10 (VTC)
DESIGN TEMPERATURE (MIN/MAX)	°C	0 / 65
OPERATING PRESSURE	barg	VTC
OPERATING TEMPERATURE (MIN/MAX)	°C	21 / 35
CAPACITY		10 M3/HR (PER TRAIN)



GENERAL NOTES:

REV	DATE	DESCRIPTION	DRN	CHK	APP
B	16.07.2021	ISSUED WITH BID	VK	TRK	DPC
A	29.03.2021	ISSUED FOR REVIEW	VK	TRK	DPC

CLIENT

VENDOR

PROJECT

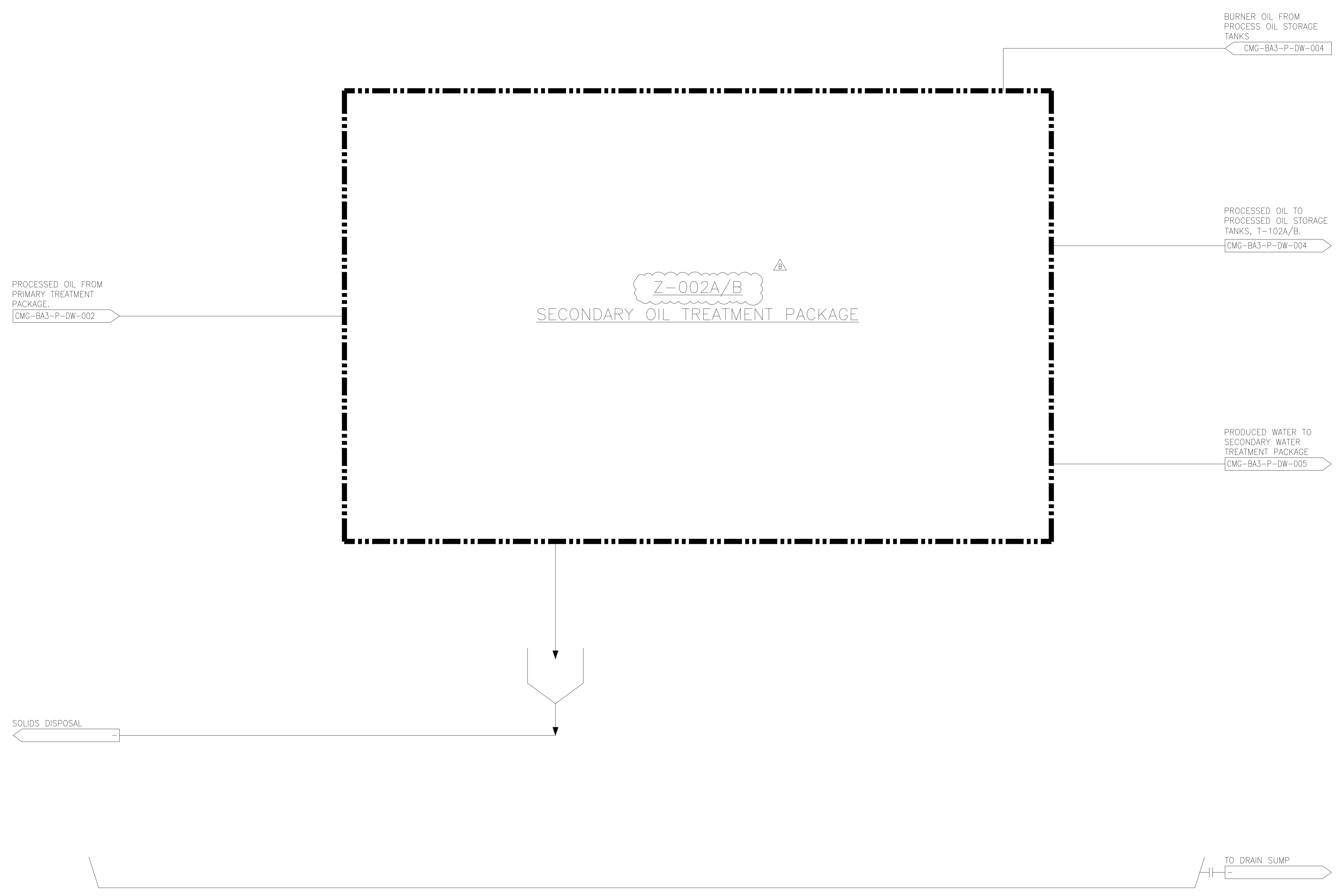
OIL AND OILY WASTE RECEPTION FACILITY

TITLE

PROCESS & INSTRUMENTATION DIAGRAM

DRAWING No	SHEET	REV
CMG-BA3-P-DW-002	2 OF 6	B
	SCALE NTS	SIZE A3

ITEM NO.		Z-102A/B
SERVICE		SECONDARY OIL TREATMENT PACKAGE
DESIGN PRESSURE	barg	FV / 10 (VTC)
DESIGN TEMPERATURE (MIN/MAX)	°C	0 / 65
OPERATING PRESSURE	barg	VTC
OPERATING TEMPERATURE (MIN/MAX)	°C	21 / 35
CAPACITY		10 M3/HR (PER TRAIN)



GENERAL NOTES:

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B	16.07.2021	ISSUED WITH BID	VK	TRK	DPC
A	29.03.2021	ISSUED FOR REVIEW	VK	TRK	DPC

CLIENT

VENDOR

PROJECT

OIL AND OILY WASTE RECEPTION FACILITY

TITLE

PROCESS & INSTRUMENTATION DIAGRAM

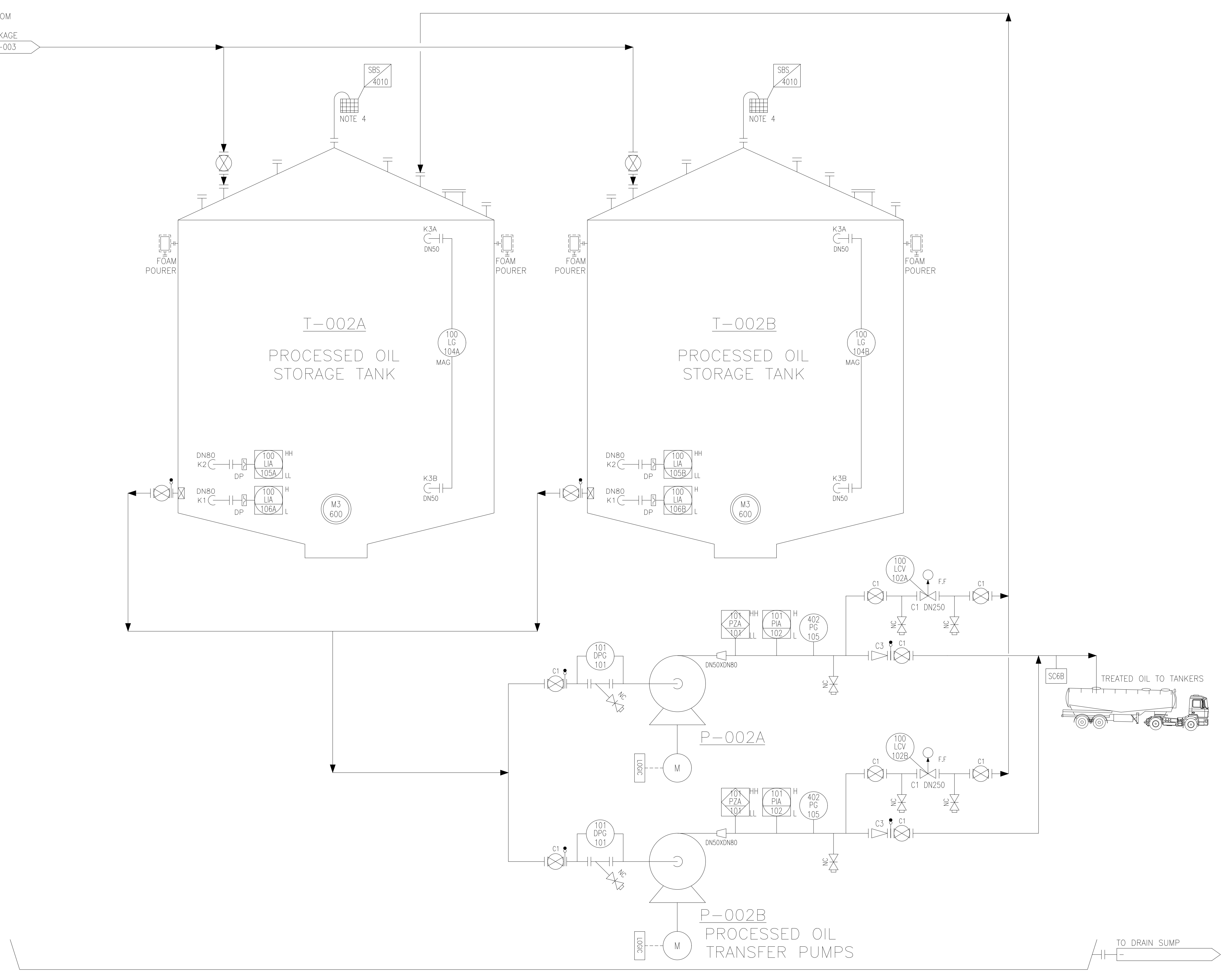
DRAWING No	SHEET	REV
CMG-BA3-P-DW-003	3 OF 6	B

