ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN (ESMP) PART 1: CONSTRUCTION

Port Reception Facility – used oil storage and recycling
Freeport, Grand Bahama

CLEAN MARINE GROUP – JUNE 2021
PREPARED BY: CLEAN MARINE GROUP LTD. & BLUE PELICAN SUSTAINABILITY SERVICES
ENVIROLOGIC INTERNATIONAL LTD.
6 WEST ATLANTIC DRIVE, FREEPORT, GRAND BAHAMA ISLAND
BAHAMAS
FINAL REVISION BY: R. JONES, PH.D

ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN (ESMP) PART 1: CONSTRUCTION

DOCUMENT CONTROL		
Revision No.	**Date of Issue**	**Revision Description**
A	18 June 2021	Draft report for review
0	24 June 2021	Issued for approval
1	2 September 2021	Updated
2	12 November 2021	Issued for use

Table of Contents

1.0 ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN INTRODUCTION

1.1 INTRODUCTION & SCOPE OF ESMP

The Clean Marine Group (CMG) Environmental &Social Management Plan (ESMP) is designed to manage environmental and social risks and impacts during the construction of the MARPOL Port Reception Facility (**Part 1**), and as an operating system to manage ongoing risks and impacts once the facility has been commissioned and placed into service (**Part 2**). It is informed by and utilizes the findings of the independent Environmental and Social Impact Assessment (ESIA), dated June 2021 as its input to establish and meet environmental, economic and social requirements. Part 1 of the ESMP (this document) identifies and manages the environmental, social, occupational, and communications processes leading up to and during the construction phase of the project. The construction phase, in this context, is inclusive of the final facility design, procurement, fabrication and construction of the various components of the project. It also includes the on-site installation of utilities, grading operations, delivery and storage of system components, erection, commissioning and prove-out of all facilities as well as the establishment of all final site improvements. The final phase of the construction process includes the commissioning of all systems, prove-out, and punch list completion for final turnover to operations.

The primary objective of the environmental management and monitoring described in this ESMP is to record environmental impacts resulting from the project activities and to ensure implementation of the mitigation measures in order to reduce adverse impacts and enhance positive impacts from specific project activities. It is also meant to address any unexpected or unforeseen environmental impacts that may arise during construction of the project. The ESMP enforces the following IFC Performance Standards (PS):

PS 1: Assessment and Management of Environmental and Social Risks and Impacts

PS 2: Labour and Working Conditions

PS 3: Resource Efficiency and Pollution Prevention

PS 4: Community Health, Safety and Security

PS 6: Biodiversity Conservation and Sustainable Management of Living Resources

This document is intended to be utilized by all site contractors, vendors and operators during the construction phase as an over-arching guide that establishes minimum standards for project performance. The precedence for governance is as follows:

- The regulations of The Bahamas shall be adhered to at all times and shall establish the minimum basic requirements to be maintained and complied with.
- International and national building codes and best practices for construction, as referenced in the various project documents including the design specifications and plans and

references, along with the project design package provided by the designer of record (DoR), shall constitute the contractual obligations of the parties participating in this project.

- This ESMP shall be followed above and beyond the previous two regulatory and contractual obligations and shall be the minimum standards used to establish project compliance for all permits, approvals, funding mechanisms and recitations by the project proponents.

1.1.1 STRUCTURE OF ESMP (PART 1)

This report provides the general provisions and context in Section 1, including the construction phase environmental and social aspects and impacts, relevant regulatory requirements, overall roles and responsibilities, and relevant CMG corporate policies. Section 2 provides the general standards for construction related occupational safety and health (OSH) and Section 3 provides the general construction related management plan for the PRF. Specific construction phase environmental and social impacts are identified in Sections 4-10. Each section starts with a brief description of the impact, followed by a description of the mitigation strategies to be deployed to negate or minimize the impact, followed by the monitoring/reporting requirements, specific training required (if relevant), other resources, documentation to demonstrate compliance and the roles and responsibilities. The final sections (11 and 12) provide a review of the environmental management system (EMS) and a summary of mitigation measures, references and responsibilities for the execution of these requirements.

The ESMP defines how it will be used, sets out procedures, and responsibilities associated with its implementation. It is a "living document" which is subject to revision throughout the life of the construction phase of the project. As details for the project are finalized a revised final edition of this ESMP will be submitted to the GBPA for approval.

1.2 CMG E&S POLICY

CMG's Senior Management Team will develop an Environmental and Social Governance (ESG) Policy statement. This policy will be the framework by which environmental, social and governance objectives and targets are set. This policy will be communicated to all Employees, Contractors, and Subcontractors via site inductions, toolbox talks, and displayed on notice boards throughout the site. This policy may also be made available to the public via CMG's website the through the dedicated stakeholder engagement process.

1.3 PROJECT DESCRIPTION & IMPACT SUMMARY

This Environmental and Social Management Plan (ESMP) is being submitted by The Clean Marine Group Limited (CMG) to the Grand Bahama Port Authority (GBPA) and the Department of Environmental Planning and Protection (DEPP) pursuant to the GBPA's request for an Environmental and Social Impact Assessment (ESIA) in respect of CMG's proposed MARPOL Port Reception Facility, that will be constructed in Freeport, Grand Bahama Island. 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 1 and 2). The site more specifically is to the west of the Freeport Container Port offices and encompasses 4.12 acres. The zoning is heavy industry by the Grand Bahama Port Authority's Freeport Land Use Masterplan and the proposed project is consistent with the current zoning designation. The general site layout is included as Figure 3.

The MARPOL Facility will be the first of its kind in the Bahamas. The Facility is being engineered, procured, constructed, and operated under the terms of a current Memorandum of Agreement (MOA) between CMG and the Cleansing Service Group (CSG) of the United Kingdom. CMG was established in 2012 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 but one of many built and operated by CSG. 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 initially of mainly 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 are not addressed in this report.

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 totaling up to 19 full-time and part-time employees (excluding temporary construction workers) 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. Figure 1 is an aerial view of the Freeport Harbour. Figure 2 is an aerial view of the project location and boundary. Figure 3 is a proposed concept layout of the new facility.

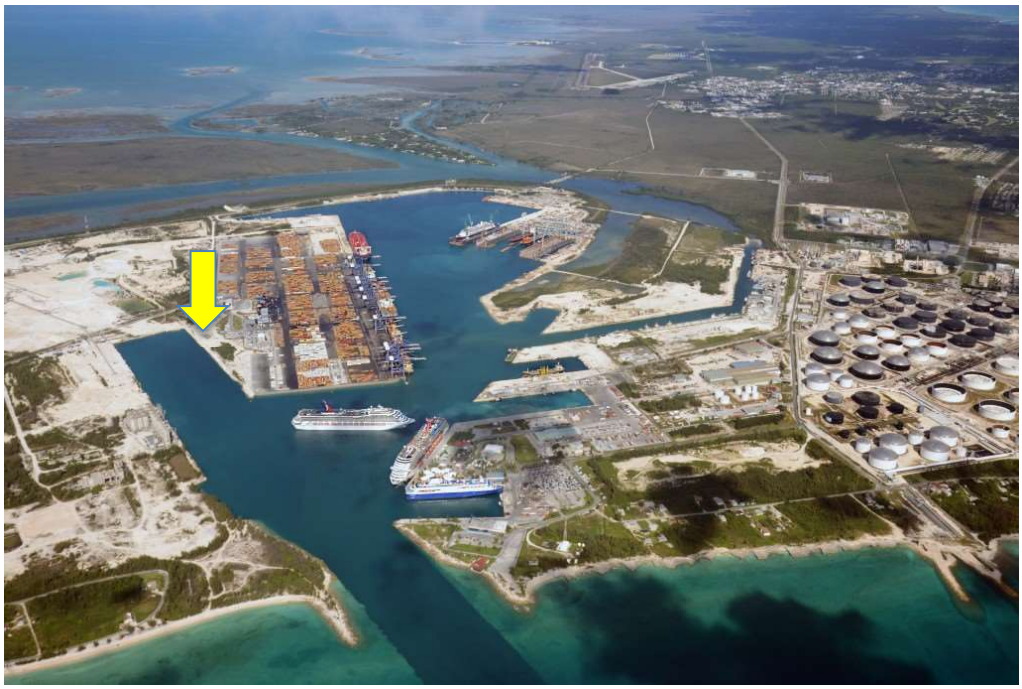


Figure 1: Aerial view of Freeport Harbour (yellow arrow indicates PRF location)

Figure 2: Aerial view of Basin 3 project location

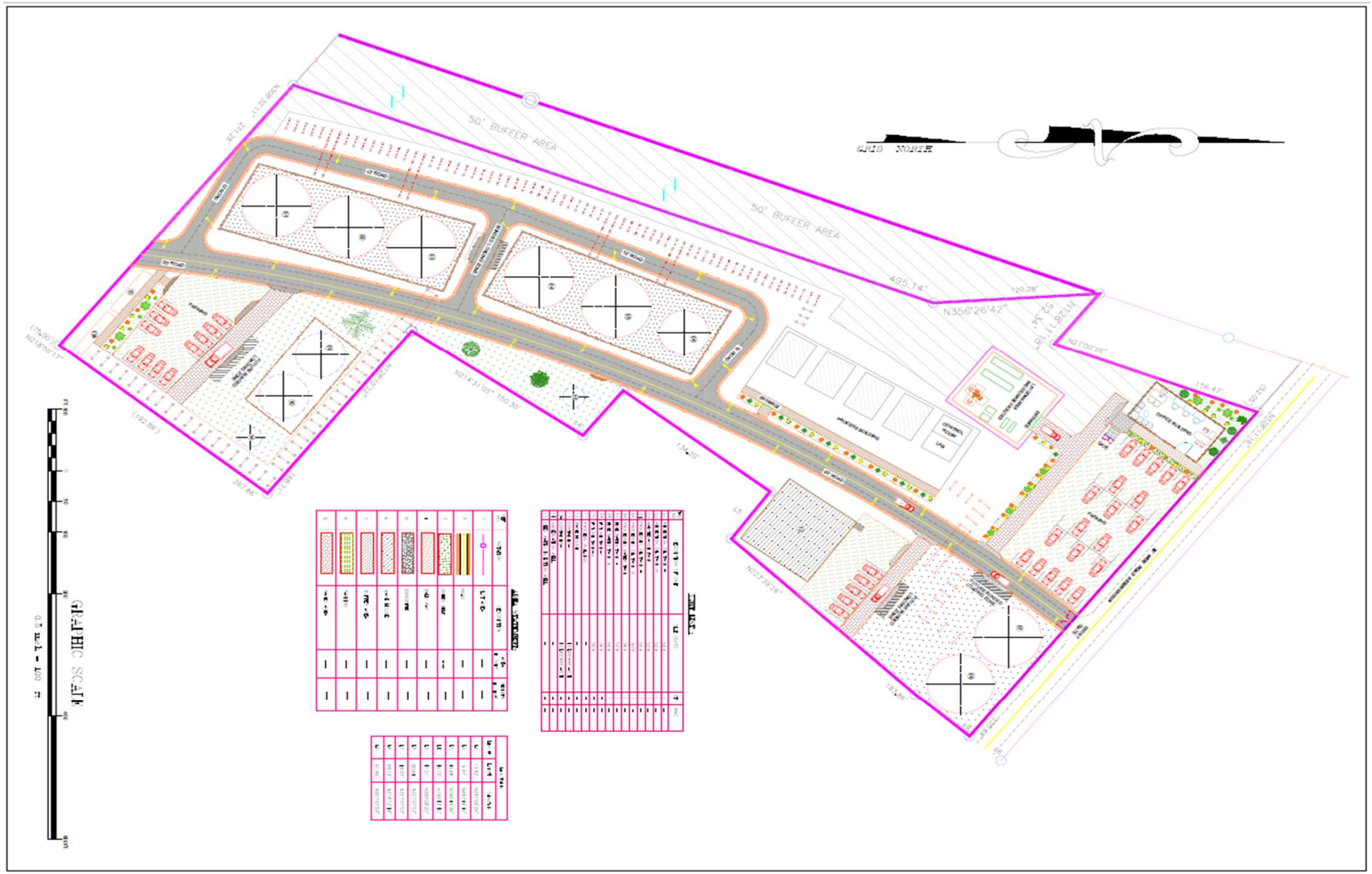


Figure 3: Conceptual PRF layout

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 WBG General 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. 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 by CSG. Most elements of the Processing plant will be constructed in the UK by CSG, to exacting ATEX standards, and shipped to site in modules that will be located and fixed in place. The tank storage Facility, civil works and interconnecting pipework will be constructed locally under the guidance of CSG.

Wastewater Disposal

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 Polymers International Ltd.

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 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.

Spent carbon will either be disposed 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).

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 incidents). 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 during construction through a contractual flow-down to the general contractor (GC). Periodic inspections by competent supervisors will be required and the specifications for inspections and safety are incorporated into this ESMP (Section 9). The site poses no specific construction risks 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. 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, are addressed in this ESMP (Part 1). 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. Regional impacts to other adjacent land uses from construction activities will be minimal. There are no residences nearby and the adjacent land uses are heavy industrial (Port related).

Description of Impacts

This report analyzed potential negative and positive impacts as a result of the Project. A total of six potentially negative environmental impacts were assessed, five of which have an overall impact rating of Medium and one is Low (construction phase impacts). 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 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 impact rating is considered High.

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.

1.4 ENVIRONMENTAL ASPECTS AND IMPACTS

CMG has completed an environmental and social risk assessment during the creation of this ESMP. All known and predictable risks have been identified, impacts defined, and appropriate mitigation measures outlined with a risk register to minimize identified impacts. The assessment addresses both potential temporary impacts that may occur during the construction period and any permanent impacts that may be sustained due to construction methods. The risk assessment is recorded as

the CMG Risk Register and contained in Appendix C. The project level Environmental and Social Impact Analysis (ESIA) has also informed this ESMP through the identification of environmental and social risks (both before and after recommended mitigation measures).

This ESMP addresses specific environmental, and occupational health and safety issues and provides specific details on how these will be mitigated, monitored and managed during the duration of the project, and during the management of the facility once commissioned. The review of the project environmental aspects and impacts is an ongoing process throughout the project's activities.

The list of potential construction phase environmental and social aspects identified as per the ESIA findings include:

- Site Clearing and Grading
- Sediment laden runoff water discharge
- Construction Air Emissions/Air Quality, including dust
- Storm Water Management
- Noise
- Construction Traffic
- Worker Safety
- Solid waste management
- Air Emissions
- Visual impacts
- Increased construction phase job creation and economic investment (positive impact)

These environmental and social aspects guide the development of this ESMP but additional measures are addressed as needed to provide for a sustainable and equitable project that reduces negative environmental and social impacts and emphasizes positive impacts.

1.5 ENVIRONMENTAL LEGISLATION, REGULATION AND GUIDELINES

CMG will fully comply with The Bahamas Government, and local authorities, such as: The Department of Environmental Health Services (DEHS), the Department of Environmental Planning and Protection (DEPP) and the Grand Bahama Port Authority (GBPA). The environmental standards and regulations set by these organizations shall be considered at all phases of the execution, such as design, engineering, procurement, construction, testing, maintenance and commissioning.

CMG also intends to adopt other Best Practices and Standards, including those established by the International Finance Corporation (IFC), and the ISO Environmental Management, Safety and Quality management systems to ensure that the company adheres to, and maintains a global standard for environmental management of its facility.

CMG will maintain a regulatory register that will identify legal requirements, standards, and parameters. Management will ensure compliance, and adherence to specified parameters through periodic review of this register. The following related Bahamas regulations have applicability to this project.

Environmental Health Services Act 1987

This Act promotes conservation and maintenance of the environment and also addresses the control of contaminants and pollutants that may adversely affect the environment and human health. The Act also outlines regulations with respect to water supplies, solid and liquid waste, beaches, seaports, harbours, and marinas.

Environmental Health Services (Collection and Disposal of Waste) Regulations 2004

These regulations provide for the collection and disposal of domestic, commercial and construction waste. Commercial waste includes ashes, refuse and rubbish. Construction waste includes any waste materials from construction, renovation, repairs and demolition.

Environmental Planning and Protection Act 2019

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.

Health and Safety at Work Act 2002

The Act provides for:

- Securing the health, safety and welfare of persons at work;
- Protecting persons other than persons at work against risks to health or safety arising out of the activities of persons at work; and
- Controlling the keeping and use of explosive, highly flammable or other dangerous substances and preventing the unlawful acquisition, possession and use of such substances.

Water and Sewerage Corporation Act 1976

This Act establishes the Corporation. Functions of this organization include the application of appropriate standards and techniques for investigation, use, control, protection, management and administration of water. The Corporation is also mandated to oversee waste disposal, water treatment and water quality.

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.

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".

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.

Additional international standards also apply to the Port Reception Facility (PRF) project. These include the following.

World Bank Environmental, Health and Safety (EHS) Guidelines

These 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 in which site-specific variables, such as area, assimilative capacity of the environment, and other project factors, are taken into account.

International Finance Corporation (IFC) Performance Standards (PS)

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, of which, five are identified as applicable to this project (see Section 1.1).

International Labour Organization (ILO) Core Labour Standards

The ILO has identified eight "fundamental" Conventions cover the principles and rights at work. These are listed below and incorporated by reference to this ESMP (Parts 1 and 2). These principles, along with the relevant legislation of The Bahamas, will guide the relationship and requirements for employment at the PRF and will be flowed down to all subcontractors and vendors. These eight core principles are:

1. Freedom of Association and Protection of the Right to Organise Convention. 1948 (No. 87);
2. Right to Organise and Collective Bargaining Convention, 1949 (No. 98);
3. Forced Labour Convention, 1930 (No. 29) and its 2014 Protocol;
4. Abolition of Forced Labour Convention, 1957 (No. 105);
5. Minimum Age Convention, 1973 (No. 138);
6. Worst Forms of Child Labour Convention, 1999 (No. 182);
7. Equal Remuneration Convention, 1951 (No. 100); and,
8. Discrimination (Employment and Occupation) Convention, 1958 (No. 111).

Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal was adopted on 22 March 1989 in response to a public outcry following the discovery, in the 1980s, in Africa and other parts of the developing world of deposits of toxic wastes imported from more developed countries. Amongst other provisions, the Basel Convention requires a receiving country to provide "informed consent", as defined in the relevant language. The Bahamas is a signatory to the Basel Convention (1992) and these provisions will be flowed down to CMG and their subcontractors.

International Maritime Organisation's (IMO) Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention

Parties to the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) are required to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries. Bahamas is a signatory to this Convention.

ISO Standards and Certifications

- ISO 14001 Environmental Management System;
- ISO 45001 Occupational Health and Safety Management Systems; and
- ISO 9001 Quality Management Systems.

Additional international standards to be implemented specifically for the PRF include:

- International Labour Organization (ILO) Code of Practice for Safety and Health in Ports (2005);
- General Conference of the International ILO Convention concerning Occupational Safety and Health in Dock Work, C-152, (1979);
- General Conference of the ILO Recommendation concerning Occupational Safety and Health in Dock Work, R-160;
- International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (IBC Code);

- Code of Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code); and
- International Maritime Dangerous Goods Code (IMDG Code).

1.6 ROLES AND RESPONSIBILITIES

Every employee, subcontractor and vendor, regardless of their role, is responsible for compliance of Safety, Health and Environmental matters under their control. CMG will identify key personnel involved with ensuring the proper implementation of the ESMP. Roles and responsibilities related to the ESMP will be clearly defined and communicated. Documents such as environmental organizational flowcharts will be designed for ease of reference to proper reporting structure. These are defined in greater detail and specific to the environmental/occupational risk identified. Primary responsibility for site compliance will rest with the Environmental Manager (EM).

