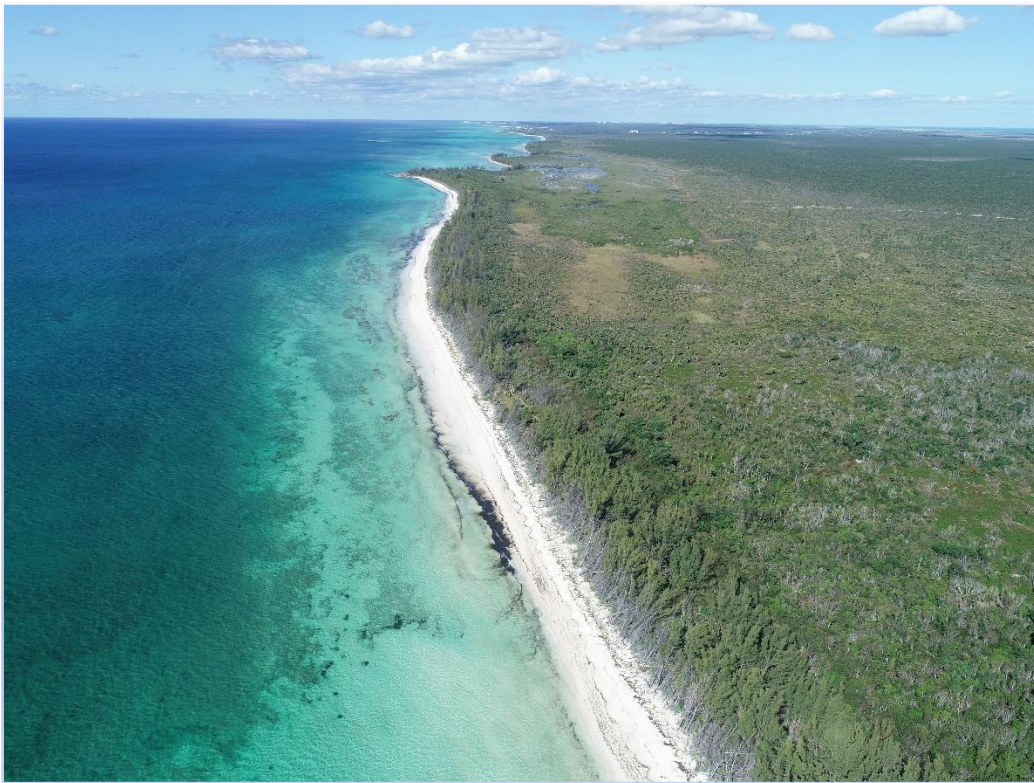


**CARNIVAL GRAND BAHAMA INVESTMENT LIMITED**  
**ENVIRONMENTAL MANAGEMENT PLAN**

**FOR**

**“GRAND PORT”**

Freeport, Grand Bahama Island  
The Bahamas



Prepared by



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## FOREWARD

This Environmental Management Plan (EMP) provides guidance for activities within Grand Port, focusing on the construction and operation of the facility. It is a living document that is subject to revisions based on situations encountered in the field and should be reviewed as often as necessary. This version of the EMP will be revised prior to the opening of the Port. As more information becomes available, specific procedures will be incorporated into the revised document. Management and staff are encouraged to provide suggestions that will improve the EMP and benefit the operation at the Port.

The EMP forms the framework for conducting work-related activities for protection of the environment and human health. It also describes the environmental policy of Grand Port, which is a Carnival Corporation subsidiary. Management, staff and contractors are required to abide by the policies and procedures outlined in this document.

Staff, management and contractors will receive training on the EMP. The developer will include a copy of the EMP in the contractor's agreement to enforce adherence to the agreed-upon guidelines. Grand Port environmental staff will perform inspection and audits to ensure both the Grand Port and Contractors are in compliance with all EMP guidance associated with the project. Post-construction, the EMP will be reviewed and revised as necessary by Carnival Corporation Senior environmental advisor for the Caribbean and Central America and other relevant Carnival Corporation staff. Additionally, the revised EMP will be submitted to The Bahamas Government and the Grand Bahama Port Authority.

The protection of the environment and human health for all Grand Port staff, food and beverage vendors, shopkeepers, and tourists is of paramount importance to Carnival Corporation. Every person working at Grand Port should conduct work activities in a safe and environmentally responsible manner. Carnival Corporation will provide staff and management with the necessary training and equipment.