SCALE	SIZE
NTS	A3

ITEM NO.		T-002 A/B	P-002A/B
SERVICE		PROCESSED OIL STORAGE TANK	PROCESSED OIL TRANSFER PUMPS
DESIGN PRESSURE	barg	ATM	10
DESIGN TEMPERATURE (MIN/MAX)	°C	0 / 65	0 / 65
OPERATING PRESSURE	barg	ATM	3
OPERATING TEMPERATURE (MIN/MAX)	°C	21 / 35	21 / 35
CAPACITY		2000 M3 (EACH)	5 m3/hr

GENERAL NOTES:

1. PROVISION FOR FUTURE TERTIARY PORTABLE WATER TREATMENT PACKAGE



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B	16.07.2021	ISSUED WITH BID	VK	TRK	DPC
A	29.03.2021	ISSUED FOR REVIEW	VK	TRK	DPC

CLIENT

CleanMarine

VENDOR

PROJECT

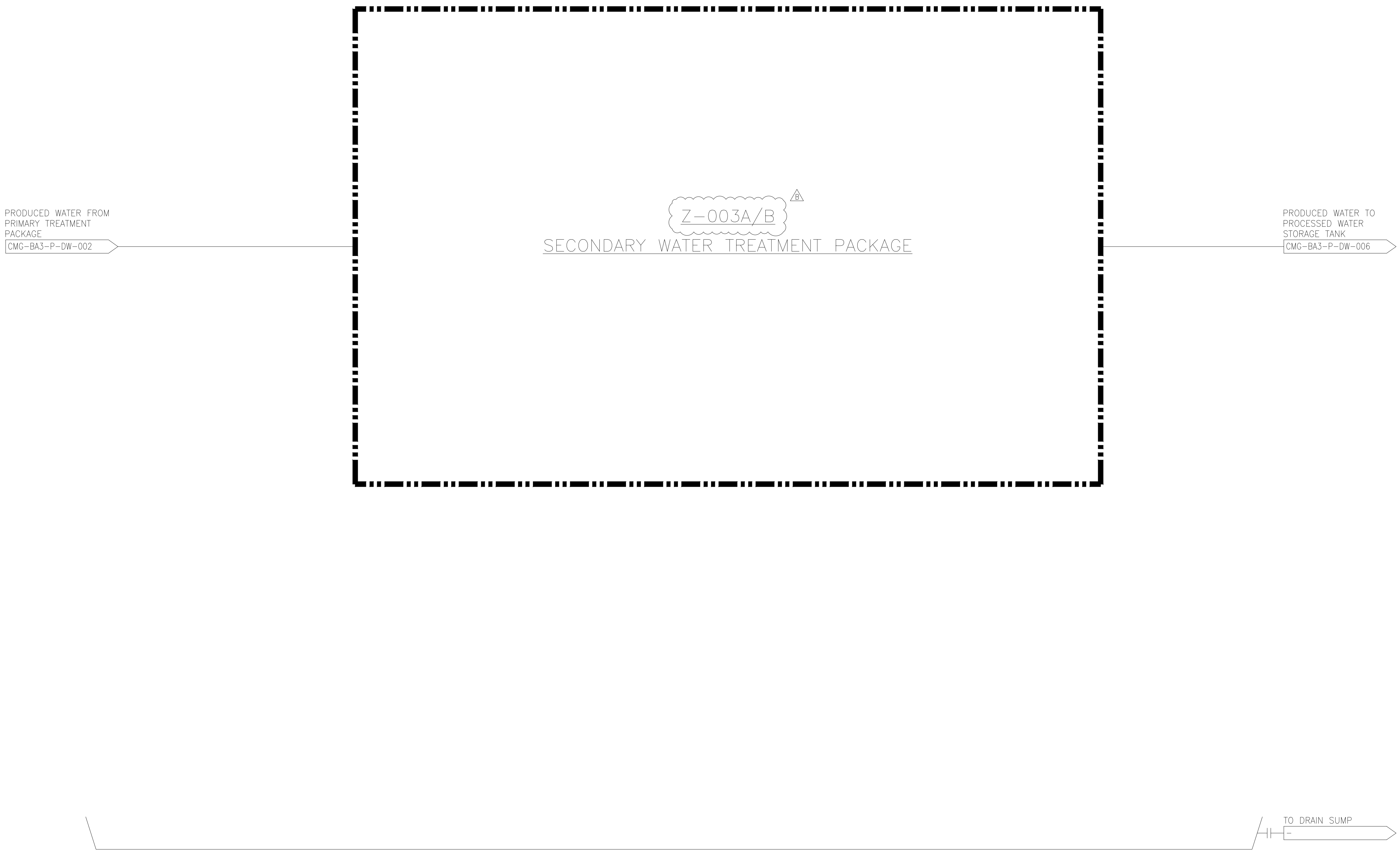
OIL AND OILY WASTE RECEPTION FACILITY

TITLE

PROCESS & INSTRUMENTATION DIAGRAM

DRAWING No	SHEET	REV
CMG-BA3-P-DW-004	4 OF 6	B
	SCALE	SIZE
	NTS	A3

ITEM NO.	Z-103A/B
SERVICE	SECONDARY WATER TREATMENT PACKAGE
DESIGN PRESSURE barg	FV / 10 (VTC)
DESIGN TEMPERATURE (MIN/MAX) °C	0 / 65
OPERATING PRESSURE barg	VTC
OPERATING TEMPERATURE (MIN/MAX) °C	21 / 35
CAPACITY	5 M3/HR (PER TRAIN)
DIMENSION (OD X T/T)	VTA



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B	16.07.2021	ISSUED WITH BID	VK	TRK	DPC
A	29.03.2021	ISSUED FOR REVIEW	VK	TRK	DPC