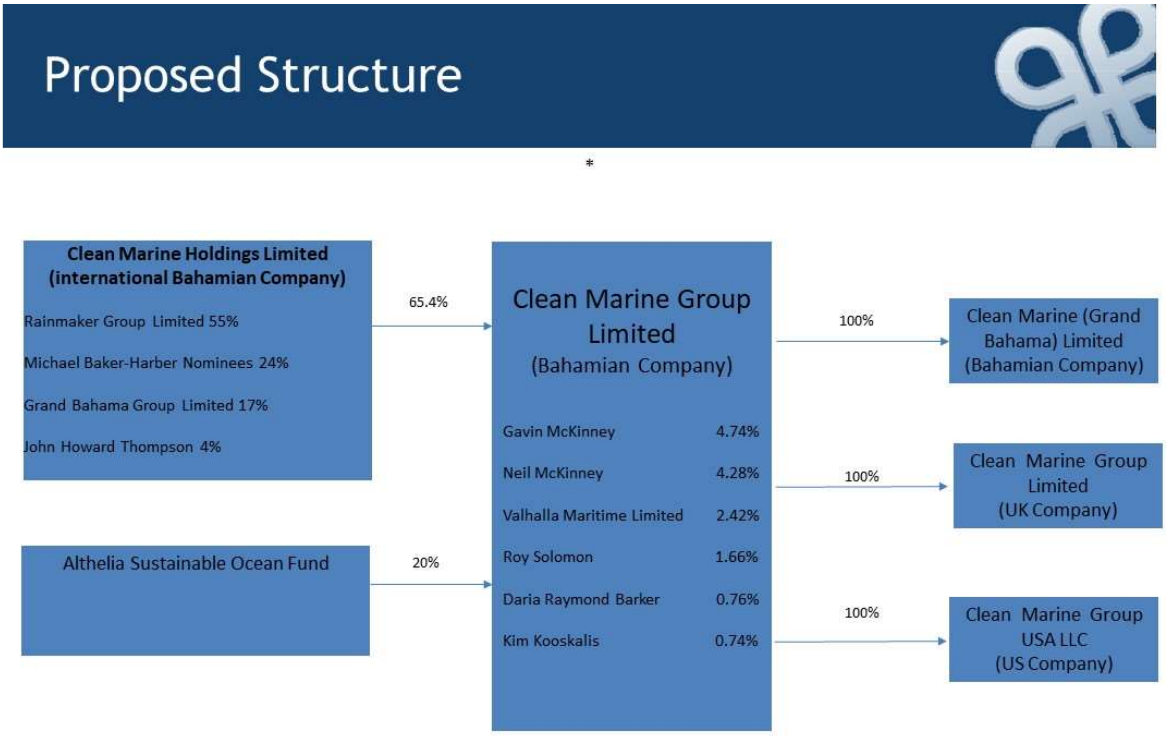


Figure 4: CMG Board Structure

1.7 TRAINING AND AWARENESS

CMG will ensure that all the personnel whose activity can cause a significant impact on the environment and/or health and safety must have acquired the necessary competencies by training and appropriate documented experiences. CMG will verify, by interviews or appraisal of the experiences, that the personnel and contractors possess the suitable competence to carry out their own task in the respect of the environment. All subcontractor and vendors must provide adequate training to the personnel that can cause a significant environmental impact and record the training activities. During the construction phase of the project the General Contractor will be evaluated for

their safety record and all appropriate certifications and assurances will be provided prior to the initiation of work. Records of training activities, tests, and attendance sheets shall be maintained as evidence of such. The initial training will include Environmental Awareness.

Additional training in the following disciplines is anticipated:

- Emergency Preparedness
- Safe Work Procedures
- Waste Management
- Spill Control Procedures

1.7.1 ENVIRONMENTAL and SOCIAL IMPACT AWARENESS

To ensure the achievement of compliance of environmental and worker protection, CMG will mandate that all employees, subcontractors and vendors participate in an environmental and social (E&S) awareness orientation.

The following issues will be addressed during the environmental awareness orientation session:

(1) Importance of working and operating in conformity with the environmental local legislation, the CMG's Environmental Policy, and the Environmental Management Plan;
(2) Roles and the responsibilities in the Environmental Management Plan;
(3) Environmental protection - protecting the environment from the effects of construction by making personnel aware of sensitive environmental resources on-or near the Jobsite;
(4) Environmental impacts consequent to their activity and the benefits for the environment deriving from their engagement;
(5) Compliance with the operating procedures (waste management, handling and storage, and disposal of chemical and hazardous products, etc.), and the potential consequences due to non-compliance;
(6) Procedures related to environmental emergencies and hurricane preparedness;
(7) Environmental aspects recognition and communication - training personnel to recognize potential environmental impacts (e.g., spills, erosion control failures, improper waste management) and to inform the Supervisor; and
(8) Liability control – demonstrating that noncompliance with regulatory requirements can lead to personal and company liability.
(9) Opportunities and procedures for grievances, complaints and anonymous tips.

1.7.2 Emergency Preparedness/Spill Prevention and Control Contingency Training

Emergency training will likely be coordinated with Spill Prevention and Control Contingency (SPCC) training for all facility personnel and will be geared towards the specific types of incidents that are

possible and tailored to the employee responsibility level. This will range from emergency notifications to planning and coordination of an event.

- Spills and Releases
- Vehicle accidents
- Storms
- Muster Plans and locations
- Evacuation Plans
- Fire Safety (including use of fire extinguishers)
- HazCom

The marine-based and land-based SPCC will be developed in coordination with training provided by Marittima. Clean Marine Services Group (CSG) will provide oil spill response training for its personnel at its oil treatment and recycling plant in Freeport. The land-based SPCC training will be developed in conjunction with the marine-based program and will include modules on the importance of spill prevention and control, the methods utilized to provide effective best management practices, monitoring, maintenance, repair, and response methods. 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
- Induction training for drivers, workers and visitors including ingress/egress and parking requirements.

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. CMG will procure all of the equipment necessary for oil spill response and proposes to use Marittima for training and contingency planning.

1.8 OPERATIONAL CONTROL AND MONITORING

As part of the ESMP procedures for managing and mitigating risks for the project, CMG will prepare and implement control plans.

CMG will provide the following control plans referenced in the ESMP (see Table 1) below.

Table 1: CMG Control Documents

Document Title	Ref. No.
ACCIDENT AND INCIDENT REPORT	CMG-IMS-Q-FM-0018
WEEKLY ENVIRONMENTAL CHECKLIST	CMG-IMS-Q-FM-0019
APPROVED SUPPLIER INDEX	CMG-IMS-Q-FM-0020
PORT SECURITY PLAN	CMG-IMS-Q-ML-0003
EMERGENCY PREPAREDNESS AND RESPONSE	CMG-IMS-Q-PR-0018
CONTROL OF EQUIPMENT	CMG-IMS-Q-PR-0019
NOISE AND VIBRATION CONTROL PLAN	CMG-IMS-Q-PR-0020
TRAFFIC CONTROL PLAN	CMG-IMS-Q-PR-0021
WASTE MANAGEMENT CONTROL PLAN	CMG-IMS-Q-PR-0022
SPILL PREVENTION AND RESPONSE	CMG-IMS-Q-PR-0023
HURRICANE PREPAREDNESS	CMG-IMS-Q-PR-0024
SOIL AND GROUND WATER CONTAMINATION CONTROL	CMG-IMS-Q-PR-0025
AIR QUALITY CONTROL	CMG-IMS-Q-PR-0026

Additional control documents in development include a Stakeholder Engagement and Grievance Management Plan and an Environmental & Social Monitoring and Reporting Plan. These will be added to the above list of control documents once complete.

Work Instructions (WI's) will be provided, complementary to the control plans, related to the following aspects:

(1) Environmental incidents and accidents management and reporting
(2) Adverse weather conditions
(3) Contaminated soil/land management
(4) Spill management
(5) Discharging water from site
(6) Erosion and sedimentation control
(7) Dust management
(8) Noise management and monitoring
(9) Completing the environmental log
(10) Waste management on site
(11) Ecological mitigation and protection
(12) Non-conformance/corrective action reporting and management
(13) Complaint handling procedure
(14) Safe work permit

Additionally, CMG will maintain the following Registers and Checklists:

(1) Legal Register
(2) Risk Register
(3) Training Register
(4) Complaint Register
(5) Weekly Environmental Checklist
(6) Daily Environmental Log
(7) Site Visitor Log
(8) Equipment Inspection Log
(9) Tank Inspection Log
(10) E&S Incident Register

1.9 MONITORING AND AUDITING

CMG will establish a program to monitor E&S compliance of construction and operational activities in accordance with the established procedures defined in the ESMP. These activities may include daily, weekly, or periodic inspections.

CMG will produce procedures that establish corrective actions for non-compliance with established EMP procedures and identify the root causes for the issue. These corrective actions are intended to not only provide an immediate fix, but to also help ensure that similar non-compliances do not occur again.

Being a new facility, CMG will conduct monthly E&S audits, while the GBPA conducts quarterly audits for at least the first year of operation. The frequency of internal and external audits may be relaxed

in the future. During the audits CMG will present documentation on the status and compliance of all aspects of the ESMP. Additional reviews of the ESMP components are outlined in Table 2.

1.10 MANAGEMENT REVIEW

CMG Management team will meet once per year to review the status of the ESMP, review audit results, discuss non-conformances and corrective actions, as well as complaints received, and resolutions to those complaints. A Management review report will be maintained for reference of findings and resolutions. Management reviews are described in Control Document CMG-IMS-Q-PR-0002 (see Table 2).

1.11 CONSTRUCTION AND OPERATIONS PHASE WORKER MANAGEMENT

CMG has developed a number of internal employee policies that will govern employment and management conduct. These specific policies will be flowed down to subcontractors and vendors operating at the facility. Copies of all subcontractor and vendor employment management policies will be reviewed as part of the procurement due diligence process. All workers (internal and external) will be provided the opportunity to file grievances related to work at the PRF and all grievances filed will be handled per the CMG policy as described in the relevant control document. Table 2 below identifies the specific employment issue and relevant control document that guides CMG management, and human resources departments regarding employment practices for employees and subcontractors/vendors at the PRF.

Table 2: CMG E&S Policy Control Documents

HUMAN RESOURCE CONTROL DOCUMENTS FOR EMPLOYMENT			
Name	Reference No.	Policy Review/Update Period	Application/Issue
INTEGRATED MANAGEMENT SYSTEM (IMS) MANUAL	CMG-IMS-Q-ML-0001	Annual	Provides overall employment processes including hiring, promotion, harassment, and complaints.
QUALITY / HEALTH, SAFETY & THE ENVIRONMENT (QHSE) POLICY	CMG-IMS-Q-PO-0001	Annual	Sets out general expectations for compliance and

			continuous improvement.
MANAGEMENT REVIEWS PROCEDURE	CMG-IMS-Q-PR-0002	Annual	Provides for management review processes.
RESOURCE MANAGEMENT PROCEDURE	CMG-IMS-Q-PR-0003	NA	Identifies capital and operation expenditure priorities.
INTERNAL AUDIT PROCEDURE	CMG-IMS-Q-PR-0004	Quarterly	Systems audit procedures (internal).
CUSTOMER SATISFACTION/ COMPLAINT HANDLING PROCEDURE	CMG-IMS-Q-PR-0005	Annual	Addresses how customer, and other third-party complaints are addressed.
OPERATIONAL CONTROL PROCEDURE	CMG-IMS-Q-PR-0006	Annual	Defines material flow processes.
PROCUREMENT MANUAL	CMG-IMS-Q-PR-0008		Defines procurement policies and due diligence.
COMMUNICATION AND ENGAGEMENT PROCEDURE	CMG-IMS-Q-PR-0010	As Needed	Defines Stakeholder Engagement & Steering Committee process.
ACCIDENT AND INCIDENT REPORTING PROCEDURE	CMG-IMS-Q-PR-0012	As Needed	Describes policies for reporting, investigations and procedures.
LEGAL AND COMPLIANCE PROCEDURE	CMG-IMS-Q-PR-0014	Annual	Defines legal compliance for the PRF including updates.

In addition to, and as provided for above, CMG has or will develop the following additional HR documents that will apply to all workers (inclusive of non-CMG employees) and that will cover the following aspects:

Table 3: Additional CMG Worker Policy Documents

EMPLOYEE HANDBOOK	**CMG-IMS-Q-ML-0002**
SMOKING POLICY	CMG-IMS-Q-PO-0002
DRUGS POLICY	CMG-IMS-Q-PO-0003
ALCOHOL POLICY	CMG-IMS-Q-PO-0004
SAFE DRIVING POLICY	CMG-IMS-Q-PO-0005
CONFLICT OF INTEREST POLICY	CMG-IMS-Q-PO-0006
GIFTS AND GRATITUDE POLICY	CMG-IMS-Q-PO-0007
ANT-BRIBERY AND CORRUPTION POLICY	CMG-IMS-Q-PO-0008
MODERN SLAVERY POLICY	CMG-IMS-Q-PO-0009
INDUCTION RECORD FORM	CMG-IMS-Q-FM-0021
ENVIRONMENTAL POLICY	CMG-IMS-Q-PO-0010

2.0 GENERAL OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS

This Section of the ESMP describes the general occupational safety and health requirements for construction and operations phases of the PRF. Construction will primarily occur during the initial period of site, utility, building and treatment system installation. However, following turn-over to operations, additional construction may occur as a result of capital improvement projects and expansions. The occupational health and safety requirements generally follow the industry standard safety hierarchy that includes eliminating risks, source control, risk minimization, and lastly, the use of personal protective equipment (PPE). These requirements will apply to all phases of the project, including initial construction, periodic improvements, maintenance and repair work and other operations related tasks.

2.1 WORKER PROTECTION

Occupational health and safety issues during the construction and decommissioning of ports are common to those of most large infrastructure and industrial facilities, and their prevention and control is discussed in the General EHS Guidelines. These issues include, among others, exposure to dust and hazardous materials that may be present in construction materials and in other building components (e.g., PCB and mercury in electrical equipment), and physical hazards associated with the use of heavy equipment, or the use of powered tools. Specific occupational health and safety issues relevant to port and hydrocarbon recovery and treatment operations primarily include the following:

- Physical hazards
- Chemical hazards

- Confined spaces
- Lock-Out/Tag-Out (LO/TO)
- Working at height
- Slips, Trips and Falls
- Vehicle collisions
- Drowning
- Electrical hazards
- Exposure to the elements
- Ergonomic injuries
- Exposure to organic and inorganic dust, and
- Exposure to noise.

General Approach Port operation activities should be conducted in accordance with applicable international regulations and standards, including:

CMG will maintain a robust system for identifying, reducing, mitigating and reporting of any near misses, lost-time injuries, potential or actualized significant injury and/or fatalities (SIFs) at the Facility. There are three primary mechanisms to reduce the likelihood of a violation of EHS standards and personnel injuries. These are:

- Proper Training
- Job Planning
- Proper Execution

2.1.1 Job Specific Training

All employees will be properly trained per their job functions and responsibilities. For example, the training described in Section 1.6 will be provided to all employees (including managers) and updated yearly. However, specific personnel will receive additional training, as required, to perform their specific job function. For example, a forklift operator must receive training on the operation of the equipment and pass a certification as a competent individual. Only individuals trained and qualified to operate the forklift will be permitted to operate it. Electrical system maintenance is another example. Only the Electrical Maintenance personnel trained and qualified to maintain and repair any electrical component will be permitted to complete these tasks. Specific employee qualifications, responsibilities and training requirements will be determined as the project develops and revisions to this initial ESMP will document those revisions.

All subcontractors working at the PRF will receive initial induction safety training (typically a two-hour +/- in-class training/review) at the facility. This induction training will focus on basic safety

requirements, inspections, emergency response actions (alarms, muster sites, exit strategies, etc.), and reporting requirements. It will also include disciplinary actions for failure to follow the facility rules. Non-workers, (visitors, guests, third-party inspectors, etc.,), will not be required to complete the contractor safety induction training but will require visitor badging and escort by a CMG (badged) representative. Visitors will also be required to wear (and be provided) PPE as appropriate.

2.1.2 Job Planning

CMG will incorporate the following requirements into the HASP (see Section 3.3) as well as routine operations:

- Job Hazard Analysis
- Safe Work Permit
- LO/TO
- Confined Space Entry
- Loading/Unloading operations
- Crane safety
- Shutdowns

2.1.3 Job Execution

Safe job execution is a function of proper training, planning and attention to detail. Common tasks that have a demonstrated risk of environmental, occupational or social risk have been assigned a specific Work Instruction (WI). Additional WI control documents will be developed as the project proceeds into operations and as additional needs are identified. A WI describes the specific task function, engineering controls suitable for risk reduction, training requirements, safety requirements, procedures to follow, the requirements/applicability for a job hazard analysis (JHA), first-aid and emergency response considerations, work permit requirements (for example if a Confined Space or Hot Work permit is required) and the types of PPE required to complete the task. Once a Safe Work Permit has been issued, the task can proceed. The first step is to assess if the proper individuals, tools, safeguards, monitoring, and oversight is available to safely complete the job. This will of course vary from job to job and may range from an entire plant shutdown for new critical equipment installation to the replacement of overhead lightbulbs. While the specific tasks will vary, the process of pre-work assessment, WI document review, JHA review, permit issuance, resource identification, proper oversight, and sign-off will be applied to all jobs. Table 4 provides a summary review of the construction and operation phase occupational and safety aspects, general actions/mitigations, responsible party and references. This general guide is detailed in the specific construction phase risk and mitigation analysis (Sections 4-10).

2.2 PERSONAL PROTECTIVE EQUIPMENT

CMG will provide all personal protective equipment (PPE) requirements for employees and visitors at no cost to the employee or visitor. The specific PPE to be assigned is job/task dependent and is defined by the JHA process, WI document and Safe Work Permit. In general, PPE anticipated to be provided and stored on-site include, but are not limited to:

- Rubber boots with steel toe and steel shank, non-slip soles
- Rubber gloves
- Latex gloves
- Splash resistant coveralls
- Smocks for laboratory personnel
- Safety glasses and goggles
- Dust masks (appropriate for task)
- Face shields
- Hearing protection
- Hard hat (where required)
- Safety harnesses for working at height
- Sunscreen
- Bug repellent

CMG maintains a policy for COVID-19 that is consistent with Bahama governmental guidance and policy. CMG presently requires vaccination of all employees or weekly PCR testing to confirm health status. Employees that are positive or come into contact with another positive person are quarantined for a period of ten days and then allowed back on site once a negative PCR test is provided. This policy will be extended to all site visitors/workers and will be managed by the site Safety Officer.

2.3 FIRST AID

CMG will maintain a fully stocked first aid station in the Office breakroom and another at the Processing Plant building. The first-aid kit will be inspected quarterly and restocked as-needed. The General Contractor shall have on site at all times at least one (preferably two) workers with current First Aid certification. Copies of current certifications will be provided to CMG prior to the initiation of site activities.

Emergency first aid will be provided by the nearest Emergency Care Providers:

<u>Daytime services</u>

- Hawksbill Clinic – Hawksbill Village

  +1 242 352 7722

- Eight Mile Rock Clinic – Bain Town

  +1 242 348 2227

Full-service Care (24-hours)

- Rand Memorial Hospital

  +1 242 350 6700 or 242 352 2689

Table 4 below provides general guidance on occupational safety that will be applicable to the PRF. It is not inclusive of all potential occupational requirements. These will be addressed by the job hazard analysis (JHA) and Work Instructions (WI) documents. It is provided as a general guide. Construction specific occupational aspects are provided in Section 9.

Table 4: General Occupational Health and Safety Aspects

ESMP Aspect	Action/Mitigation Measure	Responsible Party	Standard/Reference
Physical hazards	• All machinery shall be guarded as appropriate • Periodic boiler safety inspections (per manufacturer's recommendations) • LO/TO • Forklifts and moving equipment / vehicle safety • No ionizing or other radiation hazards are anticipated	CMG	Bahamas Employment Act of 2001 / Bahamas Health and Safety at Work Act / General EHS Guidelines (IFC) / UK HSE Regulations for specific workplace requirements (as an example)
Chemical hazards	• Chemical containers must be labelled and stored properly • Vapors and fumes that come from welding or exposure to solvents must be controlled and properly vented. Exposure assessments are required. PPE may be required. • Gases like acetylene, propane, carbon monoxide and helium and flammable materials like gasoline, solvents, and explosive chemicals must be properly labelled, stored, bunded and ventilated.	CMG	

	• Chemical pesticides should be used sparingly and per manufacturers instructions.		
Confined spaces	Follow HSE/OSHA Confined spaces rule and industry guidance.		CONFINED SPACES - HSE
Working at height	Working from heights, including ladders, scaffolds, roofs, or any raised work area. Safety railings, toe boards, and other building components should be used to avoid working at height. Other requirements include: • Ladder inspection and safety standards • Scaffold inspection and safety standards • Roof work standards • Safety harness inspections	CMG	WORK AT HEIGHT - OCCUPATIONAL HEALTH AND SAFETY (HSE.GOV.UK)
Slips, Trips and Falls	Spills on floors or tripping hazards, such as blocked aisles or cords running across the floor shall be assessed for each task by the JHA. Good housekeeping shall be practiced with daily inspections and logs.	CMG	Bahamas Employment Act of 2001 / Bahamas Health and Safety at Work Act / General EHS Guidelines (IFC) / UK HSE Regulations for specific workplace requirements (as an example)
Vehicle collisions	Vehicle collisions for forklifts will be mitigated by dedicated drive paths / markings and signage and/or barriers. Other vehicles are managed per the TMP.	CMG	
Drowning	Ring buoys will be placed at appropriate intervals along the quay.	CMG	U.S.C.G. Safety Regulations, and Bahamas Health and Safety at Work Act.