If any employee is uncertain the proper way to conduct a work activity, they should immediately consult with a supervisor/manager.

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## HEALTH, ENVIRONMENTAL, SAFETY, SECURITY AND SUSTAINABILITY CORPORATE POLICY

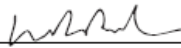
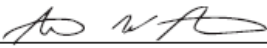
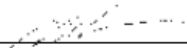
### Carnival Corporation & plc and its Operating Lines are committed to:

- Protecting the health, safety and security of our passengers, guests, employees and all others working on our behalf, thereby promoting an organization that always strives to be free of injuries, illness and loss.
- Protecting the environment, including the marine environment in which our vessels sail and the communities in which we operate, striving to prevent adverse environmental consequences and using resources efficiently and sustainably.
- Complying with or exceeding all legal and statutory requirements related to health, environment, safety, security and sustainability throughout our business activities.
- Assigning health, environment, safety, security (HESS) and sustainability matters the same priority as other critical business matters.

### To implement this Policy, the management of Carnival Corporation & plc and its Operating Lines will:

- Ensure compliance with this Policy within each of Carnival's Corporate and Operating Line organizations.
- Identify managers who are responsible for HESS and sustainability performance and ensure that there are clear lines of accountability.
- Develop, implement and monitor effective and verifiable management systems to realize our HESS and sustainability commitments.
- Support a proactive framework of risk mitigation in the areas of HESS aimed at preventing, monitoring and responding to threats.
- Identify the aspects of our business that could negatively affect the environment and take appropriate action to minimize any adverse effects.
- Identify, document, assess and conduct periodic reviews of the principal HESS and sustainability risks affecting our business and implement practical measures to manage the identified risks effectively.
- Provide HESS and sustainability support, training, advice, and information, as appropriate, to passengers, guests, employees, and others working on behalf of the Company.
- Perform annual HESS audits and take prompt action on identified audit findings.
- Maintain an Ethics & Compliance reporting hotline to allow for anonymous reporting of HESS and compliance concerns.
- Promptly report and properly investigate all HESS incidents and take appropriate action to prevent recurrence.
- Establish and act upon goals and objectives to improve our HESS and sustainability performance.
- Promote industry best practices and publicly report to and maintain open dialogue and cooperation with key stakeholders on HESS and sustainability matters.
- Require business partners to know and comply with applicable legal and statutory requirements related to HESS, labor and human rights.
- Require that employees who become aware of any vessel or crew's inability to comply with Company, legal or statutory requirements report same to management and specifically require that Environmental Compliance reports from shoreside employees be made in writing to their Operating Line Compliance Manager.
- Prohibit retaliation against anyone who reports a violation of Company, legal or statutory requirements and establish that an employee's failure to notify regarding any such violation is grounds for discipline or dismissal.
- Conduct a Corporate senior management review of this Policy at least annually.

Approved by:

William R. Burke  
 Chief Maritime Officer

Arnold W. Donald  
 President and CEO

Micky Arison  
 Chairman of the Board

Original Issue: 10/15/07 | Revised: 10/18/17



## 1.0 INTRODUCTION

The Carnival Grand Bahama Investments Limited (CGBIL) “Grand Port” is a cruise port destination operated under the Carnival Corporation brand. The “Grand Port” name is a temporary name until a permanent branding name is identified. The facility includes a town center with shops and restaurants, recreational facilities, and a pier that can accommodate two cruise ships simultaneously.

The pier design is sized to accept Carnival’s new class of ships, the XL-Class, which is powered by liquified natural gas (LNG). Pier construction requires the excavation of 1.1 million cubic yards of material. A core feature of the facility is a 1.6-mile-long canal parallel to the coast. This canal will be used to transport guests throughout the facility. The ferry boats used in the canal are electric powered.

Other major components of the facility are the conservation of approximately 103 acres of mangrove wetlands and a 55-acre nature trail. This facility is the largest cruise port facility operated by Carnival Corporation and is intended to operate at the highest standard following Carnival’s Health, Environmental, Safety, Security and Sustainability Corporate Policy. Overall, the construction of the facility will require the development of 148 acres of habitat for shops, restaurants, offices, infrastructure and amenities.