CLIENT

VENDOR

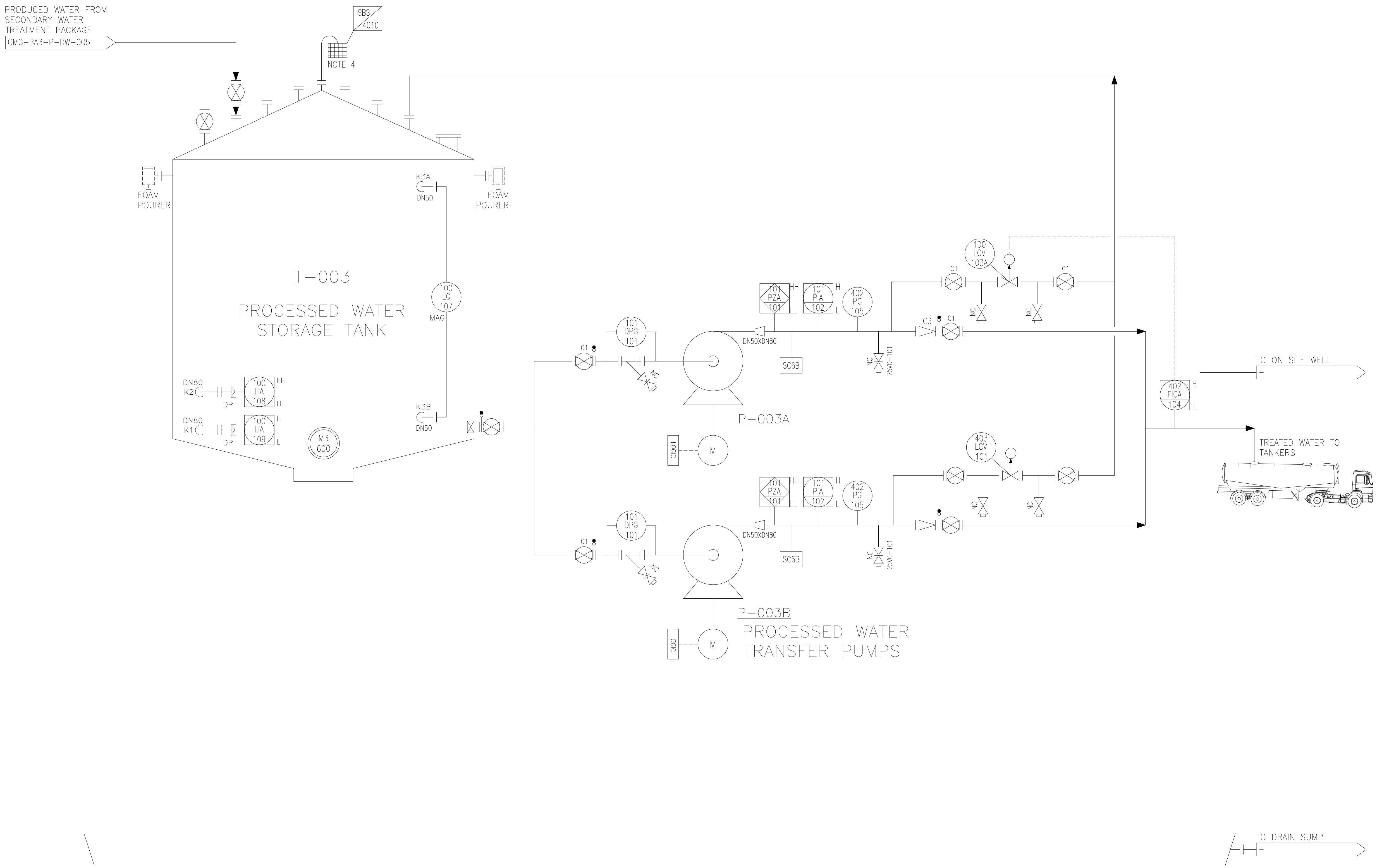
PROJECT
OIL AND OILY WASTE RECEPTION FACILITY

TITLE
PROCESS & INSTRUMENTATION DIAGRAM

DRAWING No	SHEET	REV
CMG-BA3-P-DW-005	5 OF 6	B

SCALE	SIZE
NTS	A3

ITEM NO.		T-003	P-003A/B
SERVICE		PROCESSED WATER STORAGE TANK	PROCESSED WATER TRANSFER PUMPS
DESIGN PRESSURE	barg	ATM	10
DESIGN TEMPERATURE (MIN/MAX)	°C	0 / 65	0 / 65
OPERATING PRESSURE	barg	ATM	3
OPERATING TEMPERATURE (MIN/MAX)	°C	21 / 35	21 / 35
CAPACITY		1000 M3 (EACH)	5
DIMENSION (OD X T/T)		36' X 36'	



GENERAL NOTES:

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CLIENT

CleanMarine

VENDOR

PROJECT

OIL AND OILY WASTE RECEPTION FACILITY

TITLE

PROCESS & INSTRUMENTATION DIAGRAM

DRAWING No	SHEET	REV
CMG-BA3-P-DW-006	6 OF 6	B
	SCALE: NTS	SIZE: A3

Appendix 4. Baseline Noise Study

MARPOL Annex I
Oil and Oily Waste
Port Reception Facility

Baseline Noise Report

Document No. CMG-BA3-H-RP-0002

0	27.02.2021	TD	AH	TD	Issued for Use
A	22.02.2021	TD	JW		Issued for Review
Revision	**Date**	**Prepared**	**Reviewed**	**Approved**	**Issued Status**

Clean Marine Group
PO Box F42531, Freeport, Grand Bahama Island, The Bahamas

Table of Contents

Executive Summary

Clean Marine Group (CMG) are constructing a MARPOL Port Reception Facility (PRF) in Freeport, Grand Bahama. An Environmental Impact Assessment (EIA) has been completed and approved. This baseline noise study will provide CMG with data which can be used to compare with that measured during the later phases of the project. The site of the facility is located within an industrial area where companies such as Freeport Container Terminal, Bahama Rock and Cemex are currently operating. These companies are operating 24hours per day, 7 days per week.

Measurements were taken on the proposed site and two of the nearest local communities, namely Queen's Cove and Eight Mile Rock. Due to the 24hour operation of the industrial area, the sampling included a night-time reading. Although it is not planned for CMG to undertake construction during the night, it was prudent to ensure that baseline data is available to CMG.

There are currently no regulations for noise limits issued by the Grand Bahama Port Authority nor Bahamian legislation. This report has benchmarked the results against European and World Bank limits. The baseline sound power levels measured at each of the locations are within the recommended limits for industrial and residential areas. The sound power level during construction and operation should be monitored to ensure that the noise levels do not exceed these limits. Monitoring is essential during these phases to allow CMG to take mitigation actions to reduce the noise should the allowable limits be exceeded.

Tien Do

FIEAust, CPEng, NER, APEC Engineer, IntPE(Aus)

1 Introduction

Clean Marine Group are constructing a MARPOL Annex I Oil and Oily Waste Port Reception Facility (PRF) in Freeport, Grand Bahama. As part of the Environmental Impact Assessment (EIA), a baseline noise study is required to ensure that the facility construction and operations do not adversely impact the area. This report documents the existing ambient noise level and the predicted noise levels for construction and operation phases. The area for the new PRF is shown in Figure 1. Three locations within the lease area are used to measure the baseline ambient noise levels.

2 Brief Project Description

Clean Marine Group (CMG) are building a Port Reception Facility (PRF) on Grand Bahama to process MARPOL Annex1 oil and oily waste. The PRF will be constructed on reclaimed land within the Freeport Harbor precinct. Waste oil will be received from trucks to the facility for processing. The waste processed will produce merchantable oil and re-usable water which will be made available to other Freeport companies and users. The re-processed water will be provided in various grades which will allow optimal use of this limited resource.

The site location for the CMG facility is located on the western side of Freeport Harbour on Parcel 2 of Basin 3 (Figure 1). The site more specifically is to the west of the Freeport Container Port offices and encompasses 4.12 acres. This site is zoned heavy industry by the Grand Bahama Port Authority's Freeport Land Use Masterplan. Therefore, this development suits the current zoning designation. The survey drawing for the site is presented as Figure 2 in the Figures section of the report.

The CMG property is bounded to the east by the Freeport Container Port office building and parking lot. To the west Basin 3, to the south Parcel 4 (vacant land owned by Freeport Harbour Company) and to the north Parccel 3 vacant land.

The photograph below shows the location of the proposed Clean Marine MARPOL treatment plant.

Figure 1: Plot Location

3 Terminology

3.1 Abbreviations

dBA	A weighted sound power level
dBC	C weighted sound power level
SPL	sound power level
L_{eq}	equivalent sound power level
L_{Aeq}	A weighted L_{eq}
L_{max}	maximum sound level recorded during the measurement period
L_{Cpeak}	C weighed peak sound power level
TWA	Time weighted average of a worker's daily exposure to occupational noise
Dose	total noise exposure during a worker's daily shift

3.2 Data Analysis and Criteria

For environmental noise studies, noise levels are typically described using A-weighted equivalent noise levels, L_{Aeq}, during a certain time period. The L_{eq} metric is useful because it uses a single number, similar to an average, to describe the constantly fluctuating instantaneous noise levels at a receptor location during a period of time, and accounts for all of the noises and quiet periods that occur during that time period. The L_{max} metric denotes the maximum instantaneous sound level recorded during a measurement period.
C-weighting, or C-weighted decibels (dBC), gives equal emphasis to sounds of most frequencies. This dBC scale is generally used to describe low frequency noise, such as the "rumble" of large fans and the "boom" of blasting. Because A-weighting underestimates the human annoyance caused by these types of low frequency sounds, C-weighting is used to assess disturbance due to low frequency sounds. Large amplitude impulsive sounds, such as blasting, are commonly defined using the unweighted instantaneous peak noise level, L_{Cpeak}, and reported as Lpk dBC.

There are currently no published noise requirements from the Grand Bahama Port Authority (GBPA) thus World Bank EHS standards will be used to determine the limits. These are indicated below. These limits align with European CE directives which stipulate 70dBA for machinery noise. CMG will aim to design the facility to achieve these limits.

Table 1.7.1- Noise Level Guidelines[54]

	One Hour L_{Aeq} (dBA)	
Receptor	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational[55]	55	45
Industrial; commercial	70	70

Figure 2: World Bank Limits[1]

4 Noise Measurement Methodology

The noise samples were taken at various times of the day over a period of 7 days. The sound pressure levels were observed to be steady without much variations except aircraft or the infrequent car traffic. These are noted in the measurements and evident in the results for L_{max}. Therefore the readings were taken over a 1 minute period.