Electrical hazards	Electrical Area Classification / Bahama Building Code LO/TO permits required All ground-faults in place (including power tools) All electrical cords/connections to be inspected each shift.	CMG	Bahamas Employment Act of 2001 / Bahamas Health and Safety at Work Act / General EHS Guidelines (IFC) / UK HSE Regulations for specific workplace requirements (as an example)
Exposure to the elements	• Heat stress will be assessed as part of the JHA • Sunblock, hats with visors/brims and long-sleeve shirts to be provided for sun protection for outside workers.	CMG	Bahamas Employment Act of 2001 / Bahamas Health and Safety at Work Act / General EHS Guidelines (IFC) / UK HSE Regulations for specific workplace requirements (as an example)
Ergonomic injuries	Ergonomic Hazards including but not limited to the following will be assessed for mitigation for each task as part of the JHA: • Improperly adjusted workstations and chairs • Frequent lifting • Poor posture • Awkward movements, especially if they are repetitive • Repeating the same movements over and over • Having to use too much force, especially if you have to do it • Frequently • Vibration	CMG	
Exposure to organic and inorganic dust generated by moving equipment and vehicles, vibration and wind may pose respiratory risk, eye, nose and throat	• Job hazard classifications to be completed before work is initiated. • Engineering controls to be implemented to reduce dust generation. • Traffic controls to be implemented to reduce dust generated by vehicles. • Respirator program if required per risk assessment. • Review by industrial hygienist.	CMG and General Contractor	Bahamas Employment Act of 2001 / Bahamas Health and Safety at Work Act / General EHS Guidelines (IFC) / UK HSE Regulations for specific workplace requirements (as an example).

irritation, poor visibility			
Exposure to noise.	Hearing safety assessed by location and task. Hearing protection for workers (permanent and transitory) to be provided at entrances, along with warning signage.	CMG and General Contractor	Bahamas Employment Act of 2001 / Bahamas Health and Safety at Work Act / General EHS Guidelines (IFC) / UK HSE Regulations for specific workplace requirements (as an example)

3.0 GENERAL CONTRACTOR RESPONSIBILITIES DURING CONSTRUCTION

The ESMP (Part 1) is specific to the construction phase of the project as it is a new development. However, it will continue to be applicable to future construction type work at the site during expansions or other capital improvements, in particular those that involve outside contractors. Part 2 of the ESMP (in development) is specific to the operations phase of the project once construction is complete. The ESIA identified aspects as outlined in Table 3. Each of these has a specific action/mitigation measure identified with responsible party and reference for its successful completion.

3.1 CONTRACTOR RESPONSIBILITIES

The General Contractor (GC) will be responsible for the construction of the proposed improvements as identified on the referenced project construction documents. The Basis of Design (current version) is included as Appendix B of this ESMP. Additionally, the GC will be responsible for compliance with all applicable Bahama regulations, international best practices, and the environmental and social policies of CMG as articulated in this document and the CMG policy register. In order to assure sufficient resources are allocated for compliance, this information will be provided to all potential bidders so that they are informed of their responsibilities. Any questions regarding their responsibilities and/or the expectations of CMG will be addressed during the bid review process and responses to requests for information (RFIs) issued by the perspective bidders.

3.2 CONTRACTOR SAFETY DOCUMENTATION

The GC will have to submit their safety documentation prior to being contracted for this project and only those with an acceptable safety track record will be considered. CMG will provide prospective GCs with this Part 1 ESMP that defines the minimum performance requirements. This is inclusive of subcontractors, vendors, suppliers and other external resources. The CMG Contractor safety documentation will include the following components (and note that this list may be modified as needed per the specific project requirements) for CMG review:

- Identification and qualification of dedicated Safety Professional/Competent person for each project
- Requirements to hold a safety orientation meeting prior to any project initiation
- Posting of emergency response information (including tools, responsible individuals, contact details and other resources as needed)
- Reporting requirements for any incident
- PPE requirements and provisions for their employees
- Exposure monitoring
- Dust control

- Electrical hazard control
- First Aid provisions (required and provided for each project)
- Spill control (required and provided resources, location and plan for each project)
- Drug use monitoring and management (including disciplinary actions)
- HAZCOM plan
- Solid waste management plan

3.3 CONTRACTOR ENVIRONMENTAL, SAFETY AND HEALTH MANAGEMENT

In addition to the requirements listed above, for the specific construction phase, the GC will be required to submit a site-specific Health and Safety Plan (HASP). The HASP shall comply with general industry standards and best practices. The HASP may also be incorporated into the overall General Construction Plan or be a stand-alone document. For the PRF, the GC shall provide a HASP that includes, at a minimum, the following components:

- Overall health and safety objectives and listed assumptions
- List of responsible individuals including 24-hr contact details
- Identification of project description at detail sufficient to identify specific job tasks and risks
- Risk Register
- Mitigation measures
- Work and Inspection schedule
- Testing and measurements proposed/required (including responsible party)
- Work method statements per job
- Job hazard analysis
- Toolbox talk requirements
- Equipment list and safety inspection schedule
- Hazardous substances and materials
- Ladders and scaffolding
- Confined spaces including testing and monitoring
- Electrical equipment installations
- Working at heights
- Housekeeping
- Site access, control and barricades

- Welding and other hot work
- Erection of building and pipe bridges components
- Foundation and trench excavation
- Concrete and formwork
- Lock Out/Tag Out procedures and requirements
- Submission of all inspection forms and checklists
- Commissioning requirements and plan
- Preventative maintenance performance and schedule
- Critical spares delivery schedule, offloading and storage requirements
- First aid and emergency health response
- Evacuation plan and muster locations
- Other requirements will be specified per project as needed

3.4 CMG RESPONSIBILITIES

The primary responsibility of CMG during the construction phase will be to provide general oversight and guidance to the GC. This oversight will assure compliance to the applicable Bahama regulatory requirements, along with the CMG generated project specifications, quality control, safety, and environmental responsibilities. These are articulated in this document and within the CMG social and environmental policy documents. Additionally, CMG will be responsible for the provision of specific services and utilities during the construction phase of the project. The following is a listing of the documents and representations CMG will provide to the GC:

- Project construction drawings and specifications
- All certifications and approvals as required for initiation of construction and operating permits
- Insurance per the contractual obligations
- Access for utilities including temporary water and electrical
- Access to the property including parking (per the TMP)

3.4.1 Owner Provided Facilities

CMG will provide the facilities listed above for the duration of the project construction phase to the GC. Access and coordination with GBPA officials, inspectors and reviews as required. CMG will also coordinate with funders and provide notifications to the GC at least 24-hours notification before any planned inspections or visits. Visitors will be provided PPE by CMG unless arranged otherwise.

3.4.2 Safety Inspections

CMG will provide for third-party safety inspections for the duration of the construction phase. The results of inspection reports will be provided to authorities and funders as required. Forensic investigations and reports will be provided if needed.

3.4.3 Quality Inspections

CMG will provide for third-party quality control inspections for the duration of the construction phase. The results of quality inspection reports will be provided to authorities and funders as required. Forensic investigations and reports will be provided if needed.

3.4.3 Punchlist Inspections

Upon receipt of the GC of project mechanical completion, CMG will provide for a preliminary and final punchlist inspection report. This report may be provided to the appropriate authorities and funders if required.

4.0 CONSTRUCTION TRAFFIC MANAGEMENT

4.1 DESCRIPTION OF IMPACT

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.

4.2 DESCRIPTION OF MITIGATION MEASURES

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).

4.3 MONITORING AND REPORTING

The CMG Environmental Officer will be responsible for monitoring of site traffic management during construction. All vehicles will be inspected for proper operational condition, current insurance and overall road worthiness. Violations of the construction traffic management provisions, or other improper activities will be identified and reported to the GC and CMG Project Manager. Unsafe vehicle operation will not be tolerated and repeated offences will be cause for removal from the project of the offending operator. Revised traffic patterns, additional temporary signage or other traffic calming measures will be implemented as-needed if it is determined the proposed measures are not adequate. The CMG Environmental Officer or CMG Project Manager will communicate any required changes to the GC. Pervasive or reoccurring traffic issues, accidents or incidents will also be reported to CMG Management and the GBPA.

4.4 TRAINING

All equipment operators will be required to provide adequate proof of the appropriate license and experience to operate the respective vehicles.

4.5 OTHER RESOURCES NEEDED

Relevant CMG documents include:

- Safe Driving Policy (CMG-IMS-Q-PO-0005)
- Traffic Control Plan (CMG-IMS-Q-PR-0021)

4.6 DOCUMENTATION OF COMPLIANCE

A Log of site activities, including vehicle operations, traffic counts and compliance to the CMG Safe Driving Policy will be maintained.

4.7 ROLES AND RESPONSIBILITIES

The CMG PM and EO will be responsible for maintaining and documenting compliance with the Safe Driving Policy (CMG-IMS_Q-PO-0005). Any accidents or incidents will be recorded.

5.0 CONSTRUCTION NOISE MANAGEMENT

5.1 DESCRIPTION OF IMPACT

Noise 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). CSG 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 65dBA. The noise levels are consistent with the movements of ships in the container terminal and Bahama Rock loading operations. The ESMP will provide the requirements for independent inspections required, including noise readings, to demonstrate compliance to these standards.

5.2 DESCRIPTION OF MITIGATION MEASURES

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.

5.3 MONITORING AND REPORTING

The CMG EO and PM will be responsible for monitoring and reporting on noise levels during construction to demonstrate compliance. Logs of all reading will be completed.

5.4 TRAINING

All employees and workers will be notified of the expectations for noise attenuation and hearing protection. No additional training is required.

5.5 OTHER RESOURCES NEEDED

A portable and calibrated noise level meter will be required onsite and provided by CMG. If portable noise barricades are required, the GC will be required to provide them during the duration of the construction phase. Hearing protection devices will be provided by the GC for their employees/workers and by CMG for their employees and visitors.

5.6 DOCUMENTATION OF COMPLIANCE

The noise measurements will be recorded in the project activities log book to document compliance.

5.7 ROLES AND RESPONSIBILITIES

The CMG EO and PM will be responsible to maintaining compliance to the noise management provisions. The GC will be responsible for managing all noise generating equipment and activities.

6.0 AIR EMISSIONS DURING CONSTRUCTION

The CMG PRF will generate air emissions during construction. Construction equipment emits exhaust emissions and generates dust from vehicle movements.

6.1 DESCRIPTION OF AIR EMISSIONS DURING CONSTRUCTION

The following is a description of the anticipated impacts generated during construction from dust and exhaust.

6.1.1 Description of Impacts for Dust Generation

During construction, there is the potential for dust generation from the movement of vehicles on the dirt track road and site. The nearest residential neighborhood is approximately 1,000 meters to the west and not anticipated to be impacted by dust generation during construction. Workers on site may be impacted by dust emissions which can be inhaled and cause irritation to the nose and throat as well as eye irritations. For these reasons, the FHC has requested dust management be addressed a part of the ESMP. 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 seems 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.

6.1.2 Description of Impacts for Exhaust Emissions

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). 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.

6.2 DESCRIPTION OF MITIGATION MEASURES

The following is a description of the mitigation measures to be deployed for control of dust and exhaust emissions during construction.

6.2.1 Dust Mitigation Measures

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 during windy periods.
- 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.

6.2.2 Exhaust Mitigation Measures

CMG will limit exhaust emissions during construction 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. CSG 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, CSG and CMG are committed to reducing this impact by incorporating the recommendations of the US EPA and IFC standards.

6.3 MONITORING AND REPORTING

Dust monitoring will include measuring levels of $PM_{2.5}$ and PM_{10} using a handheld monitor (for example, a handheld real-time sensor (light scattering) that can provide instant results. Pre-construction sampling will occur prior to the start of site activities to establish a baseline (compensating for wind and humidity). If visible emissions are identified during construction activities at the downwind perimeter, measurements will be obtained to determine if dust levels have increased by more than 10 percent over background levels. If increases of 10 percent are identified, the contractor will be required to apply wetting techniques (wetting of road surfaces from a portable tank or sprinkler) to reduce dust levels to non-visible levels at the site's downwind perimeter.

No air quality monitoring for exhaust emissions is planned during construction as this is a short duration impact. All fuel utilized onsite for construction equipment will be monitored to confirm it is low-sulphur and all equipment will be inspected for compliance to the Tier IV standards. Original equipment manufacturer certifications will be required from the GC. Compliance will be reported in the project logbook.

6.4 TRAINING

No additional training needs have been identified for this aspect.

6.5 OTHER RESOURCES NEEDED

A portable dust monitor will be required on site and provided by CMG.

6.6 DOCUMENTATION OF COMPLIANCE

Documentation of dust measurements will be recorded in the activities logbook. OEM and fuel compliance records will also be maintained in the project file.

6.7 ROLES AND RESPONSIBILITIES

The CMG EO and PM will be responsible to maintaining compliance to the construction phase air emissions management provisions. The GC will be responsible for managing all dust generating activities and for providing OEM specifications for exhaust and fuel compliance.

7.0 CONSTRUCTION PHASE SURFACE WATER QUALITY IMPACTS

7.1 DESCRIPTION OF SURFACE WATER QUALITY IMPACTS

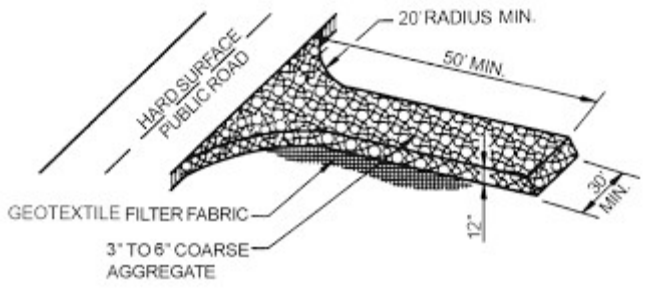
The site preparation will consist of grading and building construction per the approved construction drawings (in development). Preparation will also include removal of existing abandoned equipment (conveyors and tanks). The site is generally devoid of vegetation (with the exception of a minor herbaceous 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. Figure 5 is a copy of a recent topographic survey (contour interval is 0.5 feet).

Figure 5: Topographic survey

7.2 DESCRIPTION OF SURFACE WATER QUALITY MITIGATION MEASURES

The civil works engineering design package will include the appropriate sediment control and stormwater provisions. The table below provides a list of the recommended best management practices for the PRF given its topography, location and proposed development plan to control surface water impacts. Figure 3 is the current proposed site layout.

Table 5: Mitigation measures for surface water impacts

Measure	Location	Image / Detail
Stabilised construction entrance	At new road connection point and construction entrance	
Super silt fence	Along westerly side of site downslope at edge of soil disturbance.	

Silt socks (biodegradable)	Along drainage courses at edge of disturbance and as outlet protection.	
Stormdrain inlet protection	Around newly installed stormdrain inlets until site is stabilised	
Temporary fuel bunding during construction	At a designated area for refuelling protected by barriers	

Vehicle drip pads	Use under vehicles while parked on site during construction	
Spill control kit	Keep on site during construction phase in case of accidental release (tank rupture, spill or line leak)	

Vegetative stabilisation	Use sod, seeding with straw mulch and netting and/or plantings to restabilise disturbed areas as quickly as possible.	

All hazardous materials brought on site during construction will be accompanied by safety data sheets (SDS). These sheets detail proper handling, storage and disposal techniques for use of hazardous materials as well as proper first aid in case of accidental exposure. All SDS files will be accessible to workers. Their location is included in the basic safety induction training. During construction temporary storage facilities at the project site for hazardous waste will have disposal containers that are covered, made of inflammable material, sealed to prevent leaking, and positioned on an impervious surface as far from any water as possible. Secondary containment for all disposal containers should be 110 per cent of the maximum volume of the container. Temporary storage facilities will be inspected at least once a day by appropriate staff to check for leaky containers. Appropriate spill containment and clean-up equipment will be easily accessible near hazardous waste storage facilities. Disposal of all hazardous waste utilized or generated during construction will occur offsite by a licensed contractor at a licensed facility as per DEHS requirements.

7.3 MONITORING AND REPORTING

Weekly inspections of all sediment control and fuel storage features shall be completed and reported on the project activities log. Inspections will also occur within 24 hours of a significant rainfall event (defined as greater than 1 inch a 1-hour period or 2 inches in a 24-hour period). A precipitation gauge will be maintained onsite by the CMG EO. All repair to sediment control measures should occur within 24-hours of their damage. Repair to damaged or poorly function devices will be recorded by the GC and confirmed by the EO.

7.4 TRAINING

No additional training is required for this environmental aspect.

7.5 OTHER RESOURCES NEEDED

Resources required for the project during construction for this aspect include all appropriate sediment control measures along with replacement materials (to be provided by the GC).

7.6 DOCUMENTATION OF COMPLIANCE

The Inspection log (with photos) during construction will provide documentation of successful execution of the sediment control measures. This log will be maintained onsite throughout the duration of construction activities.

7.7 ROLES AND RESPONSIBILITIES

The GC is responsible for the purchase, deployment and maintenance of all sediment control devices during construction and shall not remove them until the project has been deemed complete and stabilised by the CMG Project Manager. The GC will provide weekly inspections (or more frequent if storm events occur) and record them on the project activities log. The CMG EO will review the activities log and provide weekly inspections of all measures. Final close-out and removal of the

temporary sediment control measures will be permitted once the site is fully stabilised. Authorisation for removal will be the CMG Project Manager.

8.0 CONSTRUCTION PHASE SOLID WASTE

8.1 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.

8.2 SOLID WASTE IMPACT MITIGATION

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).

8.3 MONITORING AND REPORTING

Daily inspections for loose refuse, plastics, food containers, etc., will occur. The GC is responsible for maintaining a tidy site (good housekeeping practices) throughout the duration of the construction contract.

8.4 TRAINING

No additional training is required for this environmental aspect.

8.5 OTHER RESOURCES NEEDED

Resources required for the project during construction for this aspect include waste bins and a general construction skip. Recycling containers will be provided as appropriate.

8.6 DOCUMENTATION OF COMPLIANCE

The Inspection log (with photos) during construction will provide documentation of a clean and refuse free project site. This log will be maintained onsite throughout the duration of construction activities.

8.7 ROLES AND RESPONSIBILITIES

The GC is responsible for the purchase, deployment and maintenance of the site during construction. The GC will provide for daily inspections. These are not required to be reported on the project activities log. The CMG EO will inspection as-needed to confirm acceptable conditions are maintained.

9.0 CONSTRUCTION PHASE OCCUPATIONAL SAFETY

9.1 DESCRIPTION OF CONSTRUCTION PHASE OCCUPATIONAL SAFETY IMPACTS

Construction phase occupational safety impacts include traditional employee construction safety risks such as excessive noise, vibration, slips, trips, and falls, and traffic (in particular construction vehicular incidents) to name a few. 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 during construction through a contractual flow-down to the general contractor (GC). The site poses no specific construction risks that are higher or lower than what would be expected at any construction project. For example, 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. 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.). 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.

9.2 DESCRIPTION OF CONSTRUCTION PHASE OCCUPATIONAL SAFETY MITIGATION

Mitigation for occupational risks during construction starts with the project design development. The designer of record (DoR) will develop a process hazard analysis (PHA) that is a cross-discipline, multiphase assessment of construction and operational risks associated with the project (inclusive of occupational and environmental aspects). The goal is to identify early in the design process those potential risks that can be “designed out” of the project. The second goal is to minimize risks with appropriate engineering mitigations such as guardrails, equipment guards, process interlocks, alarms, etc. The third and last goal is to define appropriate PPE levels for those workers who may be exposed to residual risks.

For construction related risks the pre-work planning process is taken another step with the development of a site-specific Health and Safety Plan (HASP) provided by the GC. The HASP identifies the specific work components that account for the project execution and each has a specific Job Hazard Analysis completed for the task. The JHA relates the specific task to the worker requirements (training and experience), tools, PPE, and environmental considerations (weather, temperature, other adjacent activities, etc). The development of the HASP and JHA will follow construction industry best practices. CMG is developing a number of specific Work Instructions (WI) control documents for the PRF. Those that apply to construction will be incorporated by reference to the GC contractual documents. These WIs identify specific PRF related hazards and requirements to complete tasks in a safe and effective manner. Once the JHA has been completed, including reference to the specific WI as applicable, a Safe Work Permit (SWP) will be completed. This document lists the specific workers, tasks, tools, PPE and other precautions (including SDSs and first-aid) for a specific and defined task. The task duration may occur over a short period of time or several days. The SWP will be completed and closed-out upon final inspection by the CMG Safety Representative, EO, or PM. The SWP must be signed by the GC Site Superintendent and CMG representative (authorised to do so). The five-step process safe work execution is as follows:

1) Identify defined work elements in the project and site-specific HASP;
2) Develop a JHA for each specific job task;
3) Obtain a SWP signed by all parties prior to initiation of specific work in the field;
4) Review planned work execution with a Toolbox Talk at the start of each workday; and
5) Close out SWP with final PM signature after all work is completed, safety protocols completed and removed as needed, and work inspected. Findings and lessons learned to be included on final documentation prior to filing.

Table 4 in Section 2 provides general occupational aspects and references for the PRF. Table 6 is specific to the construction industry. It identifies a list of the top ten construction related occupational risks as obtained from the US OSHA using the “fatal four” leading causes of fatalities in the workplace and the top recordable injuries (lost-time) and safety violation notices for the industry. A full industrial hygiene assessment of construction related risks is beyond the scope of this ESMP. The GC for the project is responsible for identify and mitigating all known and suspected occupational risks and a dedicated construction safety professional will be utilized for this task. Mitigation measures below are provided for information and awareness and are not a comprehensive listing of all potential risks.

Table 6: Top ten construction related risks (by percent lost time injuries)

Occupational Risk	Mitigation Options	Examples / References
FATAL FOUR		
Falls / Working at height	• Guardrails • Personal arrest systems • Safety nets • Proper use of portable ladders • Proper use of scaffolds	The U.S. OSHA Fall Protection Standard (1926.501) and Scaffold Standard (1926.451) are good references. The OSHA ladder safety standard should also be consulted (1926.1053).
Struck By Objects	• Use of toe boards and railings • Nail gun safety • Cranes and rigging plans • Wind restrictions	Refer to OSHA standards for Working at height, as well as the Crane Safety rules (29 CFR Part 1926
Electrocutions	• Distance requirements • Isolation • De-energizing and grounding • LO/TO procedures	OSHA Control of Hazardous Energy standard (1910.147) as reference.
Caught In/Between	• Identifying pinch points • LO/TO procedures • Machine guarding requirements for hand tools, drilling rigs, etc.	OSHA Machine Guarding standard (1910.212).
TOP TEN MOST COMMON CONSTRUCTION ACCIDENTS		
Falls	Leading cause of accidental death in the construction industry. Compliance with all fall protection provisions will be strictly enforced by CMG and GC.	See reference above for Fall protection standards.

Falling Debris	Scaffolds will have toe-boards to minimize the potential for falling debris.	See scaffold standards.
Electrocutions	Only properly trained and qualified electricians can work on energized components. LO/TO will be strictly enforced.	See energized equipment standards.
Explosions or burns	Life-safety standards including portable fire extinguishers, spark arrestors, proper storage and labelling of all flammable compounds will be strictly enforced.	See HAZCOM standards (OSHA 1910.1200) and availability of all SDSs for workers and visitors during construction.
Slips and Falls	Good housekeeping practises to eliminate trips, slips and falls will be followed.	
Machinery accidents	Proper placement of barricades, signage, training, daily equipment inspections, and machine guards.	HAZCOM and Machine guarding standards.
Caught In/Between	Proper placement of barricades, signage, and machine guards. Additional measures include the use of spotters, and supervision.	HAZCOM standards.
Trench or ground collapse	Proper trenching and excavation protocols to be used including design of trench works per soil hazard classification.	OSHA trench and excavation safety standards (1926, Subpart P).

Vehicle accidents	Dedicated travel lanes, ingress/egress and signage should be uses. Signalling may be required.	See CMG Traffic Management Plan and Safe Driving Policy
Over fatigue / Ergonomic impacts	Proper JHA will account for repetitive stress, manual lifting requirements, anti-fatigue measures, heat stress controls and proper work/rest rotations.	JHA and HASP to include specific provisions for the project.
ADDITIONAL COMMON CONSTRUCTION SAFETY PROTOCOLS		
Confined Space	A confined space permit shall be issued prior to entry into any confined space as defined by OSHA or HSE.	Confined spaces in construction are defined by OSHA in 1926, Subpart AA.
Security	Toolbox talks will address employee safety and security from potential workplace violence, theft, bullying, harassment, and other threats or coercion.	CMG workplace policies address these risks and will be flowed down to their respective subcontractors and vendors.
Emergency Preparedness for Hurricanes/storms	Warning notifications to be posted. Muster and evacuation routes identified and included in employee/worker training. Additional materials stored for use during a storm event for securing all temporary structures, lashings, glazing protection, flood controls, and other materials needed to secure the project site.	FEMA references for hurricane protection at construction sites (see: https://www.hopenn.com/prepare-your-construction-sites-for-severe-weather/).

9.3 MONITORING AND REPORTING

Periodic inspections by competent supervisors will be required continuously throughout the duration of the project. Safety inspections will occur generally on a weekly basis by the CMG EO but will be unannounced. Violations of the occupational safety standards will be immediately addressed with the GC. The most common violations are routine and minor (such as not wearing eye protection or safety boots) or driving in a non-designated zone. These will be flagged and reported to the GC Site Superintendent. Repeated or willful violations will be cause for contract actions, and dismissal of workers from the site. Safety inspections will be noted in the CMG Inspection Logbook.

9.4 TRAINING

Training needs are dependent upon the specific task, regulatory requirements and assigned individuals. At a minimum, no worker will be permitted to complete a task, operate equipment or oversee work that they are not properly trained and qualified to complete.

Minimum and specific training requirements for construction workers per US OSHA are provided in Standards 29 CFR 1926 as appropriate. In general, the employer must train each affected employee in the manner required in the recognition and avoidance of unsafe conditions applicable to their work environment. The minimum standard is typically a 10-hour training program for workers and a 30-hour training program for supervisors. More specific training requirements are provided for specific tasks, operations and hazardous conditions (see reference). For example, the "Focus Four" on the most common fatalities at construction sites are generally reviewed with workers during a 10-hour training program (see Figure 6). All employees and visitors will be required to attend the mandatory Safety Induction Training (once the facility is operational). This requirement will not be imposed during construction.

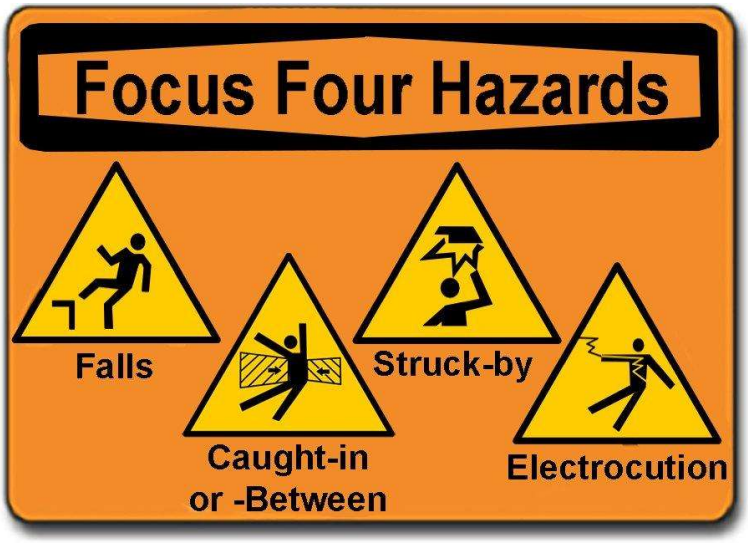


Figure 6: Focus Four OSHA Safety Graphic

9.5 OTHER RESOURCES NEEDED

All training records, safety protocols, HASP and JHA to be provided by the GC prior to construction.

All construction related safety equipment, including, but not limited to, machine guards, barriers, signage, trench boxes, shoring controls, PPE, ablution facilities, emergency eye-wash stations (portable), drip pads, spill control, caution tape, SDSs, etc., to be provided by the GC at start of construction.

9.6 DOCUMENTATION OF COMPLIANCE

All daily work activity logs, inspection logs, safety violations, citations, complaints, notices of violation, lost-time injuries and completion inspections (including SWP and other documentation as requested) to be maintained and delivered to CMG upon request or occurrence.

9.7 ROLES AND RESPONSIBILITIES

The GC Safety Representative will be responsible for day-to-day safety protocols, inspections and documentation. The GC Superintendent will be responsible for day-to-day compliance. The CMG EO and PM will be responsible for safety inspections, documentation and contract performance. Safety violations or incidents will be reported by CMG to the GBPA as required.

10.0 CONSTRUCTION PHASE SOCIO-ECONOMIC IMPACTS

10.1 DESCRIPTION OF IMPACTS

The primary impact (positive) resulting from the construction phase of the CMG PRF is the Increased employment. This 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 20+/- jobs resulting from the construction phase will generate added revenue from employment wages to the local community. While total economic impact as a result of capital investment will be reduced due to the acquisition and fabrication of major equipment overseas, the local expenditures in goods, services, materials, and labour will provide a positive net benefit to the region. The additional benefit of increased training, experience and advancement for local workers is also noted.

The only negative social impacts have been identified as increased traffic, noise and dust as a result of construction activities. These are addressed in previous sections of this ESMP.

10.2 DESCRIPTION OF MITIGATION

CMG will promote the positive benefits of this aspect through an emphasis on hiring of local contractors for the construction of utilities, site grading, building erection, infrastructure and landscaping/stabilization of the project. Specific specialty components (process equipment and pollution controls) will likely be procured and fabricated off-site by an overseas vendor. CMG will give preference to GCs that utilize a higher level of local suppliers, vendors, and workers over those that utilize outside (non-Bohemian) resources. All workers shall be paid prevailing wages. All workers (CMG or otherwise) will be covered by the CMG Administrative and Operational Controls Documents as appropriate (see Appendix A).

10.3 MONITORING AND REPORTING

CMG will provide a statement of net economic outcomes for the construction phase that includes capital expenditures, procurement of local goods and services, employment (including full-time and part-time), wages and salaries of workers, benefits and fringe and estimated total economic impact.

10.4 TRAINING

No additional training is required for this aspect.

10.5 OTHER RESOURCES NEEDED

No additional resources are required for this aspect.

10.6 DOCUMENTATION OF COMPLIANCE

CMG will issue a post-construction close-out report documenting the socio-economic benefits of the project (inclusive of construction and transition to operations phase impacts).

10.7 ROLES AND RESPONSIBILITIES

The CMG PM and Executive Committee will be responsible for review and issuance of the final close-out report.

11.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM (ESMS)

CMG has established an Environmental and Social Management System (ESMS) that includes policies, procedures, and personnel responsible for implementing the Project. This section describes the Project-specific ESMS and its component parts including the Environmental and Social Management Plan (ESMP) that has been generated for the Project.

The CMG management system is a set of processes and practices to consistently implement policies to meet the business objectives. The ESMS procedures and continuous improvement process are designed to inform employees of what is required, provide them with resources to meet CMG objectives and to ensure compliance by accountability measures. The management system helps to assess and control r risks and is the key to lasting improvement. The ESMS continual improvement – an ongoing process of reviewing, correcting and improving your system will utilize the most common method of Plan-Do-Check-Act cycle (PDCA), described below.

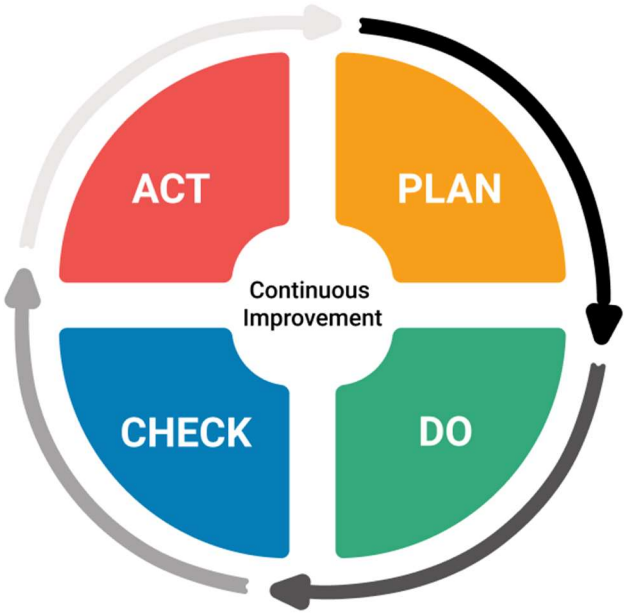


Figure 7: ESMS Strategy graphic (stock image)

The nine components of the CMG ESMS are:

1. Policy
2. Identification of Risks and Impacts
3. Management Programs
4. Organizational Capacity and Competency
5. Emergency Preparedness and Response
6. Stakeholder Engagement
7. External Communications and Grievance Mechanisms
8. Ongoing Reporting to Affected Communities
9. Monitoring and Review

11.1 POLICY

The Clean Marine Group (CMG) Freeport, Bahamas Port Reception Facility (PRF) will strive to meet and exceed wherever practicable all environmental laws and regulations while operating a resource efficient operation that minimizes greenhouse gas (GHG) emissions, the release of pollutants into air, water, and land. It will continually strive for the proper handling and treatment, including recycling and waste minimization, of all hazardous chemicals, hazardous and non-hazardous wastes and the recovery, reuse, treatment, and proper disposal of all generated waste. CMG is also committed to providing a safe, equitable, transparent and non-discriminating workplace for all employees where

worker's rights are protected, and compensation and promotions are merit-based (see CMG CMG-IMS-Q-PO-0010 ESG Policy).

11.2 IDENTIFICATION OF RISKS AND IMPACTS

CMG will maintain a Risk and Impact Register to track and manage all potential environmental and social risks associated with the project. Appendix C is an Identification of Risks and Impacts utilizing the ESMS Toolkit (IFC) template.

11.3 MANAGEMENT PROGRAMS

The management programs includes the specific management plans (ESMPs), Work Instructions (WI), the ISO Management Certifications and mechanisms as part of the comprehensive CMG Integrated Management System (IMS), see Appendix A for Master Document List).

11.4 ORGANIZATION CAPACITY AND COMPETENCY

CMG will maintain fully qualified and competent professionals with current knowledge and skills on environmental and social issues, including regulatory requirements and industry best practices. They will also have been trained on management system standards. CMG will involve external experts to assist in the identification of risks for complex projects.

11.5 EMERGENCY PREPARDNESS AND RESPONSE

CMG not only has employees' and contractors' full involvement, we also focus on continued participation and communication with surrounding communities on emergency management planning. External communication channels in case of an emergency are defined. "Off-site" emergency management and "mutual aid" are key features of our emergency plan. The CMG Emergency Preparedness Plan is integrated to the Port Authority Contingency Planning and reviewed on a regular basis.

See also See Section 12.0 of this ESMP and Plant Protection Standards.

11.6 STAKEHOLDER ENGAGEMENT

CMG has promoted a Stakeholder Engagement process led by a Steering Committee (see Table 7 below for representation). Stakeholder mapping has followed the process below:

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 7: Steering Committee representation

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

The stakeholder mapping exercise (in process) has tentatively identified the following organisations/institutions for inclusion in the communication and engagement process.

Table 8: Additional potential stakeholders

CMG Stakeholder Engagement Plan				
Stakeholder	**Representative**	**Concern**	**Engagement Method**	**Information Exchange**
GBPA	Rico Cargill	Ability to provide services and compliance to approvals/standards.	Regular scheduled meetings and formal submittals.	Technical data submitted and formal responses for Authority.
GBSY	Marvin Basden	Operational alignment, traffic and other regional Port related issues.		
FSS	Jeremy Cafferata	Operational alignment, traffic and other regional Port related issues.		
Lender / IDB	Terry-Ann Segree	Execution to and management of ESMP.		
Lender / IDB	Mikia Carter	Execution to and management of ESMP.		
Lender / Althelia	TBD	Execution to and management of ESMP.		
Lender / Minrova	Kevin Whittington-Jones	Execution to and management of ESMP.		
Workers	TBD	Transparency of Human Resource policies, EH&S.	Job boards, notices and direct communications.	Details on worker rights, grievance policy, and opportunities.

Residences	TBD	Environmental compliance and emergency preparedness.	TBD	TBD
Customers	TBD	Regulatory compliance.	TBD	TBD
Suppliers	TBD	Supply chain compliance and transparency.	TBD	TBD
Media	TBD	Documentation of public benefit.	Directed communications.	Social Media and Press Releases
Local religious or other cultural institutions along with community action organisations.	TBD	Consultation on potential socio-economic risks and opportunities to meet public need.	Directed communications and/or SC assignment.	Social Media and email correspondence.
Other local and/or adjacent operations	Freeport Container Port / CEMEX / Bahama Rock	Operational alignment, traffic and other regional Port related issues.	Invitation was sent to these organizations with no response received.	

11.7 EXTERNAL COMMUNICATIONS AND GRIEVANCE MECHANISMS

CMG will utilize a variety of methods for external communications. Formal communications to regulatory authorities will be via signed correspondence (electronic and/or hard copy as required) and where appropriate, email exchange. Notices to the public will be via formal press releases if appropriate, and/or to the dedicated Facebook™ (FB) page for the PRF. The FB page will be monitored for information and posts from stakeholders and other interested parties by the CMG Information Officer.

Grievance mechanisms will include social media monitoring such as the aforementioned FB page. The phone number of the CMG Information Officer will be provided for direction communications. All

informal and formal complaints of merit will be addressed. The method will vary by the type and seriousness of the grievance. Minor grievances will be addressed by the PRF Manager or Information Officer whereas more serious complaints will be addressed by senior management. For internal employees, a dedicated 800 number and email address will be provided for anonymous complaints that directly links to the corporate HR representative. Formal complaints will be heard by the local and/or corporate HR representative.

The public, especially neighbouring businesses, must be informed of the mechanism for reporting concerns or problems and this mechanism must be easily accessible and responsive. Options for this mechanism include a telephone hotline, website or contact person. When concerns are communicated, they will be acknowledged within 24 hours and resolved within 48 hours, when feasible. If it is not feasible to resolve a matter within 48 hours, persons will be advised of this and regularly updated on progress in addressing their concerns.

Once construction commences, the public will be advised of instances of inconvenience or disturbance, such as changes to traffic routes and times of excessive noise per the mechanisms described above. Signage will also be utilized on and near the site to advise of things, such as traffic diversions and active construction areas. At least one sign needs to include information about the onsite contractor inclusive of a telephone number and email address for contacting them. Contact information will also be provided for DEHS, DEPP and Ministry of Works. Notices will also be placed on social media (such as Facebook™) notifying the public of site activities including construction progress. CMG is investigating the ability to add an anonymous feedback link to their corporate website for this project.

11.8 ONGOING REPORTING TO AFFECTED COMMUNITIES

The PRF Steering Committee take responsibility for stakeholder communications, reporting and continuous improvement on relationships with all identified stakeholders.

11.9 MONITORING AND REVIEW

The CMG IMS includes the following control documents to manage the ongoing reporting and review of stakeholder engagement activities:

- Internal Audit Report (CMG-IMS-Q-FM-003)
- Customer Feedback Form (CMG-IMS-Q-FM-005)
- Complaints Form (CMG-IMS-Q-FM-0010)

12.0 SUMMARY AND RECOMMENDATINOS

12.1 CONSTRUCTION PHASE

This ESMP has identified the impacts, mitigation measures, references, and responsible parties for the construction phase of the CMG PRF at the port of Freeport, Grand Bahama Island. These are summarized below (and in Table 10 below).

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.

Table 9: Construction Phase ESMP Summary Table

ESMP Aspect	Action/Mitigation Measure	Responsible Party
General site development impacts	Identify limits of disturbance including laydown yards, fuel storage locations, staging and equipment storage.	General contractor and designer of record
General social impacts	Provide temporary security fencing around the perimeter of the property to control access during construction. Lock all equipment out when not in use.	General contractor
Construction Traffic Management	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.	