4.1 Location Selection

Three locations are selected for the study. These represent the areas of importance during the construction and operation. Only three locations were selected given consideration of the size of the plot and also the shape of the plot.

Location1 is near the northern boundary of the lease area. This is the proposed location of the future office and closest to the current Bahama Rock limestone conveyor loading system.

Location2 is on the east boundary which is closest to the container terminal. Although this is on the boundary, the terminal has a large storage of containers which in effect shields the plot area against the cranes and ships on the other side of the container terminal. The location is also the site of the proposed processing plant.

Location3 is on the southern boundary of the plot area. This is also the proposed location of the tank farm hence lower noise expected from this area from our operations. Any noise will likely be from the container terminal and ships entering and leaving Basin3.

Location 4 is Eight Mile Rock community. This area is still very active and a gateway to the other communities on the West of the island.

Location 5 is Queen's Cover community. This community was devastated by Hurricane Dorian and has not recovered significantly. There are a handful of occupied residences only.

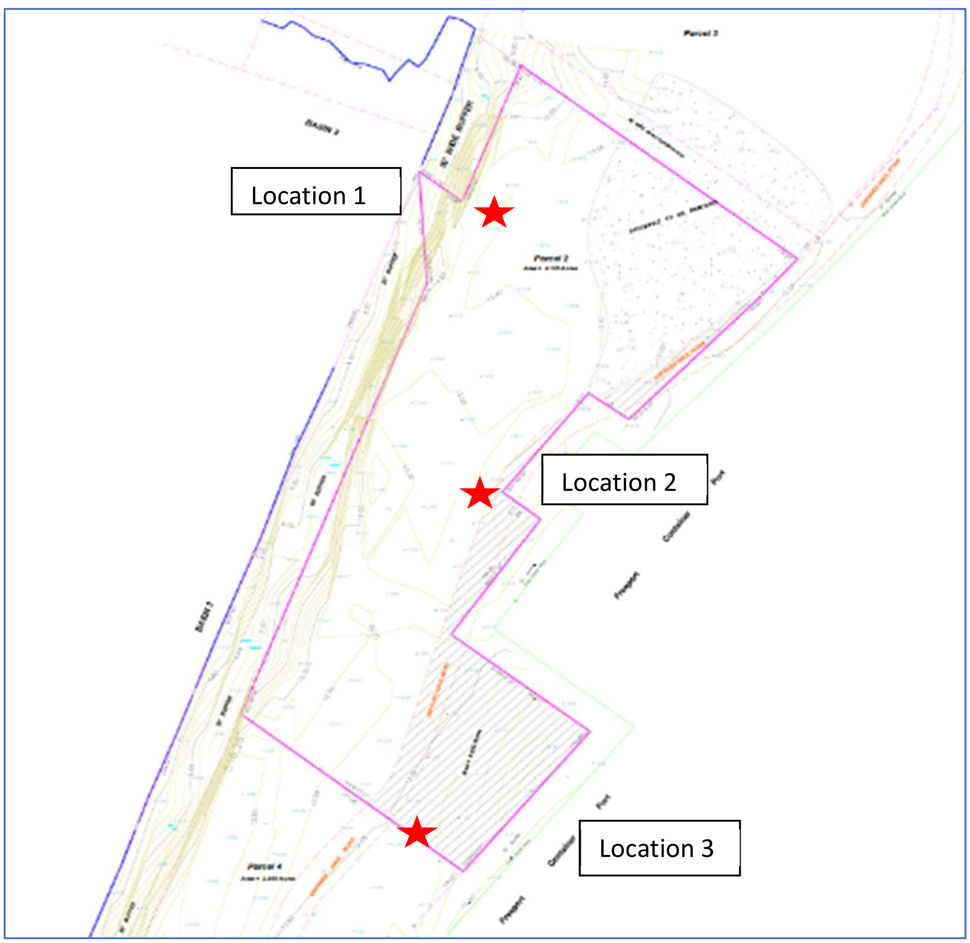


Figure 3: Lease area locations

Figure 4: Residential Locations

Figure 5: Location 1 looking SSE to container terminal

Figure 6: Location 2 looking over the container terminal fence

Figure 7: Location 4 ENE towards CMG plot

Figure 8: Location 5 looking SW towards CMG plot

4.2 Measurement

The measurement was taken with an iPhone11 using the National Institute for Occupational Safety and Health (NIOSH) app. This app has been developed by NIOSH to promote awareness of noise in workplaces and allow employees to make informed decisions about their noise environment and whether they needed to make changes to protect their hearing. The app has been tested and validated at the NIOSH acoustics lab with results indicating that the app is accurate to within ±2dBA. Other key features[2] of the app include:

- Developed by experienced acoustics engineers and hearing loss experts.
- Meets Type 2 requirements of IEC 61672:3 SLM standard when used w/ external microphone.
- Provides the most relevant metrics found in professional sound instruments today. Averages such as L_{Aeq} and TWA, Max and Peak Levels, Noise Dose and Projected Dose according to NIOSH and OSHA standards, and all three major weighting networks (A, C, and Z).
- Capability to calibrate either internal or external microphone. Reporting and Sharing data.
- Up-to-date informational screens on what noises are considered hazardous, how to conduct a noise measurement, how to properly select a hearing protector, and guidelines for preventing hearing loss.
- Technical support available directly from NIOSH hearing experts.

The measurements were taken with the iPhone internal microphone.

4.3 Existing Noise Environment

The site is located in an industrial area on reclaimed land. The nearest urban area is Eight Mile Rock town across Basin3 and approximately 1.5km in a direct line. The other urban area is Queens Cove which is approximately 2.5km in a direct line to the North East. Although these areas are sparsely populated, baseline noise measurements will be taken at these locations and indicated by Figure 4: Residential Locations. Basin3 is currently occupied by Cemex and Bahama Rock to the western side of Basin3 and the Freeport Container port directly to the west and sharing a boundary (with 30' buffer) with the CMG lease area. The container port ship wharf is on the other side and usually has a "wall" of containers stacked between the ships and CMG plot. This reduces the noise from the ships and cranes used to unload and move the containers. The site is close to the flight path of runway 06 of Freeport Grand

Bahama International Airport (IATA FPO) however these are not considered in the analysis. This is noted as highly intrusive noise in the World Bank guidelines and should not be considered in background noise levels. The Bahama Rock operations include bulk carrier loading via conveyor system and this has been included in the analysis.

Figure 9: Bahama Rock bulk carrier being loaded by conveyor

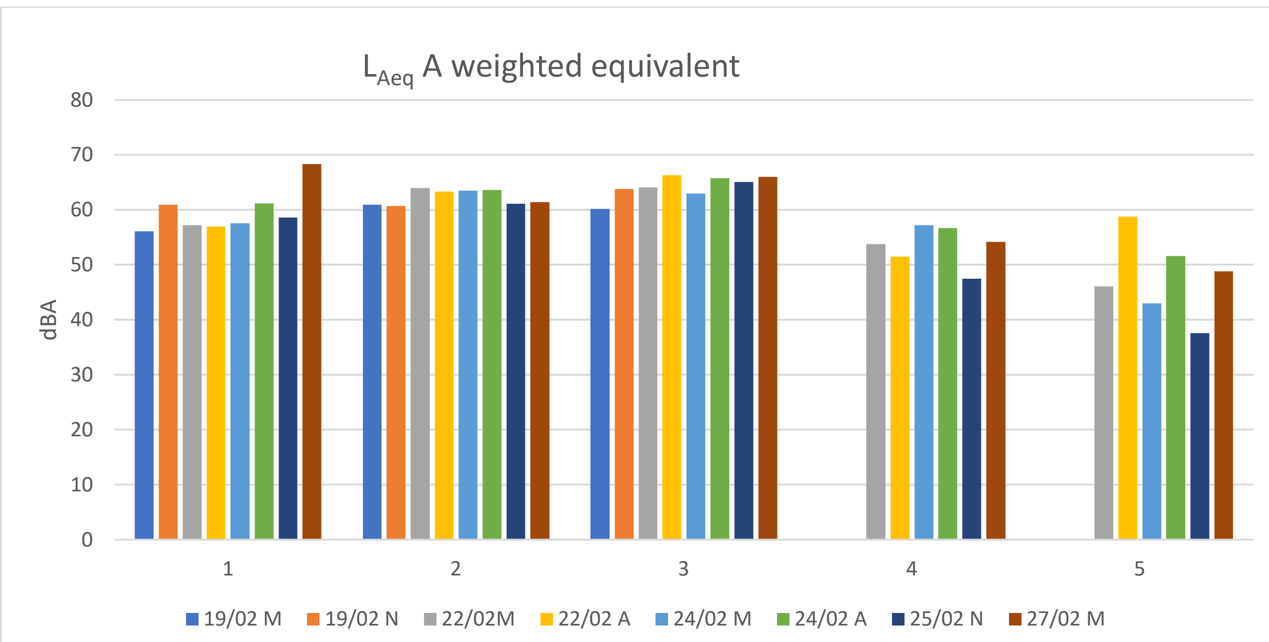
Figure 10: Night-time measurement at Location1

5 Results

Readings are taken generally in the morning (M), midday (N) or afternoon (A). One reading during the evening (E) was taken should construction or operations be undertaken at night. No measurements are taken during periods of rain or high wind which would increase the baseline noise readings. Notes are included with the measurements detailing any unusual activity during the measurement such as vehicles or aircraft. The average shown in the table below does not include the night result.