Water quality impacts	Install perimeter controls / super silt fence, rip-rap outlet protection and earthen berms to minimise run-on and run-off to and from the site. Install a stabilized construction entrance with stone over filter cloth. Use a mechanical sweeper to control loose soil. Silt socks (biodegradable) Stormdrain inlet protection Temporary fuel bunding during construction Vehicle drip pads Emergency spill control kit available onsite	General contractor
Air quality impacts	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. 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.	General contractor
Construction noise impacts	Implement noise control measures at the source by ensuring all mufflers and spark arrestors are in place and functioning.	General contractor

	Limit heavy equipment use to daytime hours only (0600 to 2100). Use noise attenuation booths for pipe cutting when possible. 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. Use noise attenuation booths for pipe cutting when possible.	
Construction occupational safety.	Enforce standards included in Construction HASP. Enforce all occupational health standards including lock out/tag out, trench safety, working at height, fall protection, hazard communication, PPE., etc. Provide routine inspections to ensure compliance with standards. See Table 4 for general recommendations and Table 6 for more specific recommendations during construction.	General contractor and CMG.
Solid waste management	Provide for skips and hauling service to the landfill. Provide skips for recycled materials. Provide for temporary ablution facilities.	General contractor.
Social impacts	CMG to survey for and document prevailing wages by labour category are paid by GC. CMG to institute a “buy local” plan to encourage the use of small and historically disadvantaged firms. CMG to post and inform all workers through induction training of opportunities and protections per CMG policies. CMG to inform all workers through induction training of grievance and complaint policies.	CMG

APPENDICES

APPENDIX A: IMS MASTER DOCUMENT RECORD INDEX

Master Document & Record Index
CMG-IMS-Q-FM-0001

Document Title	Document Ref No.	Rev.	Issue Date	Review Cycle	Distribution									
					Top Management	QHSE	Design	Operations/ Engineering	Purchasing	HR	Sales	IT	Finance	Administration
IMS MANUALS														
IMS MANUAL	CMG-IMS-Q-ML-0001	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
IMS POLICIES														
QHSE POLICY	CMG-IMS-Q-PO-0001	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
IMS PROCEDURES														
DOCUMENTED INFORMATION PROCEDURE	CMG-IMS-Q-PR-0001	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
MANAGEMENT REVIEWS PROCEDURE	CMG-IMS-Q-PR-0002	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
RESOURCE MANAGEMENT PROCEDURE	CMG-IMS-Q-PR-0003	A												
INTERNAL AUDIT PROCEDURE	CMG-IMS-Q-PR-0004	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
CUSTOMER SATISFACTION/ COMPLAINT HANDLING PROCEDURE	CMG-IMS-Q-PR-0005	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
OPERATIONAL CONTROL PROCEDURE	CMG-IMS-Q-PR-0006	A												
ENVIRONMENTAL ASPECT IDENTIFICATION AND ASSESSMENT PROCEDURE	CMG-IMS-Q-PR-0007	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
PROCUREMENT MANUAL	CMG-IMS-Q-PR-0008	A												
RISKS AND OPPORTUNITIES PROCEDURE	CMG-IMS-Q-PR-0009	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
COMMUNICATION AND ENGAGEMENT PROCEDURE	CMG-IMS-Q-PR-0010	A												
MONITORING, MESUREMENT AND CONTINUAL IMPROVEMENT PROCEDURE	CMG-IMS-Q-PR-0011	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
ACCIDENT AND INCIDENT REPORTING PROCEDURE	CMG-IMS-Q-PR-0012	A												
HAZARD IDENTIFICATION AND ASSESSMENT PROCEDURE	CMG-IMS-Q-PR-0013	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
LEGAL AND COMPLIANCE PROCEDURE	CMG-IMS-Q-PR-0014	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
IMS FORMS, REGISTERS, CHECKLITS & PROGRAMMES														
MASTER DOCUMENT & RECORD INDEX	CMG-IMS-Q-FM-0001	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
DOCUMENT ISSUE SHEET	CMG-IMS-Q-FM-0002	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
INTERNAL AUDIT REPORT	CMG-IMS-Q-FM-0003	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
MANAGEMENT REVIEW AGENDA AND MINUTES	CMG-IMS-Q-FM-0004	A		ANNUALLY	x	x								
CUSTOMER FEEDBACK FORM	CMG-IMS-Q-FM-0005	A												
RISK AND OPPORTUNITY REGISTER	CMG-IMS-Q-FM-0006	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
EQUIPMENT INSPECTION AND CALIBRATION FORM	CMG-IMS-Q-FM-0007	A												
TRAINING REGISTER / ATTENDANCE FORM	CMG-IMS-Q-FM-0008	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
SUPPLIER EVALUATION	CMG-IMS-Q-FM-0009	A		ANNUALLY	x	x			x					
COMPLAINTS FORM	CMG-IMS-Q-FM-0010													
LEGAL AND COMPLIANCE REGISTER	CMG-IMS-Q-FM-0011	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
ASPECT IDENTIFICATION FORM	CMG-IMS-Q-FM-0012	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
OBJECTIVES MANAGEMENT PROGRAMME	CMG-IMS-Q-FM-0013	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
CORRECTIVE ACTION REPORT	CMG-IMS-Q-FM-0014	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
INTERNAL AUDIT FEEDBACK	CMG-IMS-Q-FM-0015	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
TRAINING EVALUATION FORM	CMG-IMS-Q-FM-0016	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x

INTERNAL AUDIT PROGRAMME	CMG-IMS-Q-FM-0017			ANNUALLY	x	x	x	x	x	x	x	x	x	x
INTEGRATED AUDIT CHECKLIST	CMG-IMS-Q-PR-0015	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
PROCESS AUDIT CHECKLIST	CMG-IMS-Q-PR-0016	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
PROCESS MATRIX AND APPLICATION	CMG-IMS-Q-PR-0017	A		ANNUALLY	x	x	x	x	x	x	x	x	x	x
DOCUMENT CHANGE REQUEST	Future			ANNUALLY	x	x	x	x	x	x	x	x	x	x
CONTEXT AND INTERESTED PARTIES MATRIX	CMG-IMS-Q-PR-0027			ANNUALLY	x	x	x	x	x	x	x	x	x	x
OPERATIONAL CONTROL DOCUMENTS														
ACCIDENT AND INCIDENT REPORT	CMG-IMS-Q-FM-0018	A												
WEEKLY ENVIRONMENTAL CHECKLIST	CMG-IMS-Q-FM-0019													
APPROVED SUPPLIER INDEX	CMG-IMS-Q-FM-0020			ANNUALLY	x	x			x					
PORT SECURITY PLAN	CMG-IMS-Q-ML-0003													
EMERGENCY PREPAREDNESS AND RESPONSE	CMG-IMS-Q-PR-0018													
CONTROL OF EQUIPMENT	CMG-IMS-Q-PR-0019	A												
NOISE AND VIBRATION CONTROL PLAN	CMG-IMS-Q-PR-0020													
TRAFFIC CONTROL PLAN	CMG-IMS-Q-PR-0021													
WASTE MANAGEMENT CONTROL PLAN	CMG-IMS-Q-PR-0022													
SPILL PREVENTION AND RESPONSE	CMG-IMS-Q-PR-0023													
HURRICANE PREPAREDNESS	CMG-IMS-Q-PR-0024													
SOIL AND GROUND WATER CONTAMINATION CONTROL	CMG-IMS-Q-PR-0025													
AIR QUALITY CONTROL	CMG-IMS-Q-PR-0026													
ADMINISTRATIVE DOCUMENTS														
EMPLOYEE HANDBOOK	CMG-IMS-Q-ML-0002	A												
SMOKING POLICY	CMG-IMS-Q-PO-0002	A												
DRUGS POLICY	CMG-IMS-Q-PO-0003	A												
ALCOHOL POLICY	CMG-IMS-Q-PO-0004	A												
SAFE DRIVING POLICY	CMG-IMS-Q-PO-0005	A												
CONFLICT OF INTEREST POLICY	CMG-IMS-Q-PO-0006	A												
GIFTS AND GRATITUDE POLICY	CMG-IMS-Q-PO-0007													
ANT-BRIBERY AND CORRUPTION POLICY	CMG-IMS-Q-PO-0008	A												
MODERN SLAVERY POLICY	CMG-IMS-Q-PO-0009	A												
INDUCTION RECORD FORM	CMG-IMS-Q-FM-0021	A												
ENVIRONMENTAL POLICY	CMG-IMS-Q-PO-0010													
CMG Purchase Requisition Form (<GBP1k)	CMG-IMS-Q-FM-0031	A												
CMG Purchase Requisition Form (<USD1k)	CMG-IMS-Q-FM-0032	A												

APPENDIX B: BASIS OF DESIGN (CURRENT VERSION)

MARPOL Annex I
Oil and Oily Waste
Port Reception Facility

Process Basis of Design

Document No. CMG-BA3-P-DB-0001

Revision	Date	Prepared	Reviewed	Approved	Issued Status
1	16.07.2021	TRK		TD	Issued for Inquiry
0	24.02.2021	TRK		TD	Issued for Inquiry
A	08.02.2021	TRK		TD	Issued for review

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

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Purpose

This document provides an overview of the Marpol Port Reception Facility (PRF) project with details and information for suppliers to deliver designs/equipment/packages compliant with the project requirements.

These requirements are provided as a guide for the design, fabrication, construction and installation of equipment/packages. The purpose is to establish a minimum level of acceptance quality however alternate designs of equal or superior quality may be proposed.

1.2 Project Overview

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 Harbour precinct. Waste oil will be received from trucks to the facility for processing. The waste processed will produced merchantable oil and re-usable water which will be made available to other Freeport companies. The re-processed water will be provided in various grades which will allow optimal use of this limited resource.

2 DEFINITIONS AND ABBREVIATIONS

Client: Clean Marine Group. Owner and operator of the PRF

Supplier: Company delivering goods and services to CMG under a PO/Contract

Sub-supplier: Company delivery goods and services to Supplier

CMG	Clean Marine Group
PRF	Port Reception Facility
GBPA	Grand Bahamas Port Authority
DEPP	Department of Environmental Protection and Planning
FHC	Freeport Harbour Company
IMO	International Maritime Organisation
EIA	Environmental Impact Assessment
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASNT	American Society of Non-Destructive Testing
ASTM	American Society for Testing Materials
AWS	American Welding Society
IEC	International Electro technical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
NACE	National Association of Corrosion Engineers
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
SSPC	Steel Structures Painting Council
TEMA	Tubular Exchanger Manufacturers Association
NPSH	Net positive suction head
TEMA	Tubular Exchanger Manufacturers Association

3 UNITS OF MEASURE

SI Units will be used for the PRF design.

Standard temperature and pressure are 0°C and 101.32kPa

Measure	Unit	Abbreviation
Area	square metre	m2
Concentration	parts per billion, parts per million	Ppb, ppm
Density	Kilograms per cubic metre	Kg/m^3
Electric Current	Ampere	A
Electrical Potential	Volts	V
Electrical Power	Watts	W
Electrical Energy	kilowatt hour or Megawatt hour	kWh or MWh
Enthalpy	Joule	J
Frequency	Hertz, Pulses per second	Hz, pps
Force	Newton	N
Pressure	Pascal	Pa
Length	Millimetre, Meter, Kilometre	mm, m, km
Mass	Kilograms	kg
Mass Flow	kilograms per hour	kg/h
Flange Rating	pound (pounds per square inch)	#
Heat	kilowatt, megawatt, kilojoule	kW, MW, kJ
Mass Enthalpy	megajoule per kilogram	MJ/kg
Noise Pressure	Decibels	dB(A)
Pipe Diameter	Inches	in
Pipe Wall Thickness	Inches	in
Pressure (gauge)	bar gauge	barg
Pressure (absolute)	bar absolute	bara
Pressure (differential)	Bar	bar
Specific Heat Capacity	kilojoules per kilogram Kelvin	kJ/kg K
Surface Tension	dyne per centimetre	dyne/cm
Temperature	degree Celsius	°C
Thermal Conductivity	Watts per meter Kelvin	W/m K
Time	second, minutes, hours	s, min, h
Turbidity	Nephelometric Turbidity Units	NTU
Velocity	meter per second	m/s
Viscosity (Dynamic)	Centipoise	cP
Viscosity (Kinematic)	Centistoke	cSt
Volume	cubic meter	m3
Volumetric Flow: Liquid / Oil / Water	barrels of liquid per day (general)	blpd
	barrels of oil per day	bopd
	barrels of water per day	bwpd
Volumetric Flow: (general)	Actual cubic metres per hour	Am^3/h
	Normal cubic metres per hour	Nm^3/h
	Standard cubic metres per hour	Sm^3/h
Volumetric Flow: Gas	Million standard cubic feet per day at standard pressure and temperature	mmscfd

4 ORDER OF PRECEDENCE

The following order of precedence shall apply:

1. National laws and regulations
2. Specifications
    a. Contract/Purchase Order
    b. CMG Requisition
    c. CMG Document List
    d. CMG Datasheet
    e. CMG Specifications
3. International codes and standards

5 NATIONAL LAWS, REGULATIONS AND CERTIFICATION AUTHORITY

National laws and regulations together with local by-laws for the Bahamas and Grand Bahama Island. This includes the Grand Bahama Port Authority (GBPA) and Freeport Harbor Company (FHC).

Supplier shall determine and put into effect all local regulatory and certification requirements affecting the performance of the work including the design, engineering, procurement/manufacture, construction and performance tests of the Equipment/Package. The scope includes the areas of health, safety, environment, equipment and facilities certification.

Supplier shall be familiar and comply with the technical and safety requirements of local standards, regulations and laws related to environmental, safety and health issues of the industry and any regional regulations where applicable in Supplier's and Sub-Contractor's work location.

6 LANGUAGE

All documentation will be in the English language.

7 CODES AND STANDARDS

As a minimum, all equipment supplied as part of this package shall be designed, manufactured, tested, commissioned, preserved, and delivered in accordance with the relevant sections of the national/International Codes, Standards and Regulations listed below. Equivalent alternatives may be offered, and these shall be identified and mutually agreed and approved by Client.

EN 10204	Metallic materials- Types of inspection documents
ASTM A36/A36M	Structural Steel
ASTM 150	Specification for High Tensile Strength Carbon-Silicon Steel Plates for Boilers and Other Pressure Vessel
ASTM A182	Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
ASTM A-370	Test Methods and Definitions for Mechanical Testing of Steel Products
ASME Sec. VIII Div. 1	Design and Fabrication of Pressure Vessels
ASME B31.3	Process Piping
ASME B31.4	Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids
ASME/ANSI B16.5	Pipe Flanges and Flanged Fittings
ASME B16.20	Metallic Gaskets for Pipe Flanges – Ring Joint, Spiral-Wound and Jacketed
ASME/ANSI B 16.20.1	Pipe Threads
ASME/ANSI B16.25	Butt Welding Ends

ASME B16.34	Valves- Flanged, Threaded, and Welding End
ASME B36.19M	Stainless Steel Pipe
API SPEC 6D	Valves
API 12F	Shop Welded Tanks for Storage of Production Liquids
API 12D	Field Welded Tanks for Storage of Production Liquids
API/RP520	Recommended Practice for Design & Installation of Pressure Relieving Systems in Refineries (Part 1)
API 537	Flare Details for General Refinery and Petrochemical Services
API 600	Bolted Bonnet Steel Gate Valves for Petroleum and Natural Gas Industries - Modified National Adoption of ISO 10434:1998
API 602	Steel Gate, Globe and Check Valves for Sizes DN 100 and Smaller for the Petroleum and Natural Gas Industries
API 610	Centrifugal Pumps for General Refinery Service
API 613	Special Purpose Gear Units for Petroleum, Chemical and Gas Industry Services
API 614	Lubrication Shaft-Sealing and Control-Oil Systems for Special-Purpose Applications
API 618	Reciprocating Compressors for Petroleum, Chemical, and Gas Industry Services
API 619	Rotary-Type Positive Displacement Compressors for Petroleum, Chemical, and Gas Industry Services
API 620	Large, Welded, Low pressure storage tanks
API 650	Welded Steel Tanks for Oil Storage
API 2000	Venting Atmospheric and Low-Pressure Storage Tanks: Nonrefrigerated and Refrigerated
API 660	Shell and Tube Heat Exchangers for General Refinery Services
API 661	Air-Cooled Heat Exchangers for General Refinery Services
API 670	Machinery Protection Systems
API 671	Special-Purpose Couplings for Petroleum, Chemical, and Gas Industry Services
API 675	Positive Displacement Pumps - Controlled Volume
API 676	Positive Displacement Pumps - Rotary
API 682	Shaft Sealing Systems for Centrifugal and Rotary Pumps
ASNT SNT-TC1A	Personnel Qualification and Certification in Non-Destructive Testing
ASME Sect. V	Non-Destructive Examination
ASME Sect. IX	Welding and Brazing Qualifications
AWS A3.0	Welding Terms and Definitions
AWS A5.1/A5.1M	Welding Electrodes
AWS/ANSI D1.1/D1.1M	Structural Steel Welding
NACE RP02-74	Recommended Practice, High Voltage Electrical Inspection of Pipeline Coatings Prior to Installation
NACE RP-0177	Mitigation of Alternating Current and Lightning Effects on Metallic Structures and Corrosion Control Systems
NFPA 20	Standard for the Installation of Stationary Pumps for Fire Protection
SSPC-PA2	Measurement of Dry Paint Thickness with Magnetic Gages
SSPC-SP1	Solvent Cleaning
SSPC-SP3	Power Tool Cleaning
SSPC-SP-5	White Metal Blast Cleaning
SSPC-SP-10	Near-White Metal Blast Cleaning
SS-05-59	Pictorial Surface Preparation Standards for Painting Steel Surface
ELECTRICAL	
ANSI C2	National Electric Safety Code

IEC	(International Electrotechnical Commission):
IEC 947	Low voltage switch-gear and control gear.
IEC 60751	Industrial RTD sensors
IEC 688	Electrical measuring transducers for converting ac electrical quantities into dc electrical quantities.
IEC 60614	Conduits for electrical use
IEC 60617	Graphic symbols for diagrams
IEC 529	Degrees of protection provided by enclosure (IP code).
IEC 478	Stabilized power supplies dc output.
IEC 502	XLPE cables 1-30kV.
IEC 60446	Identification of conductors by colours or numerals
IEC 445	Identification of equipment terminals and of terminations of certain designated conductors. Including general rules for an alphanumeric system.
IEC 439	Low voltage switchgear and control gear assemblies.
IEC 364	Electrical Installation of buildings.
IEC 60341	Push-button switches
IEC 337	Control Switches.
IEC 332	Tests on electric cables under fire conditions.
IEC 304	Standard colours for Insulation of Low-frequency cables and wires
IEC 292	Direct-on-line (full voltage) ac starters.
IEC 60287	Electrical cables-calculation of the current rating
IEC 269	Low voltage fuses.
IEC 255	Electrical relays.
IEC 60204.1	Electrical equipment of industrial machines
IEC 60189	Low frequency cables and wires with PVC insulation and PVC sheath
IEC 129	AC disconnectors and earthing switches.
IEC 60095	Lead-Acid starter batteries
IEC 60085	Thermal evaluation and classification of electrical insulation
IEC 60079	Electrical apparatus for explosive gas atmospheres.
IEC 73	Colours of indicator lights and push buttons.
IEC 60072	Dimensions and output ratings for rotating electrical machines, Part 1-2
IEC 51	Direct acting indicating analogue electrical measuring instruments and accessories.
IEC 60034	Rotating Electrical Machines, Part 1-3-5
IEC/CISPR11	Limits of Electromagnetic Interference for Electrical Appliances and Equipment.
IEC 606	Application guide for power transformers.
IEC 1024	Protection of structures against lightning.
IEC 61084	Cable trunking and ducting system for electrical installation
IEC 61131-3	Programmable controller – Programming Language
IEC 61140	Protection against electric shock
IEC 61293	Marking of electrical equipment with rating related to electrical supply- safety requirements
IEC 61537	Cable tray system and cable ladder system for cable management
IEC 61641	Testing of response to internal faults
IEC 61508	Functional Safety – Safety Related System

IEC 62040	Uninterruptible power systems
IEC 62066	Surge over-voltage and surge protection in low-voltage AC power systems
IEC 50014	Electrical Apparatus for Potentially Explosive Atmospheres – General Requirements.
IEC 50019	Electrical Apparatus for Potentially Explosive Atmospheres – Increased Safety Exe
IEC 50020	Electrical Apparatus for Potentially Explosive Atmospheres – Intrinsic Safety
IEC 60446	Basic safety principles for man machine interface
NFPA 70	National Electrical Codes
NFPA 90A	Standard for Installation of Air Conditioning and Ventilation
NFPA 496	Standard for Purged and Pressurized Enclosures for Electrical Equipment
NFPA 780	Standard for Installation of Lightning Protection Systems
API 2003	Protection against Ignitions arising out of Static, Lightning and Stray Current
API 505	Area classification Code for Petroleum Installations.
API RP 540	Electrical Installations in Petroleum Processing Plant
NEMA PB1	Panel board
NEMA TC2	Electrical Polyvinyl Chloride (PVC) Conduit
NEMA WC70, WC71, WC74	Thermoplastic Insulated Wire and Cable for Transmission and Distribution of Electrical Energy
NEMA WC7	Cross Linked Thermosetting Polyethylene Insulation Wire and Cable for Transmission and Distribution of Electrical Energy
NEMA WC8	Ethylene-Propylene Rubber Insulated Wire and Cable for Transmission and Distribution of Electrical Energy
IEEE 142	Grounding of Industrial and Commercial Power Systems
IEEE 242	Protection and Co-ordination of Industrial and Commercial Power Systems

INSTRUMENTATION	
ISO 11064	Ergonomic design of Control Centres
ANSI C80.1, C80.3, C80.5, C80.6	Rigid Steel Conduit, Zinc coated
API/RP501	Process Measurement Instrumentation
API/RP502	Signal Transmitters and Air Supplies
API 520 & 521	Sizing, Selection, and Installation of Pressure-Relieving Devices
API/RP550	Manual on Installation of Refinery Instruments and Control Systems.
API/ANSI 551, 552, 553, 554, 555, 556	Installations of Refinery Instruments and Control Systems
API/RP2001	Fire Protection in Refineries
DIN V 19250	Microcomputers in Safety Techniques
EEUMA 160	Safety Related Instrumentation Systems for the Process Industries
NFPA 72	National Fire Alarm Code
EIA-232	Interface Between Data Terminal Equipment (DTE) and Data Communication Equipment (DCE). Employing Serial Binary Data Interchange.
EIA-422	Balanced Serial Data Communications Interchange.
IEC 60529	Ingress Protection Code
IEC 61131-3	Programmable Controllers – Part 3: Programming Languages
IEC 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
IEC 61511	Functional Safety

ISA S5.1	Instrumentation Symbols and Identification.
ISA S5.2	Binary Logic Diagrams for Process Operations
ISA S5.3	Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems.
ISA S5.4	Instrument Loop Diagrams
ISA S5.5	Graphic Symbols for Process Display
ISA RP12.1	Electrical Instruments in hazardous atmospheres
ISA RP18.1	Alarm annunciation
ISA S50.1	Compatibility of Analogue Signals for Electronic and Industrial Process Instruments
ISA RP55.1	Hardware Testing of Digital Process Computers
ISA S75.01	Control Valve Sizing
ISA-S84.01	Application of Safety Instrumented Systems for the Process Industries
ISO 5167	Orifice Plate dimensions
EN50081/82	CENELEC Electromagnetic Compatibility Generic Emission & Immunity

CIVIL & STRUCTURAL	
ASTM C33	Standard Specification for Concrete Aggregates
ASTM A615/A615M	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A36	Structural Steel
ASTM A53	Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
ASTM A106	Seamless Carbon Steel Pipe for High Temperature Service
ASTM A123	Zinc (Hot Galvanized) Coating on Product Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips
ASTM A307	Carbon Steel Externally Threaded Standard Fasteners
ASTM A325M	High-Strength Bolts for Structural Steel Joints
ASTM A490M	High-Strength Steel Bolts, Classes 10.9 and 10.9.3, For Structural Steel Joints
ASTM A501	Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing AWS D1.1/D1.1M
AISC	Manual of Steel Construction
AISC LRFD	Load and Resistance Factor Design Specification for Structural Steel Buildings
AISC ASD	Manual of steel Construction Allowable Stress Design 9th Edition
AISC	Code of Standard Practice for Steel Buildings and Bridges ACI 318
ACI SP-66	ACI Detailing Manual
ACI 117	Standard Specifications for Tolerances for Concrete Construction and Materials
ACI 211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 211.2	Standard Practice for Selecting Proportions for Lightweight Concrete
ACI 214	Recommended Practices for Evaluation of Strength Test Results for Concrete
ACI 301	Specifications for Structural Concrete Buildings
ACI 302	Recommended Practices for Concrete Floor and Slab Construction
ACI 304R	Guide for Measuring, Mixing, Transporting and Placing Concrete
ACI 304.2R	Placing Concrete by Pumping Methods
ACI 305	Recommended Practices for Hot Weather Concreting
ACI 308	Recommended Practice for curing Concrete

ACI 318	Building Code Requirements for Reinforced Concrete
ACI 347	Recommended Practices for Formwork
ACI 504R	Guide to Joint Sealants for Concrete Structures
ACI 530	Building Code Requirements for Masonry Structures
ASCE	Manuals of Engineering Practice No. 42 “Design of Structures to Resist Nuclear Weapons Effects”
ASCE	Design of Blast Resistant Buildings in Petrochemicals Facilities
ASCE/SEI 7-05	Minimum Design Loads for Buildings and Other Structures
ASTM A185	Welded Steel Wire Fabric for Concrete Reinforcement
ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A497	Welded Deformed Steel Wire Fabric for Concrete Reinforcement
ASTM A615	Deformed and Plain Billet Steel Bars for Concrete Reinforcement
ASTM C31	Standard Method for Making and Curing Concrete Test Specimens at Field
ASTM C39	Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens
ASTM C90	Standard Specification for Hollow Load-Bearing Concrete Masonry Units
ASTM C91	Standard Specification for Masonry Cement
ASTM C94	Specification for Ready-Mixed Concrete
ASTM C143	Standard Method of Test for Slump of Hardened Concrete
ASTM C145	Standard Specification for Solid Load Bearing Concrete Masonry Units
ASTM C150	Specification for Portland Cement
ASTM C260	Air Entraining Admixtures for Concrete
ASTM C309	Liquid Membrane Forming Compounds for Curing Concrete
ASTM C494	Chemical Admixtures for Concrete
ASTM C476	Standard Specification for Mortar and Grout for Reinforced Masonry
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C618	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASCE/SEI 7-05	Minimum Design loads for Buildings and other Structures

8 PROJECT REQUIREMENTS

8.1 Design Life, Availability and Reliability

The PRF is to be designed to operate on a continuous basis, subject to volume of waste received for processing. The availability of the PRF will be 90% with a reliability of 98%.

All equipment shall be designed for a design life of 20 years. The design life shall be achievable with minimum on-site maintenance and maximum availability. All components shall be readily available on the market including spare parts.

8.2 Service Conditions

All equipment shall be designed for continuous use in an exposed, tropical, salt laden, corrosive atmosphere with 100% relative humidity. The equipment shall be designed for 75dBA with the noise limit shall not exceed 82dBA SPL. Any equipment that does not meet this criterion shall be provided with additional measures to meet this noise limit. The main processing equipment will be located inside a building to provide protection from the weather and additional noise attenuation with the aim of 70dBA max. outside of the CMG facility.

8.3 Hazardous Area

The process building will be classified as a hazardous area due to the hydrocarbons and hydrocarbon vapor present during transfer and processing. Localized hazardous areas will be defined for equipment located outside of the building.

8.4 Plant Nameplate Capacity

The PRF shall be designed to process 20m^3/h of oil and oily mixtures. The facility will be constructed with two trains of 10m^3/hr each. The facility and tanks will be designed for the full nameplate capacity. Foundations and tie-in points shall be designed accordingly.

8.5 Oil/Oily Waste Composition

The oil and oily waste composition are expected to be similar to the below

Sample	Sample ID, Type & Description
215-20-01349-005	TK #6 Bottom Sample

Method	Test	Result	Units
ASTM D4052	API Gravity @60°F	11.5	*
ASTM D445	Kinematic Viscosity @122°F/50°C	612.7	cSt
ASTM D4294	Total Sulfur Content	0.294	%wt
ASTM D95	Water % (V/V)	> 25.00	% v/v
ASTM D97	Pour Point	9	°C
ASTM D93B	Flash Point (Fuel Oil)	> 110.0	°C

Notes: ASTM D95 Water by Distillation result is 72%v/v which is out of method range

Sample	Sample ID, Type & Description
215-20-01349-001	TK #6 (825005) Submitted Sample

Method	Test	Result	Units
ASTM D4052	API Gravity @60°F	26.3	*
ASTM D7042	Kinematic Viscosity @50°C/122°F	30.44	cSt
ASTM D4294	Total Sulfur Content	0.352	%wt
ASTM D95	Water % (V/V)	0.10	% v/v
ASTM D97	Pour Point	-30	°C
ASTM D93B	Flash Point (Fuel Oil)	100.5	°C

Sample		Sample ID, Type & Description	
215-20-01349-004		(TK 5, TK 6, TK 8) Composite	
Method	**Test**	**Result**	**Units**
ASTM D7042	Kinematic Viscosity @50°C/122°F	20.55	cSt
ASTM D4052	Gravity by Digital Density Meter		
	API Gravity @60°F	26.6	°
	Density @15°C	894.6	kg/m³
Calc	CCAI	796	
ASTM D4294	Total Sulfur Content	0.390	%wt
ASTM D93B	Flash Point (Fuel Oil)	93.5	°C
IP 570	Hydrogen Sulfide	< 0.40	mg/kg
ASTM D664A	Acid Number	1.68	mg KOH/g
ASTM D4870	Potential Total Sediment	0.05	%m/m
ASTM D4530	Micro Method Carbon Residue	2.50	%wt
ASTM D97	Pour Point	-33	°C
ASTM D95	Water % (V/V) Running	0.10	% v/v
ASTM D482	Ash Content	> 0.180	mass%
IP 501	Vanadium Content	29	mg/kg
IP 501	Sodium Content	10	mg/kg
IP 501	Aluminum Content	46	mg/kg
IP 501	Silicon Content	33	mg/kg
IP 501	Aluminum + Silicon Content	79	mg/kg
IP 501	Calcium Content	> 100	mg/kg
IP 501	Zinc Content	21	mg/kg
IP 501	Phosphorus Content	> 60	mg/kg

Notes: IP 501 Calcium actual result = 1245 mg/kg, Phosphorus actual result = 118 mg/kg

8.6 Re-processed Fluids

The processed oil will be required to meet the quality for Marine Residual Fuel per ISO8217 RMG. The outlet specifications shall meet criteria of <0.2%BS&W. An extract of ISO8217 RMG is shown below.

Characteristic		Unit	Limit	Category ISO-F-											Test method reference
				RMA	RMB	RMD	RME	RMG				RMK			
				10	30	80	180	180	380	500	700	380	500	700	
Kinematic viscosity at 50 °C		mm²/s [a]	Max	10,00	30,00	80,00	180,0	180,0	380,0	500,0	700,0	380,0	500,0	700,0	ISO 3104
Density at 15 °C		kg/m³	Max	920,0	960,0	975,0	991,0	991,0				1010,0			ISO 3675 or ISO 12185; see 6.1
CCAI		–	Max	850	860	860	860	870				870			see 6.2
Sulfur [b]		mass %	Max	Statutory requirements											ISO 8754 or ISO 14596 or ASTM D4294; see 6.3
Flash point		°C	Min	60,0	60,0	60,0	60,0	60,0				60,0			ISO 2719; see 6.4
Hydrogen sulfide		mg/kg	Max	2,00	2,00	2,00	2,00	2,00				2,00			IP 570; see 6.5
Acid number [c]		mg KOH/g	Max	2,5	2,5	2,5	2,5	2,5				2,5			ASTM D664; see 6.6
Total sediment – Aged		mass %	Max	0,10	0,10	0,10	0,10	0,10				0,10			ISO 10307-2; see 6.9
Carbon residue – Micro method		mass %	Max	2,50	10,00	14,00	15,00	18,00				20,00			ISO 10370
Pour point (upper) [d]	winter	°C	Max	0	0	30	30	30				30			ISO 3016
	summer	°C	Max	6	6	30	30	30				30			
Water		volume %	Max	0,30	0,50	0,50	0,50	0,50				0,50			ISO 3733
Ash		mass %	Max	0,040	0,070	0,070	0,070	0,100				0,150			ISO 6245
Vanadium		mg/kg	Max	50	150	150	150	350				450			IP 501, IP 470 or ISO 14597; see 6.14
Sodium		mg/kg	Max	50	100	100	50	100				100			IP 501, IP 470; see 6.15
Aluminium plus silicon		mg/kg	Max	25	40	40	50	60				60			IP 501, IP 470 or ISO 10478; see 6.16
Used lubricating oil (ULO): – Calcium and zinc; or – Calcium and phosphorus		mg/kg	–	Calcium > 30 and zinc > 15 or Calcium > 30 and phosphorus > 15											IP 501 or IP 470, IP 500; see 6.17

ISO 8217 Marine Fuel Oil

The processed water will be disposed into the on-site deep well once the storage tank reaches capacity. The outlet specifications shall meet criteria of 10ppm (max.) oil in water and 98% of 5µ TSS. These figures will be confirmed in the approved EIA.

The facility will be designed with future considerations to further treat this water to potable water standards.

Solids and vapour by-product should be planned to use in an incinerator to generate steam and/or power.

8.7 Start Up

Process facilities heating duties shall allow for safe start up and subsequent ramp-up from the minimum flow to the maximum production flow rates based on the arrival temperatures between ambient temperature and normal operating temperature.

8.8 Equipment turndown requirement

Turndown must be addressed for all systems as per specific requirements. The turndown may be different for individual equipment items within a system.

8.9 Storage tanks

The tanks shall be sized to accommodate the following storage capacities and sparing. Tanks T-004A/B will be installed in the future and area/foundations will be prepared during the initial construction. The bunding for the tanks shall be designed to contain 110% of the volume of the largest tank.

Tank	Purpose	Size	Volume (each)	Quantity
T-001A/B	Reception	1 weeks x nameplate	2000 m3	2
T-002A/B	Processed oil	2 weeks x nameplate	2000 m3	2
T-003	Processed water	2 weeks x nameplate	1000 m3	1
T-004A/B	Potable water	1 weeks x nameplate	1000 m3	2
T-005A/B	Firewater	Per regulations (Min2500Gal)	2000 m3	2
T-001C	Spare/Maintenance	Equal to largest tank	2000 m3	1

8.10 Equipment Sizing Criteria

The equipment should be oversized to provide an allowance above the design operating conditions. This oversized sizing shall be used as the design basis and the selection of equipment.

Equipment	Oversize Factor	Parameter
Pumps	10%	Flowrate
Tanks	10%	Volume
Boilers	10%	Duty or Flowrate
Air Compressors	10%	Flowrate

8.11 Sparing Philosophy

The design of the system shall include the sparing philosophy to ensure the availability and reliability can be achieved. For equipment which is designed for continuous operation and critical to the processing, then a 2x100% sparing philosophy shall be adopted. Where regular maintenance is required, the equipment could be designed with 3x50% philosophy to ensure that there is continuous operation at nameplate capacity. Should the equipment not be critical to the processing, then other considerations such as buffer tanks can be considered to allow for 1x100% selection.

The above philosophy will need to be confirmed during the design considering the operating requirements.

8.12 Chemical Injection System

The chemical injection requirement and dosage rate shall be based on information provided by chemical vendor. Concentrations of chemicals are to be confirmed based on selection of chemicals used.

The skid shall comprise of day tank and pumps for dedicated chemical injection supply. Sizing of chemical storage day tank shall be based on 14 days consumption at design capacity. Tote tank capacity of 30 days' supply for continuous chemical injection.

8.13 Vent System

The Vent system shall be designed to collect and safely dispose of the hydrocarbon Vapours released from the slop processing tanks during normal operations. The collected vapours are diluted to below its LEL level before being disposed in a safe location.

Alternative recycling of the vapour shall be considered such as incineration for power/heat.

8.14 Open Drains

The drain volumetric rates are based on average rainfall of 5mm/hr or deluge rates, whichever is higher.

The drains system will consist of the following:

- Closed Drains; and
- Open Drains (Hazardous & Non-Hazardous).

Open Drains

- Open Drains system is segregated into hazardous and non-hazardous open drains.

The Open Drains system consists of the following equipment:

- Hazardous Open Drains Pump (1 x 100%);
- Hazardous Open Drains Caisson (1 x 100%);
- Non-Hazardous Open Drains Pump (1 x 100%);
- Non-Hazardous Open Drains Caisson (1 x 100%)

Liquids and spillages containing Hydrocarbons from skid drip pans located in the hazardous areas are routed to respective drain pits.

8.15 Utilities

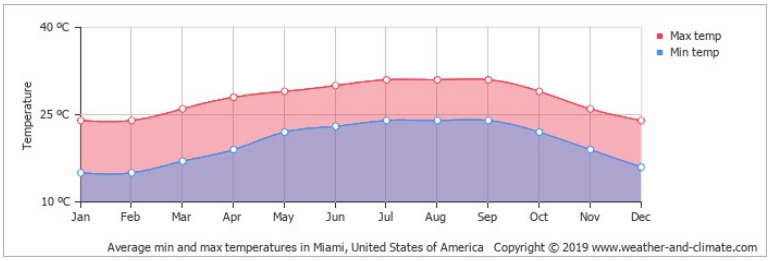
Utilities will be provided by GBPA.

Utility	Notes
Power	Three-phase, 4-wire, 480Y/277 volt as defined by GB Power secondary service
Water	Re-processed water to be used
Gas	Not available
Nitrogen	On site generation should be considered
Compressed Air	Instrument air to be derived from CA
Instrument Air	To be derived from the compressed air system. <5µ particulates, <1ppm hydrocarbons
Re-processed oil	Steam boiler
Cooling medium	Waste stream pre-heating

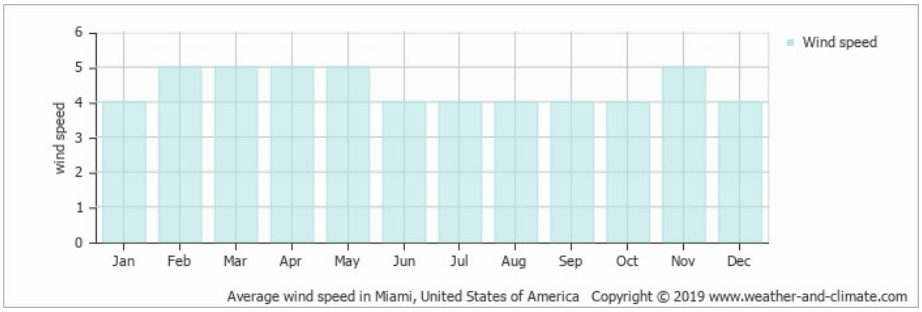
9 ENVIRONMENTAL DESIGN CRITERIA

The site is located within Freeport Harbor, Grand Bahama. The parcel of land is situated on reclaimed land with approximately 300m wharf frontage.

The 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 the 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 over land away from the sustaining marine environment. The hurricane season extends from about June to November.



Bahamas Annual Temperature Profile



Bahamas Annual Wind Profile

9.1 Environmental Data

9.1.1 Solar Radiation

Solar radiation 0.88 kW/m2 for Latitude of 60° should be considered.

9.1.2 Noise

The plant area noise level shall not exceed 82dBA measured at 1m, in any direction, from the equipment. In restricted areas, the noise level will be reduced to the lowest level that is reasonably practicable.

9.1.3 Hurricane and Flooding

The site is subject to hurricanes and susceptible to flooding due to the proximity to the water. The plant shall be designed for 30-year storm surges without overflows to the ocean.

9.2 Foundations and Soil

The foundations and soil to be monitored for subsistence and contamination during the construction and operation.

9.3 Deep Water Well

The processed water will be injected into an onsite deep disposal well. An observation well will be drilled prior to construction commencement to monitor the disposal well through the construction and operation.

10 PROCESS DESIGN BASIS

10.1 Line Sizing

When sizing lines, the following constraints shall be addressed:

- Required capacity/available driving pressure
- Noise/vibration
- Pressure surges
- Material degradation - erosion, corrosion and cavitation
- Liquid accumulation/slug flow
- Sand accumulation

Piping shall be sized for the controlling operating case determined by analysis of flow rates, operating pressure and temperature for all identified normal operating modes. For gas and two-phase lines, particular attention shall be given to the effects of changes in operating pressure, temperature and gas composition during the life of the field.

The flow rate used in determining line size shall be the maximum process (simulation) design flow rate at the most arduous conditions. However, proper consideration shall be given to equipment (pumps etc.) where design margins on capacity have already been applied. Consideration shall also be given to the range of possible operating conditions, other than nominal design rates.

10.2 Permissible Pipe Sizes

A minimum size of 2” should in general be used for all process, process support and utility piping to ensure adequate mechanical integrity. Smaller piping can be used where protection and/or support is provided to withstand human activity.

- Minimum size for the sewage and open drain header shall be 4” and sub headers 3”.
- Overflow from atmospheric tanks shall as a minimum be equal to the largest inlet pipe.
- Tubing may be used for air, hydraulic oil and other non-combustible/non-hazardous fluids.
- 2" Minimum size nozzles for vessels, tanks, heat exchangers.
- 2" Minimum size connections for pipelines/turret pipe work (for mechanical strength reasons).
- 2” minimum size to be used for instrument connections.