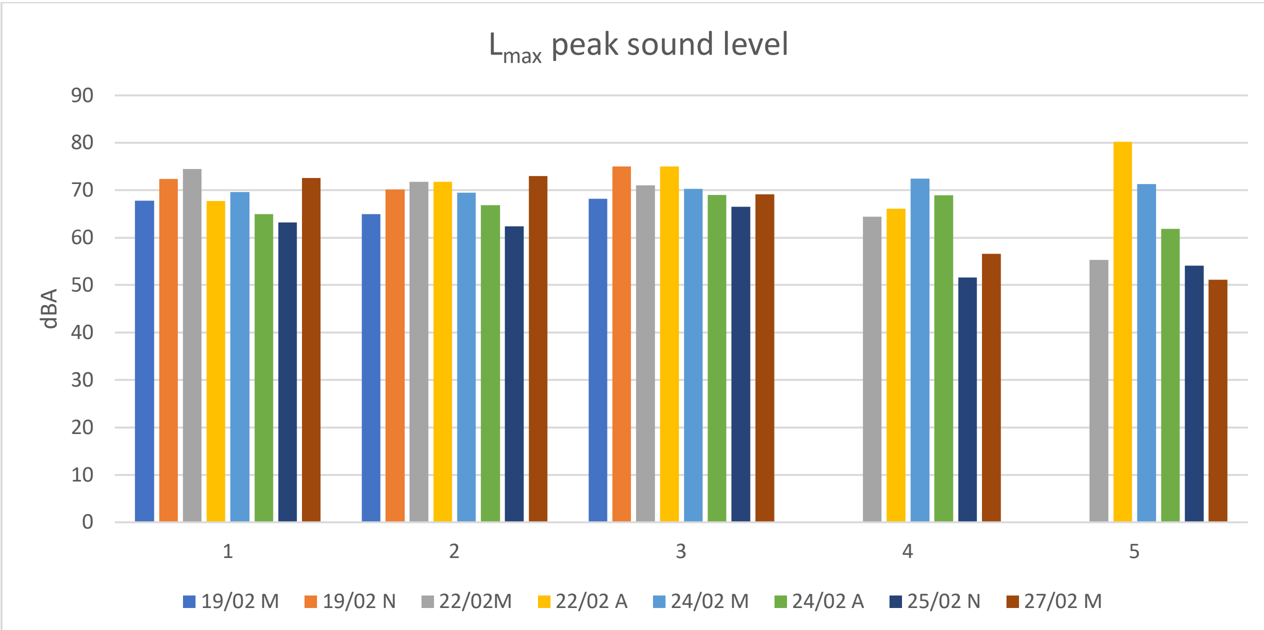
5.1 L_{Aeq} A weighted equivalent

Location	19/02 M	19/02 N	22/02M	22/02 A	24/02 M	24/02 A	25/02 E	26/02 M	Average
1	56.1	60.9	57.2	57.0	57.6	61.2	58.6	68.3	59.2
2	60.9	60.7	64.0	63.3	63.5	63.6	61.1	61.4	57.7
3	60.2	63.8	64.1	66.3	63.0	65.8	65.1	66.0	60.6
4			53.8	51.5	57.2	56.7	47.5	54.2	54.5
5			46.1	58.8	43.0	51.6	37.6	48.8	49.3



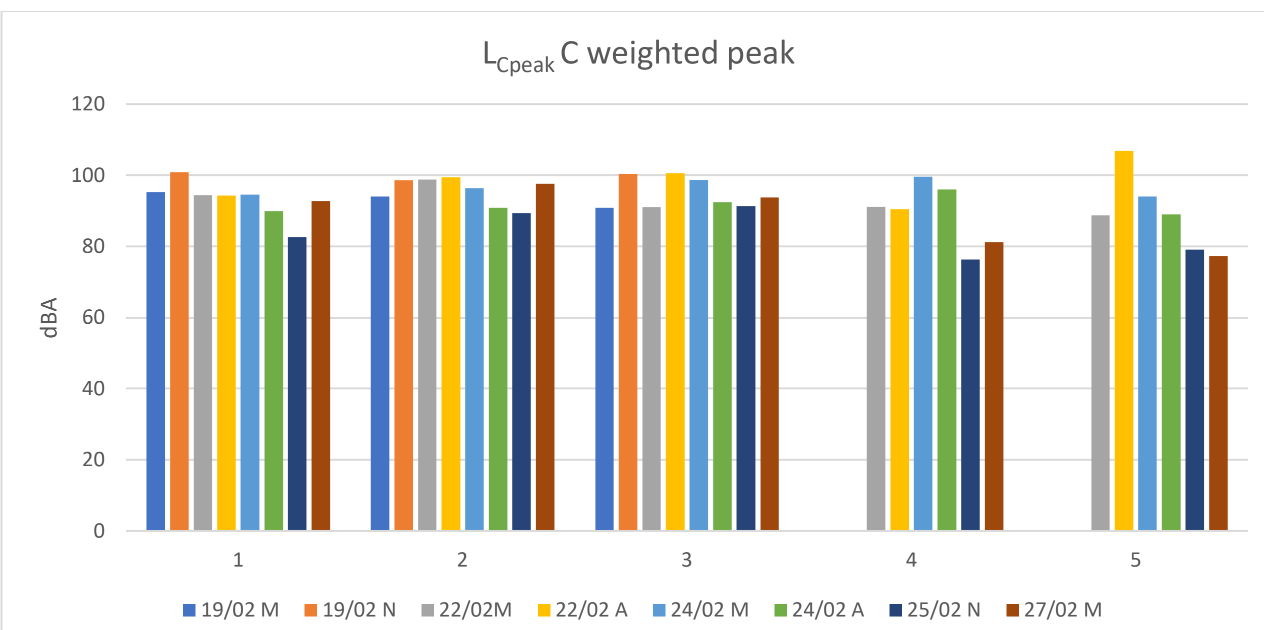
5.2 L_{Cpeak} C weighted peak

Location	19/02 M	19/02 N	22/02M	22/02 A	24/02 M	24/02 A	25/02 E	26/02 M	Average
1	95.3	100.9	94.4	94.3	94.5	89.9	82.6	92.8	87.1
2	94.0	98.6	98.8	99.4	96.3	90.9	89.3	97.6	90.2
3	90.9	100.4	91.1	100.5	98.7	92.4	91.3	93.8	88.1
4			91.2	90.4	99.6	96.0	76.3	81.2	87.8
5			88.7	106.9	94.0	89.0	79.1	77.3	86.0



5.3 L_{max} peak sound level

Location	19/02 M	19/02 N	22/02M	22/02 A	24/02 M	24/02 A	25/02 E	26/02 M	Average
1	67.8	72.4	74.5	67.7	69.6	64.9	63.2	72.6	66.2
2	64.9	70.1	71.8	71.8	69.5	66.8	62.4	73.0	66.3
3	68.2	75.0	71.0	75.0	70.3	69.0	66.5	69.1	65.4
4			64.4	66.1	72.5	68.9	51.6	56.6	62.3
5			55.3	80.2	71.3	61.9	54.1	51.1	59.1



6 Predicted Noise Levels

6.1 Construction

The noise during construction will be expected in two main phases. The first phase being heavy machinery to complete the civil works. This is expected to be minimal as the site topographical survey has indicated a variation of less than 2" over 90% of the area with a drop-off of 7" along the western boundary to the water buffer zone. Two deep wells will be drilled with the location yet to be determined however these are small bore wells which is expected to be completed within a few days. More details and monitoring will be conducted during the drilling operations.

The second phase will be the construction of the tanks, process building and office building. The noise from these activities is expected to be within normal noise limits with the main noise from heavy machinery (trucks delivery equipment and lifting cranes). It is suggested that these activities are not scheduled during the night-time hours (2000hrs-0700hrs) should any work be scheduled during these times. Monitoring will be conducted regularly during this phase.

6.2 Operation

The facility will be designed to house the processing equipment inside a plant building. This building will be secondary attenuation of the noise from the rotating equipment and process piping. The primary attenuation will be the design of the equipment to meet 75dBA maximum by way of local treatment to individual machines. The sound level outside of the building will be less than 70dBA.

Noise from tanker truck movements delivering waste to and removing re-processed oil will be infrequent. The number of tanker movements will be much less than the number of trucks hauling containers from and to the container port.

7 Conclusions

The study has taken measurements during a 7-day period and the results in section 5.0 indicate that the L_{Aeq} does not exceed 65dBA within the industrial area. The noise levels are consistent with the movements of cranes and ships in the container terminal and Bahama Rock loading operations. The night-time noise confirms that there is lower levels measured in the residential areas however the levels recorded in the plot area (Locations 1-3) does not significantly drop due to the 24hour operation of the container terminal and Bahama Rock. The L_{Apeak} is much below the general accepted limits of 110dBA.

The residential area is within the acceptable limits of 55dBA and the locations are the closest to the industrial area. Noise levels measured are affected more due to local traffic than background noise from the industrial area which account for the peaks in the measurement.

It is recommended that a comparison be conducted with a calibrated sound level meter to confirm the NIOSH study for the specific device used with the software. This should be done at the earliest and not later than the commencement of construction.

8 References

1. International Finance Corporation, World Bank Group
   General EHS Guidelines: Environmental Noise Management
   April 30, 2017
2. https://www.cdc.gov/niosh/topics/noise/app.html
   NIOSH Sound Level Meter App
   Including referenced Publications and Studies

Appendix 1 – Weather during the study period

Figure 11: Friday 19th February Morning

Figure 12: Monday 22nd February Morning

Figure 13: Wednesday 24th February morning

Appendix 2 – Data Measurement Typical Output

Noise measurement report

Date: 19/02/2021, 08:49

Operator: Tien Do

Place: Basin3, Location1

Measurement results

Measurement time (hh:mm:ss)	00:01:00	
LAeq	56.1	dB
LCpeak	95.3	dB
Max. level	67.8	dB
TWA		dB
Dose		%
Projected dose		%

Notes

Cranes operating at container port along with forklifts

Appendix 5. C.V. of Principal Consultants

ROBERT R. JONES, Ph.D.

Phone: 423.444.5432 / Skype: robjones6600
131 Smartview Lane, Abingdon, VA 24210
rjones6600@gmail.com

EDUCATION

Ph.D.; 2010 - Environmental Science; Rhodes University, South Africa
M.Sc.; 2000 - Environmental Science & Policy; Johns Hopkins University
B.Sc.; 1987 - Geography and Environmental Planning; Towson University

EMPLOYMENT HISTORY

2015-Present; Program Manager, BAE Systems, Holston Army Ammunition Plant, Kingsport, TN. Responsibilities include managing industrial modernization environmental compliance projects (design through operation), project management and risk mitigation for an international defense contractor. Managed $100M in industrial wastewater modernization and hazardous waste incineration project development from concept through system commissioning and turn-over. Recent experience includes leading a team of experts on an international trade study for explosive waste incineration technologies in Europe and the United States.

2006 – 2015; Owner/Principal Consultant, Sustainable Development Consulting International, Inc. (SDCI), Virginia, USA. Responsibilities included developing and managing sustainable economic development projects for municipalities and non-governmental organizations through conceptualization, design, financing, construction, and commissioning/client turn-over. Additional projects included environmental and economic impact studies for mining and hazardous waste abatement projects in Angola, Central African Republic, South Africa, Kenya and the United States.

2003 to 2006; Project Manager and Senior Consultant, Coastal & Environmental Services (CES), and Conservation Support Services (CSS), Grahamstown, South Africa. Responsibilities include project management for international clients throughout Africa. Preparation and review of major strategic land use assessments, risk assessments, environmental impact assessments and contract management.

1989 to 2003; Projects Manager/Associate, Frederick Ward Associates, Inc., Bel Air, Maryland. Responsibilities included environmental assessment, project feasibility assessments, remediation projects, wetland mapping and project management.

PROFESSIONAL EXPERIENCE / RECENTLY COMPLETED PROJECTS

- 2019; Project Manager under contract through the U.S. Army for a technology feasibility study and **international trade study**. Responsibilities include leading a diverse team of subject matter experts, engineers, and safety professionals to identify and down-select pollution remediation technologies including assessment of technology readiness levels (TRLs), safety, engineering, environmental, and operational issues.
- 2015-Present; Project Manager for a $40M **industrial wastewater treatment** plant modernization program to reduce pollution and achieve regulatory compliance for the U.S.

Army. Projects were completed ahead of schedule and under budget. Responsibilities include proposal development, subcontract management, schedule development and management, risk management, testing and evaluation plans, customer reporting, contract deliverables, quality control, commissioning, and close-out.

- 2012-2015; **Feasibility Assessment** / Project Manager for the St. Paul Industrial Development Authority (IDA). Robert Jones completed a market and demographic assessment for a downtown revitalization project (Willis Building / Dye Properties) and development concept (including pro forma, financing strategy and economic impact assessment). R. Jones further completed grant applications that resulted in the acquisition of $1.1+ million in development funding for a mixed-use redevelopment of the property. The project is currently under construction with a total budget of $8 million and R. Jones is providing continual project management support to the IDA.
- 2012; Southwest Virginia Regional Recreation Authority (SRRA). R. Jones assisted the Lane Group as the primary economic consultant for the Spearhead Trails **Market Feasibility Assessment**. Work included a detailed market feasibility assessment supported by primary data collection in West Virginia, Virginia, and Kentucky. The study included assessments of various project alternatives, supporting tourism infrastructure and facility pro forma development.
- 2010; R. Jones completed an environmental and socio-economic /housing survey and social impact assessment (**SIA**) of the former asbestos mining regions of South Africa for the National Department of Environmental Affairs and Tourism (DEAT) – Assessment of environmental asbestos contamination across four Provinces. Lead environmental and socio-economic consultant for Conservation Support Services (CSS).
- 2007-2011; Project Manager for Heartwood: Southwest Virginia's Artisan Gateway. R. Jones was the project manager on behalf of the Owner for the architectural design, **LEED** certification, construction administration, economic assessment, marketing studies and Clerk of the Works services. R. Jones was the principal grant writer for over $12 million in funding for the project. The total project budget was $18 mil.
- 2004-2006; Strategic Environmental and Socio-Economic Assessment (**SEA**) for the South African National Department of **Water Affairs and Forestry** (DWAF) – strategic environmental assessment to determine the extent of new forestry potential in the Eastern Cape., South Africa. Project Manager and lead consultant for a team of twenty professionals including professional forestry consultants, hydrologists, biologists, socio-economic and stakeholder engagement, social impact assessment and **GIS**. The project was as a best practice example by Department of Water Affairs.
- 2006; R. Jones was the lead environmental and socio-economic consultant for a Preliminary Environmental and Social Impact Assessment for the Dimbi Diamond Mining Project in the **Central African Republic** – lead environmental assessor for Coastal & Environmental Services.
- 2004-2005; **Port of Port Elizabeth** Strategic Environmental Assessment (**SEA**) for Transnet South Africa (conducted for Coastal & Environmental Services (CES), Grahamstown, South Africa. Served as principal environmental consultant reporting to Kevin Wittington-Jones, Project Manager at CES.
- 2002; Industrial Development Feasibility Assessment (with Frederick Ward Associates) of the Perryman industrial corridor, Harford County, Maryland. R. Jones was the assistant project manager and environmental planner for a 2,000-acre industrial development feasibility study conducted on behalf of the Harford County Industrial Development Authority.