The sizes normally used are based on the ANSI standards. Any line size of standard nominal bore may be specified.

10.3 Pipe Roughness

For all calculations of pressure drop, the following pipe roughness values should be used:

Type of pipes	**Roughness**
Carbon Steel (CS); non-corroded	0.05 mm
Carbon Steel (CS); corroded	0.5 mm
Stainless Steel (SS), Duplex Stainless Steel (DSS)	0.05 mm
Titanium, Cu-Ni and 6Mo	0.05 m
Glass reinforced Plastic (GRP) and Glass Reinforced Epoxy (GRE)	0.02 mm
Polyethylene, PVC	0.005 mm
Flexible hose	Consult supplier (As a rough estimate, roughness (in mm) = ID (inches)/20 for steel carcass.)

Notes: -

1. Where CS is employed in a corrosive service (e.g., Flare System) the higher roughness value shall be used. However, in a non-corrosive service, the lower roughness value associated with new CS pipe will be used.

10.4 Liquid Lines

The velocities shall be based on preventing problems with erosion, water- hammer pressure surges, noise, vibration and reaction forces. In some cases, a minimum velocity is required.

Where flow is critical the line should be sized such that the actual pipe friction pressure drop does not exceed 50% of the available pressure drop.

Recommended Pressure Drops

As a guideline, a maximum pressure drop of up to 0.9bar/100meter may be used. Also see below Table for Allowable Pressure Drop.

Fluid	CS	SS/Titanium/Duplex/6Mo	CuNi	GRP
Liquids	6	7	3	4
Liquids with sand	5	7	NA	4
Liquids with large quantities of mud or silt	4	4	NA	NA

In lines carrying liquids with solids minimum velocity shall be 0.8 m/s to avoid solid deposition at the bottom of the pipe.

10.5 Fire Water

The line sizing of fire water lines shall be based on available system pressure and allowable flow velocities.

The pressure drop to the large deluge systems shall be calculated on basis of the most unfavourable pipe routing to those systems.

In the ring main pipe-work, the flow velocity shall not exceed the velocity as given in Table above. Upstream the deluge skids, the flow velocities should not exceed 10 m/s. Some areas may require velocities higher than 10 m/s in order to hydraulically balance the systems, which are acceptable, provided the reaction force within the system does not cause excessive stress in the pipe work or the supports.

10.6 Pumped Liquids

The available NPSH must be checked for all pump suction lines and the pump supplier's recommendation shall be considered before the line size is finalized.

The pump NPSH available shall be determined at the rated flow based on low low liquid level in the associated upstream vessel. A minimum of 1m margin shall be applied between NPSH (A) and NPSH(R). The equivalent length for pressure drop calculation through a permanent strainer shall be taken as 250 D. D is the nominal bore of pipe. D should be in meters.

A Sub-cooled fluid is defined as one that is at least 15°C below the fluid bubble point.

The pump discharge lines shall be sized based on the normal flow. The system pressure loss shall be considered to ensure that the pump is not over-specified or the increased pressure causes an unnecessary change in pipe class.

10.7 Centrifugal Pump

Process Hydrocarbon Liquids Up to Specific Gravity = 1.2

Nominal Line Sizes (inches)	Allowable Pressure Drop Bar/100m			Maximum Velocity m/s	
	Pump Suction		Pump Discharge	Pump Suction	Pump Discharge
	Boiling Fluid	Sub-Cooled Fluid			
2-3	0.01 – 0.04	0.04 – 0.14	0.23 – 0.33	1.1	1.8
4	0.01 – 0.04	0.04 – 0.14	0.23 – 0.33	1.4	2.4
6	0.01 – 0.04	0.04 – 0.14	0.23 – 0.33	1.5	3.0
8	0.02 – 0.05	0.11 – 0.25	0.34 – 0.45	1.8	4.3
10+	0.02 – 0.05	0.11 – 0.25	0.34 – 0.45	1.8	4.9

Where sludges contain higher solids and viscosity, progress cavity pumps shall be considered.

10.8 Reciprocating/Diaphragm Pump

Due to pulsation and acceleration effects, lower flowing velocities are required than for centrifugal pumps. The acceleration head effect is proportional to pipe length, velocity, pump speed and a factor depending on the number of plungers in the pump (the acceleration effect decrease as the number of plungers is increased). Installation of pulsation dampers on both of suction and the discharge lines is to be considered. The data shown below is based on a single plunger.

API RP14E equations shall also be used for sizing of the lines.

Maximum Velocity (m/s)		
Speed (rpm)	**Suction**	**Discharge**
up to 250	0.6	1.8
251 – 330	0.5	1.4
above 300	0.3	0.9

10.9 Liquid Flowing by Gravity

Lines flowing by gravity includes tank overflows, drains (sanitary, closed and open drains), and other lines where the liquid flows due to gravity forces instead of pressure difference. Generally, for fixed installations, a minimum downward slope of 1:100 shall be used. However, with mud and/or sand, the slope shall be at least 1:50.

Pipes that are running full, and do not require a minimum downward slope to avoid particle deposition, shall be sized according to the total available static pressure head, and the maximum allowable velocities for liquid lines.

Diameter inches	Liquid flow capacity, m3/hr	
	Slope 1:50	Slope 1:100
2	3.7	2.6
4	24	17
6	70	49
8	150	106
10	271	192
12	441	312
14	665	471

The liquid in the entrance part of a near horizontal pipe normally need some acceleration distance to reach fully established velocity. To reduce the entrance pressure loss, the inlet section should have increased diameter compared to above Table. For the first ten pipe diameter length, the next larger pipe diameter in above Table should be selected ending with an eccentric reducer.

The vent line should be designed for an air/vapour volumetric flow-rate equal to the liquid volumetric flow through the vertical line and a pressure loss of maximum 0.005 bar.

10.10 Vapour / Gas Lines

10.10.1 Velocity Limitations

In lines where the pressure drop is not critical, gas velocity shall not exceed limits which may create noise or vibration problems. As a rule of thumb, the velocity should be kept as below:

$$V = 175 \times \left(\frac{1}{\rho}\right)^{0.43}$$

or 60 m/s, whichever is lowest

Where;
V = maximum velocity of gas to avoid noise (m/s)
ρ = density of gas (kg/m3)

The gas line should be also checked based on API 14E for optimum size selection.

Recommended Pressure Drop

Where pressure drop is critical, the following guidelines shall be used. The pressure drop should be prorated between the operating pressures given.

Operating Pressure (barg)	Allowable Pressure Drop (bar/100m)
0 – 35	0.001 – 0.11
35 – 138	0.11 – 0.27
> 138	P/500 (P is operating pressure in bara)

10.11 Saturated Steam Lines

Operating Pressure (barg)	Max Velocity (m/s)	Pressure Drop (bar/100m)
0 – 16	50	0.05

10.11.1 Insulation

Due to corrosion under insulation being a general problem on insulated equipment, the philosophy shall be to avoid insulation where possible. Appropriate coating systems shall be selected to minimize the above problem when insulation is required.

Minimum design ambient temperature is required to select insulation/heat tracing and appropriate winterization.

10.12 Relief Lines

In general, all flare lines shall be designed to keep the ρv2 < 200,000 kg/ms2 criteria (where ρ is the fluid density or mixed density for two phase conditions in kg/m3 and V is the velocity in m/s).

Flare line size and back pressure shall be checked with Flare net and specify the back pressure of PSV as appropriate.

10.12.1 Pressure Safety Valve Lines

The upstream and downstream line shall be sized based on the rated capacity of the PSV. The upstream line shall be sized so that the pressure loss is below 3% of valve set pressure at the rated flow condition to avoid valve chattering. Pilot operated valves can tolerate higher inlet-pipe pressure losses when the pilot senses the system's pressure at a point that is not affected by inlet-pipe pressure drop. In any case the upstream line size should be at least equal to the PSV inlet nozzle size.

Maximum flowing velocity in the lines downstream of the PSVs to the first sub header shall in general be less than 0.7 Mach. For the PSV where the outlet velocity is higher, a reducer should be installed as close as possible to the PSV to increase line size and hence limit the velocity to a maximum Mach 0.7 downstream of the reducer.

The actual backpressure at the PSV outlet must be checked to be consistent with backpressure limitations. API 520 is to be referred for back pressure limitations for various types of safety valves. This is also subject to manufacturer's confirmation on capacity corrections require, if any.

Sonic velocity should be avoided by stepwise increasing the pipe size.

Upstream and downstream block valves shall be full bore type.

Acoustic fatigue must be considered for high flow, high pressure drop relief lines.

10.12.2 Vent Lines from Atmospheric Tank

Maximum backpressure shall be 0.07 barg.

10.12.3 Sloping of Flare Lines

A minimum slope of 1: 200 shall be implemented on the relief line.

11 GENERAL MECHANICAL

The following defines the Mechanical Design Basis for the project.

The following design philosophy (in order of precedence) will guide the preparation of material requisitions and procurement of the equipment for the project.

a. Equipment designs will adhere:
    i. to applicable statutory requirements.
    ii. Purchase Order Scope of Supply
    iii. Data sheets,
    iv. Project Specifications
    v. Applicable design codes and standards, such as ASME, API, ASTM, AWS, etc., as applicable.

b. Industry-wide recommended practices will be adhered to unless specific exemptions are granted.

c. Primary material grade pressure retaining envelopes for this project will be ASME listed carbon steels and stainless steels.

d. The materials will be tested per code requirements.

e. Corrosion and erosion will primarily be mitigated by providing adequate corrosion allowance based on plant design life. Based on economic evaluation, some equipment may be internally coated or lined or superior corrosion resistance alloys (CRAs) selected, if so, dictated by corrosive or erosive fluid properties.

f. Minimum Design Metal Temperature (MDMT):

    i. Unless extenuating process conditions dictate otherwise, all outdoor equipment, which includes storage tanks, pressure vessels, heat exchangers, air-coolers etc., shall be designed for a MDMT of -5 °C. The maximum skin temperature for all out-door exposed equipment shall be treated as 85 °C. Note that the process design minimum will be 0 °C to eliminate the need for heat tracing.

    ii. All lifting lugs for outdoor equipment shall be designed for a minimum temperature of -5 °C.

    iii. All indoor equipment shall be designed for a MDMT of 10 °C.

g. Ladders, platforms and railings shall comply with International safety regulations. Ladders shall be the side step-off type. Platforms shall be provided to serve the facilities at an elevation of more than 3 meters (10 feet). The service platforms shall be designed with emphasis on safety and accessibility and shall be provided with a self-closing safety gate

11.1 Equipment Design and Selection - General

The following principles will guide the design and selection of equipment for this project,

a. All equipment will be new.

b. Attempts will be made to maximize equipment standardization and minimize the spare parts inventory.

c. Spare parts requirement will be consolidated for potential cost savings. The spare parts shall not be coded equipment-wise. Identical parts shall have a single code. For example: if a Constant Level Oiler (of identical make/features) is supplied by many pump vendors, such Oilers shall have a single spare part number. The same situation shall apply to bearings. For example, if a particular bearing e.g.,

"SKF-200ZZ" is supplied by a pump vendor, and the same bearing is found in an electrical motor, the bearing shall be stocked under a single part number. This ensures reduced inventory, and also ensures that a part is available at all times.

d. Specification review will be conducted to identify any areas of equipment improvement. In addition, opportunities for the design improvement and cost reduction will be investigated during the equipment bid evaluation process. During this stage, material and design alternatives will be discussed with the vendor.

e. Equipment will be safe and of high quality, and operate in an environmentally acceptable manner.

f. Selection of equipment and accessories shall be based on minimum maintenance requirements without the need of specialized maintenance staff and with minimal special or proprietary maintenance tools.

g. The equipment and packages shall be designed for a service life of 20 years in general and uninterrupted continuous operation.

h. Equipment with their drivers shall be mounted on a common skid frame and shipped and installed as a single unit where applicable. As far as possible, skid mounted equipment shall be ready for installation as a single unit, requiring a minimum of field activities. Skids shall be designed for the use of spreader bars.

11.2 Skidded Equipment

All equipment shall be skid mounted and all efforts shall be made to maximize the components on each skid in order to limit the number of skids and associated field construction.

Skid layout shall take full account of personnel safety and ease of access for the performance of all the operational and maintenance requirements. All nozzles shall terminate at the skid edge on the side closest to and parallel to the pipe rack. All piping skids shall be hydro-tested in a shop prior to being shipped to site.

It is preferred that the skids are shipped to site as complete units. If, however, this is not possible due to restrictions in shipping dimensions, the design shall allow for partial disassembly to meet these requirements, while keeping the amount of site work to a minimum. The items shipped loose shall be properly packed, tagged and protected for shipment in accordance to standard requirement

Skids shall be fabricated of steel frame construction for installation on concrete foundations, fastened to the foundations by anchor bolts and washers and nuts.

Primary skid members shall be ASTM A36 rolled or fabricated structural sections. Fabrication and welding shall be performed in accordance with the applicable portions of the AISC Manual of Steel Construction and the AWS D1.1, Structural Welding Code. Skids shall be of continuous welded construction; skip welding is not permitted.

Skids shall be designed to withstand all types of loading that can occur during transportation and operation. They shall be longitudinally and torsionally rigid enough to prevent misalignment of equipment and piping and to prevent damage to piping, flanges, flanged connections and any other equipment and material during transportation and installation.

Skid dimensions, including packaging, shall not exceed the maximum dimensions possible for transportation, which are 15-foot width, 15-foot height and 60–80-foot length, and 100 tons weight. The CONTRACTOR may use smaller dimensions if needed to adhere to other shipping limitations.

Items that are sensitive to extreme vibration or shock or any other adverse conditions that can occur during transportation, shall be designed in such a way that they can be dismantled for the purpose of transportation and will be shipped loose.

Access to the skid mounted equipment shall be available from the skid perimeter and walkways. Walkways, access ladders and handrails, where applicable, shall be installed in accordance with applicable standards and regulations to ensure safe access to equipment.

All equipment, valves and instruments on a skid shall be tagged according to the P&IDs.

Relief valves shall generally be spring loaded valves sized for total specified volume and checked for fire size requirement. High pressure vessels shall be equipped with 2 relief valves.

All packaged skidded equipment bidders shall include certified lifting beams for loading and unloading their equipment along with accurate and readable lifting diagrams.

11.3 Piping

The requirements for all piping layout and design of piping systems will be in accordance with ASME B31.3 "Process Piping".

The piping arrangement for the main PRF and utilities shall be designed for individual and independent operation of each train. Tie-in valves will be provided in process and utility piping (wherever required) for extension of facilities.

Interconnecting piping including utility systems shall be placed above ground on supports such as pipe racks, pipe bridges and sleepers. Pipe stress analysis will be performed for relevant piping sections.

The valves will be above ground and flanged. For economic reasons and interchange ability, a minimum of types of valves shall be selected.

The carbon steel pipe systems shall be externally coated after installation.

All piping connections to tanks and vessels carrying process liquids/gases shall be flanged to enable fitting of spectacle blinds or spades/spacers. This will permit isolation of equipment and allow personnel to safely enter purged vessels or tanks during shutdown.

Pipe work operating at other than ambient temperature (i.e., below -5ºC or above 65ºC) and subject to touch by personnel shall be protected by insulation or protective guards.

Piping arrangement and selection of type of pipe support shall eliminate loading of equipment nozzles (resulting from weight of piping), longitudinal movement and vibration of piping.

Proven support systems resulting from load calculations shall be implemented for the pipe support system.

The contact surfaces between the pipe and the bearing shall be protected from damage through abrasion by intermediate layers (e.g., PE or PP material). Material selection and design of the steel work must consider contact corrosion. Piping supports for valves requiring periodic maintenance shall be designed for easy removal of equipment for maintenance purposes.

11.4 Equipment Availability/Reliability Requirements

Individual equipment Suppliers shall describe the design life and overall reliability of the package by referring to similar designs that have been operating for several years under similar conditions.

In making assessments of availability, Suppliers shall not take into account operator error or failure of services or systems outside Supplier's scope of supply. However, the system shall be designed to minimize the effect of such errors and failures particularly where the failure of a service is of a partial or momentary nature.

An overall plant availability analysis shall be performed taking all crucial equipment into account and to verify the overall plant availability of 355 days per year.

11.5 Surface Preparation and Painting

Surface preparation and coating of all equipment will be according to CMG Paint Specification. Suppliers standard coating may be acceptable subject to CMG prior approval. Final color of packages and equipment will be specified by CMG.

11.6 Lifting and Material Handling

All equipment/items within skids shall be retrievable for repair or replacement. For vessel internals that need to be replaced, Supplier shall ensure that replacement of these parts is possible without the need to erect scaffolding.

Supplier shall provide and submit for clients review the detailed Material Handling Procedures/Study for equipment change-out and equipment parts that needs to be lifted out and transported for maintenance.

Material handling equipment for equipment change-out and equipment parts that needs to be lifted out and transported for maintenance are to be included by Supplier.

The Supplier shall specify on the arrangement drawings the material handling facilities necessary for dismantling equipment or to remove equipment from the package.

An engineering solution shall be provided for lifting and handling inside the skid for all equipment required to be removed for maintenance and weighing more than 25kg.

All equipment shall be retrievable for repair or replacement and shall be adequately equipped with handling equipment such as jib cranes, hoists, lifting lugs, monorails, etc.

Space for maintenance, transport, dismantling and installation of test equipment shall be provided. Items weighing more than 200kg which need to be taken out for maintenance shall have permanent lifting equipment installed.

Any lifting provisions (monorail, pad eyes etc), headroom clearance or maintenance space required within the skid / immediately outside of the skid battery limits shall be clearly marked in the arrangement drawings.

For skids with multiple levels, it is Supplier's responsibility to provide permanent lifting facilities within the skid (monorails, pad eyes etc) to transfer equipment / parts out of the skid for maintenance.

Lifting equipment required within a package shall be included unless otherwise stated.

It is Supplier's responsibility to provide a safe and ergonomic solution to move equipment/parts out of the skid.

11.7 Spare Parts

Spare parts shall be specified and included in the Spare Parts and Interchangeability Form. This form identifies those spares which are required during commissioning, 2 years operation and capital spares. Capital spares are defined as those which cost more than 30% of the initial purchase of the equipment or longer than 20 weeks lead time.

11.8 Layout and Maintainability

The plant layout shall maximize the efficiency of the plot area available taking into account exclusion/buffer zones, emergency exit routes and pipe rack routing. Process equipment suppliers will be provided with a suggested plot area. Bidders should note any additional area required to ensure maximum efficient use of space, ergonomics and cost.

12 GENERAL INSTRUMENTATION

12.1 Design Basis

Instrumentation shall be provided to satisfy the following requirements:

a. Enable safe and convenient start up, uninterrupted operation and controlled shut down
b. Enable safe manually initiated emergency shutdown.
c. Provide automatic protective action where deviation of process variables could result in hazard to personnel or equipment.
d. Provide information and control to enable plant and utilities to meet specific requirements for safety, efficiency and economic operation.
e. Provide local indication of process variables at points allow local adjustment of control, shutdown and operation under abnormal condition.

12.2 Field Instruments

Instrumentation shall be of electric, electronic and/or pneumatic type. All field instruments including those furnished with packaged equipment shall comply with these requirements.

- All field instrumentation should be of a proven type.
- Field instrumentation shall be immune to hand-held Radio Frequency Interference and in compliance with EN50081/82.
- The field instrumentation in general will meet the requirement for environmental, service conditions and area classification of the installed locations.
- All field instruments shall be totally enclosed, weatherproof construction or have a suitable Ingress Protection rating in accordance with IEC 60529 (classifications IP-65) for the area and environment that it is to be installed.
- All externally mounted electronic instrumentation (includes pressure transmitters, pressure switches, I/Ps, field signal indicators-LCD Displays, etc.) as a minimum shall be installed on instrument protection holder with sunshade complete with hook-up.
- Field transmitters and positioners instrument for process safety and safeguarding shall be smart type, analogue 4-20 mA with superimposed digital signal based on HART protocol.
- All fields electronic instruments shall be suitable for installation in Zone 1, Group IIA, T3 area a minimum and certified by ATEX or equivalent statutory approving authority.
- All field instruments shall be rated for use in the hazardous area it is installed in, in accordance with IEC 60079
- where possible, transmitters shall be adopted for all field instruments. Usage of switches shall be minimized. All field transmitters shall be equipped with integrated LCD.
- Process control instrumentation and process safety instrumentation shall be segregated and functionally independent from each other.
- All electronic instrumentation will be RFI/EMI immune (tested in accordance to IEC 60801).