PUBLICATIONS

2006 Shackleton, C.M., McConnachie, M., Chauke, M.I., Mentz, J., Sutherland, F., Gambiza, J. & Jones, R. Urban fuelwood demand and markets in a small town in South Africa: livelihood vulnerability and alien plant control. *International Journal of Sustainable Development & World Ecology,* 13: 1-11.
2006 European Asbestos Risk Management Conference, Rome, Italy; *Environmental Risk Assessment in South Africa*
2007 Shackleton, C.M., J. Gambiza and R. Jones. Household fuelwood use in small, electrified towns of the Makana District, Eastern Cape, South Africa. *Journal of Energy in Southern Africa,* 18: 4-10

SKILLS

- MS Office products including MS Word, Excel, PowerPoint, Outlook, and Project.
- ArcMap desktop v10 and ARC GIS with supplements including community analyst and market analyst applications.
- Imagery Analysis (CASP qualified U.S. Army).
- Earned Value Management (EVM), and Project Management Institute (PMI) for Federal Contracts and the Federal Acquisitions Regulations (FAR).
- Life-Cycle Management (LCM) for project assessment.
- Regulatory controls for EAR, ITAR, GHS, and Aarhus Convention requirements.
- Expert Witness for groundwater contamination from mining impacts, underground petroleum releases and environmental impact analysis.

Appendix 6: Public Consultation Process Description

6.1: Screen Capture of CMG Website Public Notice

PUBLIC CONSULTATION
CLEAN MARINE GROUP

Clean Marine Group's Environmental and Social Impact Assessment and Environmental and Social Management Plan have been submitted to and reviewed by both the Department of Environmental Planning and Protection and the Grand Bahamas Port Authority Limited.

The development includes an office building, warehouse, storage tanks and associated utilities on a 4-acre site located adjacent to the Freeport Container Terminal on Basin 3.

The public is advised that the Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP) for the proposed MARPOL Port Reception Facility located in Freeport, Grand Bahama Island are available for public review.

Physical copies of the ESIA and ESMP are available to the public for review in Grand Bahama at The Grand Bahama Port Authority Limited, located on West Mall Drive and at The Department of Environmental Planning and Protection office located in Charlotte House on Shirley and Charlotte Streets in New Providence.

Electronic copies of the ESIA and ESMP can be found at

PDF ESIA

PDF ESMP Pt1 Construction phase

PDF ESMP Pt2 Operations phase

A public meeting will be held on Thursday 14th October 2021 at 6pm via Zoom with meeting ID: 890 487 2250
Password: 219570

JOIN US

The public is invited to send written comments or questions regarding the project to environment@cleanmarinegroup.com, inquiries@depp.gov.bs leave a comment on the Clean Marine Group Facebook page https://www.facebook.com/cleanmarinegroup. Written comments and questions regarding the project will be received for 21 days after the date of the public meeting. The 21 day period will end on 12th November 2021 at 5:00pm EST.

6.2: Comment Log from Public Consultation

Individual	Representing	Comment/Question	Response	Follow-up Actions

No comments received

6.3 Public Notice

PUBLIC CONSULTATION
CLEAN MARINE GROUP BAHAMAS

The ESIA and ESMP have been submitted to and reviewed by both the Department of Environmental Planning and Protection and the Grand Bahamas Port Authority Limited. The development includes office building, warehouse, storage tanks and associated utilities on a 4 acre site located adjacent to the Freeport Container Terminal on Basin3.

The public is advised that the Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP) for the proposed MARPOL Port Reception Facility located in Freeport, Grand Bahama Island are available for public review.

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6.4 Public Meeting Presentation Slides

Clean Marine

Protecting the Ocean´s Resources

October 2020

Agenda

- Introduction and Purpose of Meeting
- The Project
- The Location
- The Facility
- The Company
- The People
- The ESIA Results
- Key Dates and Contacts

Introduction & Purpose of Meeting

- The Bahamas passed the **Environmental Impact Assessment Regulations of 2020** (part of the Environmental Planning and Protection Act of 2019).

- These regulations require certain projects to have an independent and qualified environmental consultant assess the potential environmental and social impacts (both positive and negative). The regulations also require the development of an environmental management plan to guide the project through construction and operations in order to ensure the recommendations of the environmental reports are implemented.

- CMG hired Blue Pelican Sustainability Services and Envirologic Intl., to develop the initial EIA which was later updated and revised by Dr. Robert Jones (along with the ESMP Parts 1 and 2). The final draft documents are those posted to the CMG website for public review.

- The purpose of this meeting is to solicit input from the public and any individuals who have an interest in the project with a particular focus on the results of the environmental assessment and management plans.

RJ0

The Project

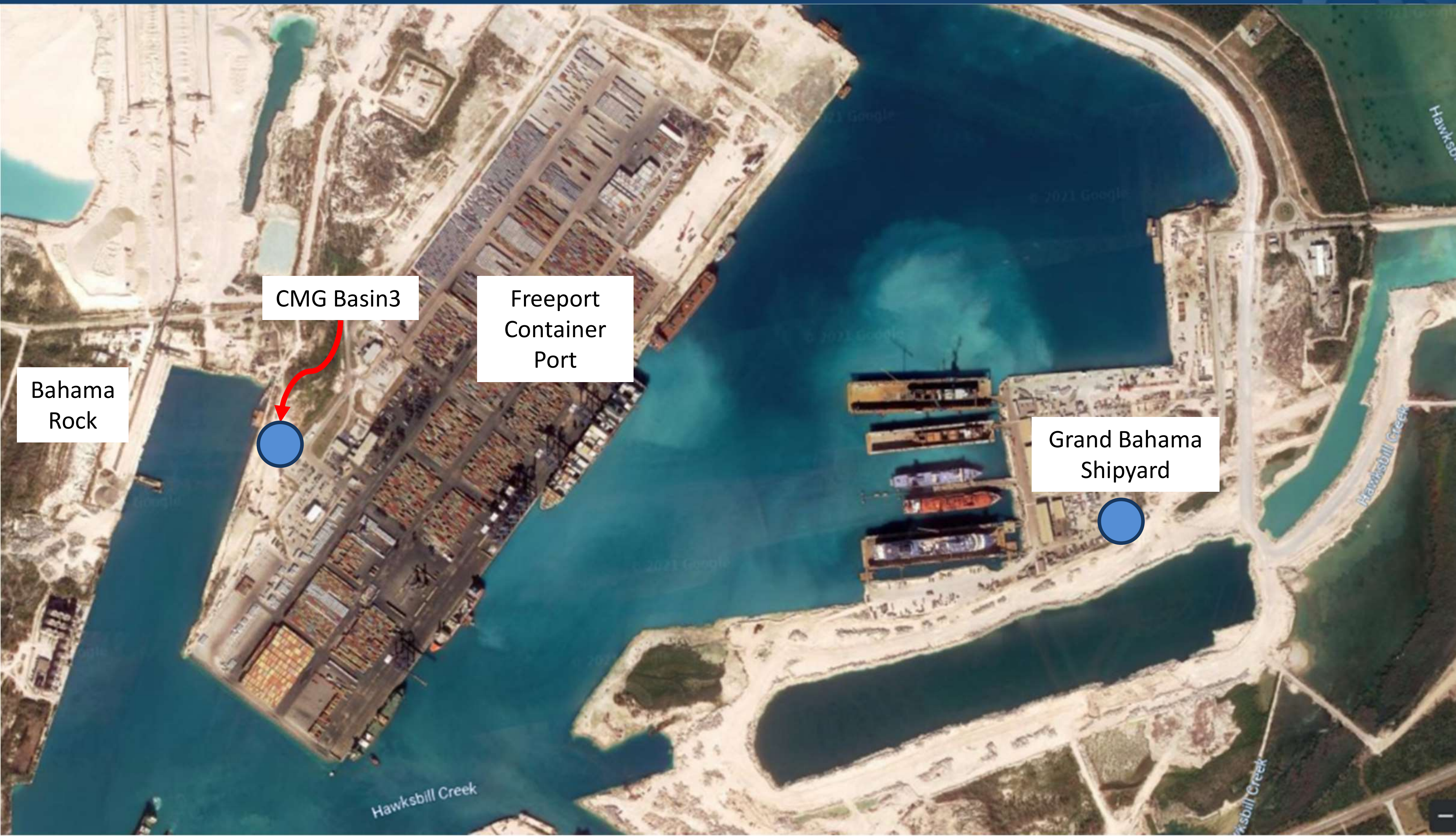
- IMO MARPOL Port Reception Facility (PRF).
- Currently, there are no Port Reception Facilities in the Bahamas nor throughout most of the islands of the Wider Caribbean.
- Port Reception Facilities should be addressed as part of an overall port management plan as set out in the Manual on Port Reception Facilities MEPC 73/78.
- The facility will process oily waste and recover the oil for re-use.
- Processing capacity is based on projections of shipping traffic (commercial and leisure cruise) in the region and specifically those that berth at Freeport.