13 GENERAL ELECTRICAL SYSTEM

13.1 Design Basis

The Electrical system shall be designed to give 100% reliability during 365 days per year. Power will be supplied by Grand Bahama Power company. A substation may be required to be constructed.

13.2 Electrical Design Philosophy

The power system and distribution equipment shall be designed such that any item of electrical equipment may be taken out of service for maintenance or to isolate a fault without the need for shutdown of the facility or any effect on production.

Normal loads shall be supplied from main power generation. Under loss of normal power generation essential loads shall be supplied from battery-backed UPS systems.

The power system shall be designed such that the largest motor loads can be started without the need to shed other loads, under all operating conditions.

13.3 Emergency Power Generation

Emergency power will be provided for essential loads only to enable a safe shutdown of the facility.

Under loss of main power, the power supply to essential loads shall be provided from a diesel engine driven emergency generator (EDG) located at site. The emergency generator unit control panel (UCP) shall incorporate manual control facilities and a facility for periodic load testing. For both the transfer back to normal power and the load testing of the unit, power to the essential loads shall not be interrupted.

13.4 Equipment or Control Room

A suitable secure, air-conditioned, Equipment Room (ER) shall be provided for housing the main Telecommunications infrastructure. This shall include, but not be limited to the switches, patch panels data and voice communication equipment, CCTV control, and other communication equipment.

HVAC services to the room shall be maintained whilst administration HVAC systems are offline.

13.5 Electrical Equipment

As far as practicable, equipment types shall be standardised to reduce spares holding and simplify maintenance.

- Outdoor enclosures shall have a minimum ingress protection class of IP56. All electrical enclosures shall be rated for the applicable area classification.
- All electrical equipment located indoors in air-conditioned spaces shall have ingress protection of IP41 minimum, with the exception of battery racks/enclosures which shall provide minimum IP21 against contact with live parts, and transformers which shall be minimum IP23.
- Indoor equipment in non-air-conditioned spaces such as machinery spaces and equipment enclosures shall have ingress protection of IP56 minimum.
- Intelligent protection and control shall be used throughout all switchgear.
- MV switchboards shall preferably be designed for front access only for cable connections and maintenance access, however switchboards with front and rear access may be considered. In general, LV switchboards shall be designed for front or double front (back-to-back arrangement) access to suit space limitations offshore.
- Interfaces between switchboards and the ESD systems shall be hardwired.

14 CIVIL & STRUCTURAL

The work under this section includes all civil and structural detailed engineering design works, including, but not limited to:

a. Site surveys
b. Site preparations
c. Rough grading
d. Foundations installation
e. Structural steel fabrication and erection
f. Dikes and roads construction
g. Buildings
h. Culvert and drainage structure installation
i. Fencing
j. Wharf facility preparation

14.1 Design Information / Parameter

The facility shall be designed for 20 years and must allow for future expansion.

Initial site layout will be as presented on the preliminary plot plan; however, changes are permitted and may be required as part of the detailed engineering design development. A fencing material requirement shall be identified and ordered as per the project specifications. Fencing shall be installed at least 100 feet beyond nearest process equipment or piping.

The site has a 300m wharf frontage. This wharf facility will not be built during the initial phase of the project however the site will be graded and piping run to allow future transfer of waste from ships/barges moored alongside to the storage tanks.

14.2 Design Loads

The design loads to be used for the structures, buildings and foundations shall conform to the requirements of the governing codes and project specifications. As a minimum, the design loads shall include dead load, live load, rain load, wind load and seismic load. Where applicable, the design loads shall also include thermal load, hydro test load, impact load, vibration load, and surcharge load as per the project standards and specifications.

14.3 Load Combinations

Structures, buildings and foundations shall be designed for all individual load cases and the various load combinations that may act together in accordance with the requirements of Project Standards and Specifications.

14.4 Materials

Materials for cast-in place concrete shall conform to the following:

a. Cement shall conform to the requirements of ASTM 150 Sulphate Resistance Portland Cement and shall be used where installation will be in contact with salt water, or soil or water that contains harmful sulphate concentration
b. Aggregates for general application, coarse and fine aggregates shall be used as per ASTM C33. At all time, the aggregates shall be free of any impurities and if not, the aggregates shall be washed with water to remove clay, silt and dust
c. All water shall be obtained from an approved source and shall be clean and free of acids, oils, vegetable and deleterious matter, which may have an effect on the strength and appearance of the hardened concrete by discoloration or efflorescence
d. Chemical admixtures may be used in concrete to improve its characteristics. The selection of admixtures to be used in the mix shall be as per the requirement of applicable codes and standards and will be subject to OMV approval

e. Reinforcement shall be deformed steel bars or welded wire fabric. Steel bars shall conform to ASTM A615/A615M
f. Anchor Bolts material shall conform to ASTM A307

Materials for earthwork shall be as per the recommendations of the Geotechnical Soil Report and to conform the following:

a. Structural fill shall be of clean, well-graded inorganic granular material obtained from approved source

b. General engineered fill shall comprise clean, well-graded granular soils or inorganic low-plastic cohesive soils as recommended by Geotechnical Soil Report and obtained from approved source

c. Landscape fill shall be fertile, natural soil, typical of the locality free from large stones, roots, sticks, clay, weeds and shall be obtained from approved source. These soils shall not be excessively acid or alkaline nor contain toxic material harmful to plant growth

Materials for Structural steel shall conform to the following:

a. Channels, angles, and connection plates shall conform to ASTM A36, Grade 70. Hollow Structural Steel, wide flange and tee shapes shall be ASTM A501, Grade 71

b. Structural steel in corrosive or low temperature use shall conform to ASTM A441 Grade 70

c. Sheet steel shall conform to ASTM A446, Grade A

d. All bolts, nuts and washers shall be galvanized. Main steel structure connection bolts shall be as per ASTM A307 Grade A, as appropriate, minimum diameter 20mm. For secondary structure connections (stairs, handrails, etc.), bolts should be smaller than 20mm

e. Welding electrodes shall conform to AWS D1.1/D1.1M Structural Welding Code

14.5 Structural Steel Works

Design and calculations shall be carried out as per AISC Manual of Steel Construction, last edition and in accordance with the applicable codes and specifications.

The project shall be designed and fabricated to withstand, in all phases of operation, the specified environmental conditions and without reduction in its service life. The design shall incorporate all reasonable measures to prevent absorption of moisture and condensation on metal parts or insulation surfaces. All equipment and material shall be protected against vermin and mould.

Equipment and materials located outdoors shall be made of materials resistant to the atmospheric SITE conditions or painted with corrosion-resistant paint. Equipment enclosures shall be painted white to minimize the solar heating effects.

Equipment enclosures, if used, shall be designed to facilitate easy monitoring, inspection and maintenance of the enclosed equipment, meet area classification and acoustical attenuation requirements.

The PRF shall be capable of continuous efficient operation at any load under the environmental conditions specified herein.

The CONTRACTOR shall take into account potential losses that may occur due to the SITE ambient design conditions and elevation above sea level.

All connections and splices for main structural members including bracings shall be designed for the full strength of the weakest member.

14.5.1 Stairs, Platforms and Ladders

Stairs, platforms and ladders shall meet the minimum requirements specified in the project specifications and industry codes and standards.

Platforms shall be provided as follows:

a. The platform shall be provided with zinc coated (galvanized) steel (serrated) grating where needed
b. For access to all maintenance and inspection openings such as manholes, clean-out fittings, etc.
c. For access to all equipment requiring regular inspection, maintenance or operator's attention such as valves, instruments, control valves, etc.
d. For columns, vertical axis vessels, storage facilities and working areas
e. Towers and other elevated equipment shall be arranged, where possible, in such a manner as to permit the use of operating and servicing platforms common to two or more items of equipment
f. All operating platforms shall have two means of access
g. The minimum width of walkways, platforms and staircases shall be 750 mm
h. The minimum headroom for platforms and walkways shall be 2100 mm
i. The width of walkways over ground level pipe racks shall be 600 mm

15 SAFETY, HEALTH, ENVIRONMENT & SOCIAL RESPONSIBILITY

Concern for Safety, the Environment and Social Responsibility (SESR) is an integral component of the Company's project planning process around the world. This project shall also comply with the standards associated with Responsible Care. ALL efforts shall be taken to ensure there are zero incidents or accidents on this job!!

Particular attention is being devoted to the protection of the region's ecosystems and natural resources. The Environmental Impact Assessment has been completed and approved by the Grand Bahama Port Authority.

The Company is also committed to achieve and maintain a healthy and reasonable level of well-being for its employees and the local community in the area. The Company adheres to the highest standards of safety by adopting functional policies and procedures combined with continuous training to create a safe working environment.

Personnel protection facilities and equipment shall be provided in the facilities to safeguard personnel from any danger during construction, operation and maintenance. Special protective clothing and equipment to be used during emergency situations shall be provided in sufficient number to cope with emergencies.

Eye-wash stations shall be provided at suitable locations in the CPF, substations and battery room. In the same units, portable emergency breathing air supply devices shall also be provided. In addition, extensive training and instruction procedures shall be undertaken to ensure familiarity of the operators with the equipment and the process involved.

Personnel protection shall be provided for any surface with operating temperature exceeding 60 degree Celsius where accidental contact is likely during normal operation. The protection could be thermal insulation, guards of suitable material or warning signs.

Normal operating areas noise levels shall be kept low enough to allow continuous manning of the areas.

APPENDIX C: CMG RISK REGISTER

Risk Register

Location/Work Area:	Grand Bahama Shipyard – Extended Processing Facility

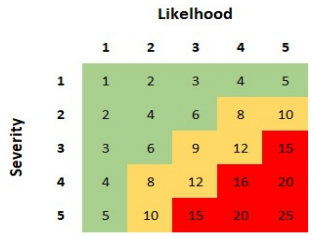
Environment, Health and Safety

General Reuqirements/Conditions

PPE				Hazard Controls		Specific Training Requirements			
Standard Site PPE	√	Face Shield	o	Emergency Plans	√	Site Induction	√	Abrasive Wheels	o
Hearing Protection	√	Goggles	o	Fire Extinguisher	√	Forklift qualified	√	Lifting & Slinging	o
Gloves	√	Safety headwear	√	Electrical Isolation	√	Side Loader qualified	o	Manual Handling	√
Safety Footwear	√	Apron	o	Lock Out/Tag Out	√	Combi Lift qualified	o	Slings and chains	o
Hi-vis	√	Safety Glasses	√	Traffic Control	√	Overhead/Jib Crane	o	Emergency reponse	√

RISK ASSESSMENT	SEVERITY (S)	LIKELIHOOD OF HARM (L)	RISK RATING (R) = S x L	RISK MATRIX
1. Identify and record for each	1 = No Injury	1= Very Unlikely	1 to 6 = Low Risk (L) (Acceptable,	
	2 = Minor Injury	2 = Unlikely	8 to 12 = Medium Risk (M)	
	3 = Lost time Injury	3 = Likely	>12 = High Risk (H) Unacceptable	
2. Identify and record the control	4 = Major Injury	4 = Very Likely		
	5 = Death or Permanent Disability	5 = Certain		

NOTE: If after risk evaluation and with all the necessary controls in place; the risk rating (R) is HIGH, the HS&E department are to be contacted for guidance on the task/process.



HAZARDS (typical listings)		RISK CONTROLS (typical listings)			
- Entanglement	- Ergonomic	**ELIMINATION** – (specify how)	- Lighting	**ADMINISTRATION**	- Toolbox Talk
- Crushing	- Suffocation	**SUBSTITUTION** – (plant or	- Ventilation	-Traffic Management Plan - Area	- Emergency Procedures
- Cutting / Stabbing/	- Explosion	substances with lesser risk levels	- Lifting devices (attachments)	- Training	- Signage
- Striking	- Biological	– specify)	**ISOLATION**	- Certification of Operators	- SSoW
- Slipping / Tripping	- High Temperature or Fire	**ENGINEERING**	- Barricades	- Competency Assessments	- Workplace Inspections
- Falling	- Noxious Fumes	- Guarding	- Cones	- Plant and equipment maintenance	and housekeeping
- Shearing	- Environment	- Presence sensing	- Bollards – Screens	- Exclusion Zones	- Observer / Spotter
- Friction	- Dust	- Residual Current Device	- Operator Only Area	- Supervision	- Atmospheric Testing
- High Pressure Fluid	- Noise	- Containment	- Loading Exclusion Zone	- Plant & Equipment Suitability	- Calibration of equip.
- Electrical	- Vibration	- Earth straps	- Observer / Spotter	- COSHH Assessment	**PERSONAL PROTECTIVE**
- Chemicals	- Weather	- Plant & Equipment		- Risk Assessment	- Standard Site
	- Radiation (UV)				- Task Specific

CleanMarine
Protecting the Ocean's Resources

Document No. CMG-GBS-O-RP-0001

Rev	Reason for Issue	Prepared	Date	Reviewed	Date	Appr	Date
1	Revised to include hurricane risks	TD	21.05.21	AH	21.05.21	TD	21.05.21
0	Issued for Use	CP	12.03.21	TD	15.03.21	TD	15.03.21
B	Updated with GBSL and ASOF comments	CP	25.02.21	TD	26.02.21		
A	Issued for comments	TD	15.01.21				

Activity/Plant/Materials	Hazards Identified	Personnel at Risk	Severity	Likelihood	Risk Rating	Risk Control	Control Methods	Severity	Likelihood	Risk Rating	Residual Risks
Personnel											
Working hours	Fatigue Weather/Heat stroke	Operators	5	2	10	Risk assessment	Management mandated working hours. Provide shade to operator areas especially control panel. Drinking water to be available and taken during regular short breaks during hot periods.	5	1	5	Overtime required due to waste receipt storage reaching full capacity
Working alone	Safety Emergency response	Operators	5	3	15	Risk assessment	Management mandated minimum personnel during operations	5	1	5	
Facilities	Hygiene Comfort	Operators	3	2	6	Workplace inspections and housekeeping	Cleaning department regularly clean ablutions. Daily checks include housekeeping walk	3	2	6	
Site access	Emergency response Emergency exit Unauthorised access	All	5	3	15	Traffic management plan	Emergency response procedure details routes to be kept clear at all times.	5	1	5	
Lighting	Fatigue Inadequate visibility	Operators	4	3	12	Plant and equipment	Sufficient lighting is provided in the area with mobile lighting towers. Should these not be available or working correctly, then operations will stop.	4	1	4	
Covid											
Pre-exisiting conditions	Higher risk/higher severity of symtoms	All	5	4	20	Employee background checks	Operations personnel to provide health history and details of any pre-exisiting conditions which may affect them.	4	2	8	Unknown pre-exisiting conditions
HMI/Control panel surfaces	Contact surface	All	4	5	20	Workplace inspections and housekeeping Operator only area	Operators to clean surfaces before each days operations	4	2	8	
Visitors	Airbourne Contact surface	All	4	5	20	Workplace inspections and housekeeping	Masks to be worn at all times. Santizer to be made available on site	4	1	4	
Deliveries/collections	Airbourne Contact surface	All	4	5	20	Workplace inspections and housekeeping Loading exclusion zone	Masks to be worn at all times. Santizer to be made available on site	4	1	4	
Facilities	Contact surface	All	3	2	6	Workplace inspections and housekeeping		3	2	6	
Mechanical											
Tricanter access	Working at height Dropped objects	Operators	4	5	20	Risk assessment Operator only area	Working at height training and risk assessment Operator only Correct PPE Handrail kickplate	4	2	8	
Mixing tank access	Working at height Dropped objects	Operators	4	5	20	Risk assessment Operator only area	Working at height risk assessment Operator only Correct PPE	4	2	8	
Rotating equipment	Vibration Noise Entanglement	Operators	4	4	16	Barricades	Mechanical guards Correct PPE Coveralls with no loose clothing	4	1	4	
Compressed air/compressor	Vibration Noise High pressure Stored energy	Operators	4	4	16	Barricades	Mechanical guards Correct PPE Coveralls with no loose clothing Regular maintenance and inspection	4	1	4	
Nitrogen bottle rack	High pressure Stored energy	Operators	4	4	16	Barricades	Mechanical guards Correct PPE Mechanical fixing (chains)	4	1	4	
Tank inspection	Confined space entry	Operators	4	3	12	Administration	Tank inspections will only be carried out by GBSY personnel	4	0	0	
Equipment bunding	Trips/slips	All	3	4	12	Traffic management plan	Site layout to ensure hoses/cables are routed in areas of low or no foot traffic Barriers to be placed to stop traffic Steps to be placed over those in traffic areas	3	2	6	
Pipe racks - ground	Trips/slips	All	3	4	12	Traffic management plan Barricades	Site layout to ensure hoses/cables are routed in areas of low or no foot traffic Barriers to be placed to stop traffic Steps to be placed over those in traffic areas	3	2	6	
Pipe racks - overhead	Striking	All	3	4	12	Traffic management plan Barricades	Site layout to ensure walk ways have no overhead hazarrds Correct PPE	3	1	3	

Activity/Plant/Materials	Hazards Identified	Personnel at Risk	Severity	Likelihood	Risk Rating	Risk Control	Control Methods	Severity	Likelihood	Risk Rating	Residual Risks
Boiler container	Confined space entry Hot piping	Operators	4	3	12	Risk assessment Entry barrier	Doors to be lashed open during operations Correct PPE	4	2	8	
Gantry crane	Dropped object	All	4	3	12	Administration	No gantry crane required. A forklift will be used when required to service the disc stack centrifuge	4	0	0	Forklist lifting operations to be carried out Correct attachment to be used
Electrical											
Control panel	Electrical	Operators	3	4	12	Operator only area	Control panel is manned at all times Control panel is locked when shutdown	3	2	6	Generator panel to also be locked when no operations
Site power	Electrical	All	5	4	20	Guarding Earth straps	Power will be isolated when not operating	5	2	10	
Cables/leads	Electrical Entanglement	All	4	4	16	Traffic management plan Barricades	Site layout to ensure hoses/cables are routed in areas of low or no foot traffic Barriers to be placed to stop traffic Steps to be placed over those in traffic areas	4	2	8	
Mobile plant											
Passenger vehicles	Striking Emergency access	All	3	4	12	Traffic management plan	Vehicles to be parked on the northern side of WTP	3	2	6	
Forklifts -solids skips movement	Striking Emergency access	All	3	4	12	Traffic management plan Competency assessment	Forklift route to be along less traffic eastern side of site	3	2	6	
Manual handling -sludge transfer -separator maintenance -solids skip movement	Ergonomics Cuts Dropped objects	Operators	4	5	20	Risk assessment Plant and equipment	Correct PPE No manual handling of items over 20kg	4	2	8	
Fluids											
Chemicals - polymer - demulsifier	Skin irritation Inhalation Fire/explosion	All	4	4	16	Risk assessment Exclusion zones	Correct PPE Safe handling training Safety shower and eyewash facility available	4	2	8	
Refuelling - diesel tank - forklift	Leaks/Spills Fire/explosion Chemicals	Operators	3	5	15	Risk assessment Exclusion zones	Refueling is by GBSY No smoking policy Equipment to be shutdown during refueling	3	2	6	
Waste transfer to reception tank - tanker to reception tank - ISO tank to ISO tank - ISO/FRAC tank to ISO/FRAC tank	Slips/Trips Leaks/Spills Fire/explosion Chemicals	Operators	3	5	15	Traffic management plan Barricades	Correct PPE Housekeeping to ensure any spills are cleaned up			0	
Steam piping	Heat Steam leak	All	4	4	16	Traffic management plan Barricades	Correct PPE Barricades and signs indicating hot piping	4	2	8	
Overflow of tanks/bins	Slips/trips	All	3	5	15	Training Containment	Spill equipment available on site Instruments for automatic shutdown of pumps	3	2	6	
Hurricane											
Tanks	Leaks/Spills Fire/explosion Impact/Mechanical	Personnel Equipment	5	5	25	Hurrican planning, preparation EWI. 20 Hurricane Plan (GBSL) CMG-GBS-O-PR-0010 (CMG)	Enclosed tanks to remain full with all valves closed Open tanks should be drained and secured	2	5	10	Damage to equipment from flying debris
Pumps	Impact/Mechanical	Equipment	5	5	25	Hurrican planning, preparation EWI. 20 Hurricane Plan (GBSL) CMG-GBS-O-PR-0010 (CMG)	Pumps to be lashed together and hoses to remain in place to provide additional security against individual pumps being a hazard	2	4	8	Damage to equipment from flying debris
Chemicals	Leaks/Spills Fire/explosion	Personnel Equipment	5	5	25	Hurrican planning, preparation EWI. 20 Hurricane Plan (GBSL) CMG-GBS-O-PR-0010 (CMG)	Remove chemicals to warehouse building	4	2	8	