Slide 4

RJ0 What do we mean by "initially"? Is there another plan?
Robert Jones, 2021-10-12T13:35:18.532

TD0 0 Initially recovering the oil for re-use with the water disposed down the well. Later we will process the water for re-use too. I will remove to avoid confusion.
Tien Do, 2021-10-12T15:03:50.909

The Location

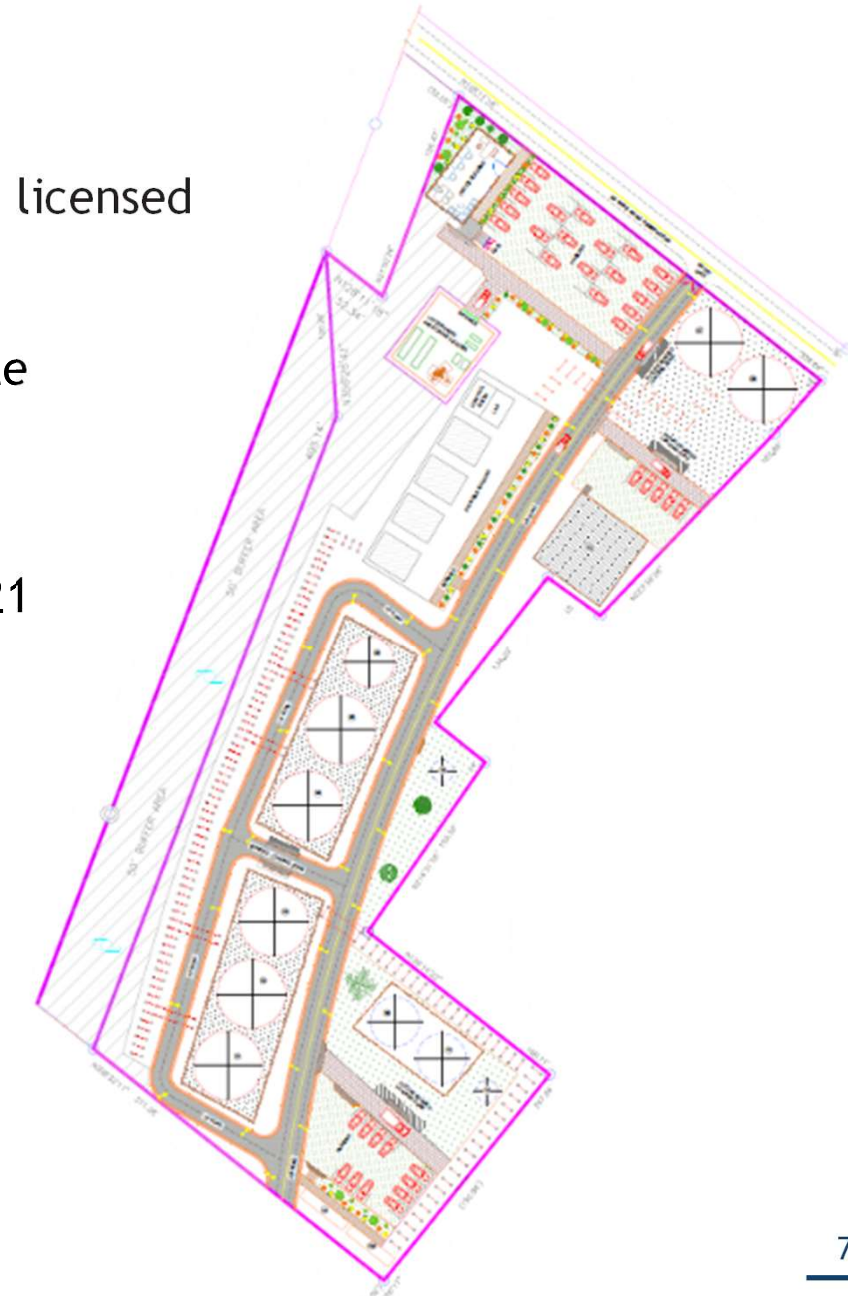


The Location

The Facility

- Stage 1 is MARPOL Annex 1 Oily Waste processing
- Utilizing a range of technology, including licensed proprietary Cavitational Reactor Technology
- Processing 150,000 tons per annum of liquid waste
- The facility will meet World Bank EHS Guidelines
- ISO systems certification expected December 2021
  - 9001 QMS
  - 14001 EMS
  - 45001 OHS

TAG NO.	DESCRIPTION OF UNIT
01	RECEPTION OIL TANK A
02	RECEPTION OIL TANK B
03	MAINTENANCE TANK
04	PROCESSED OIL TANK A
05	PROCESSED OIL TANK B
06	PROCESSED WATER TANK
07	FIRE WATER TANK A
08	FIRE WATER TANK B
09	FUTURE TANK-1
10	FUTURE TANK-2
11	PROCESS BUILDING
12	WARE HOUSE
13	CONTAINER-1
13A	CONTAINER-1
14	OBSERVATION WELL
15	DEEP WATER INJECTION WELL



The Company

- CMG was established in 2017 to acquire the business and assets of the Grand Bahama Group
- Clean Marine Group is a Bahamas headquartered business with fully owned subsidiaries located in The Bahamas and the UK
- CMG received the IDB Blue Lab Tech Challenge award in 2019 to explore Cavitational Reactor technology ability to increase efficiency of treating liquid waste from marine vessels
- GBPA licensed for MARPOL PRF
- Additional investment from Mirova of over $10m, over and above the $5m of investment from its Bahamian investors. Mirova Natural Capital “strategies are aimed at financing projects that combine profit with purpose: ecosystem conservation, restoration and sustainable livelihoods for local communities”

The People

The key team have a wide range of skills and experiences which each bring to the team.

- **Michael Fitton, CEO**

Michael is a qualified Company Commercial Solicitor and from 1984 up until 1996 was a company commercial solicitor with DLA Piper in the UK.

- **Robert Speller, Managing Director**

Since 2004 Robert has been a resident of Freeport and has extensive knowledge of the Bahamas and the business environment through his benevolent contribution as President of Freeport Rugby Club.

- **Alex Hamer, Director of Operations**

Alex has 16 years Operations Management experience in varied industries including IT, oil and gas, construction and project engineering (chemical and electrical).

- **Robert Jones, EHS Advisor**

Robert R. Jones Ph.D is an independent environmental consultant based out of the United States with over thirty-five years of experience conducting environmental and social impact assessments in the USA, Africa and the Caribbean.

- **Tien Do, Project Director**

Tien has two decades experience in operational management, project execution and global manufacturing. Inn addition to an Engineering (Honours) degree and MBA from an Australian university, Tien is also a Chartered Engineer and Fellow of Engineers Australia.

- **Christina Pratt, Project Coordinator**

A Bahamian citizen, Christina is an experienced Process Improvement/Quality and Project Management professional with a focus on systems and processes. With experience in implementation of ISO standards into organizations, business optimization, cost reduction, and quality control and assurance.

- **Carlos Palacios, Operations Specialist**

Carlos has 15 years experience in field installation/service and operations of oil processing facilities throughout South America. Carlos has also installed and commissioned facilities in Australia and Europe for major equipment manufacturers.

The ESIA Results

- Environmental
  - The proposed location is made up of dredge spoils and fill and is not a pristine area. It is part of the industrial zone for the Port.
  - There are no streams, wetlands, sensitive habitats, marine protected areas, or coral reefs in the vicinity and no impacts were identified to these resources.
  - The facility will receive, treat and store hazardous liquids and this process represents a risk to the environment, workers and the public if there were to be an accidental release (leaks, spills, etc.).
  - Emissions to the deep groundwater via a deep well will occur of treated wastewater (after being treated to international standards for acceptability).
  - Emissions to the air from the storage and transfer of oily water and recovered oil, along with process equipment, will occur.
  - The ESIA and the ESMP propose recommended mitigation measures to reduce these impacts.
  - The project proponents have committed to complying with and implementing all recommended measures.

The ESIA Results

- Social
  - Construction (temporary) and Operations (permanent) job creation
  - Support other local businesses
  - Create the infrastructure that will allow more vessels to visit Freeport
  - Reduce the uncontrolled release of ship-generated wastes into the oceans.
- Upskilling
  - New technology introduced to the island
  - Training of local operators by experts in the field

Key Dates and Contacts

- Key dates
  - 12th November - close of public comments
  - 17th November – revised ESIA and ESMP with comments and responses will be available on the Clean Marine Group website
- Submit any additional comments to:
  - Clean Marine Group
    - environment@cleanmarinegroup.com
  - DEPP
    - inquiries@depp.gov.bs