As in all Carnival ports in the Caribbean and Central America, Grand Port will have a Health, Environment and Safety (HES) Department comprising qualified staff who will be trained by corporate specialists and by the staff of the other ports, further enhancing the best practices in this field applied in the operation of all Carnival ports. As in the rest of Carnival ports, the HES Department will have a fully equipped in-house laboratory. The HES Department will manage solid waste (including waste reduction and potential recycling), wastewater system, potable water, public health (potable water and food safety as well as pest management), coastal and marine environment (including but not limited to: beach water quality, benthic resources, coral reef restoration projects and beach management plan), terrestrial environment (including but not limited to: flora and fauna, mangrove restoration and reforestation) and will also implement a comprehensive environmental education program with the participation of key stakeholders, as well as other aspects of the operation of the port.

This facility will have a state-of-the-art wastewater treatment plant that will have a high-quality permeate that will be reused for irrigation purposes in areas of low foot traffic. Additionally, Grand Port will operate a sea water reverse osmosis (SWRO) system for the provision of potable water to the facility. Potable water bunkering for cruise ships in port will be provided by the Grand Bahama Utility Company (GBUC). Due to the impacts of Hurricane Dorian, the ability to provide a self-reliant potable water supply is essential. However, the operation of the SWRO does not preclude Grand Port from using the GBUC supply if it meets drinking water standards set forth by the Port. Grand Port will also incorporate water conservation measures such as the reuse of wastewater, rainwater harvesting and others.

This Environmental Management Plan (EMP) also covers the marine side of the project, which includes a pre-dredge benthic survey to assess the health of corals due to impacts of Hurricane Dorian, dredging



methodology coral relocation, spoil management plan, and turbidity control and monitoring. The benthic survey will include the Peterson Cay National Park.

## **2.0 ENVIRONMENTAL MANAGEMENT PHILOSOPHY**

CGBIL is committed to operating Grand Port in a manner that is in compliance with all laws of The Commonwealth of The Bahamas, Freeport Bylaws and Bahamas Government Policies. Moreover, it honors the commitments made in the Environmental Impact Assessment (EIA) and EMP submitted to Bahamas Environment, Science and Technology Commission (BEST) and the Environmental Department of the Grand Bahama Port Authority (GBPA). CGBIL will operate beyond regulatory compliance requirements to reduce risk to human health and the environment and establish its own environmental quality standards where appropriate. CGBIL is committed to operating in a manner that does not create adverse impacts to the environment beyond site development. Management will devote such time and resources as are necessary to carry out this commitment. CGBIL will maintain qualified personnel to handle and manage these duties in a responsible manner. All employees, contractors and service providers are expected and required to conduct their activities in a way that is consistent with the facilities EMP and overall Health Environmental Safety Security and Sustainability (HESS) policies of Carnival Corporation and best management practices.

Contractors are required to follow the EMP and an orientation session will be conducted prior to the start of work. Contractors shall meet Carnival Corporation standards for environmental protection and shall comply with this EMP.

All employees and contractors are expected to act as stewards for the protection of the environment and to immediately report to their supervisor any potential risks that may result in adverse impacts. Additionally, employees and contractors are required to abide by all safety protocols established at Grand Port.

### **3.0 ENVIRONMENTAL MANAGEMENT SYSTEM**

Grand Port's Environmental Management System (EMS) is integrated by the EMPs for the design-construction and operational phases. The EMP comprise a set of environmental procedures designed to implement Carnival's Grand Port environmental policy.

#### **3.1 Purpose and Scope**

The purpose of this is to provide an effective environmental management tool for the construction and operation of the facility and pier structure to ensure protection of the environment, employee safety and public safety. Through the use of the EMP, Carnival's goal at Grand Port is to minimize any impacts to the surrounding area. It is imperative that all employees and contractors know and follow all of the procedures detailed in the EMP and industry standards.

The EMP is a living and dynamic document which will be revised as needed to address situations as they arise through the course of the operation of the facility. Revisions to the EMP are approved by Port Director and/or person responsible for the HES Department.

Moreover, as a Carnival subsidiary, the facility is governed by the Carnival Corporation's Health, Environmental, Safety and Security (HESS) policy. The key elements of the HESS policy are:

1. Protecting the health, safety and security of our passengers, guests, employees and all others working on our behalf, thereby promoting an organization that always strives to be free of injuries, illness and loss.
2. Protecting the environment, including the marine environment in which our vessels sail and the communities in which we operate, striving to prevent adverse environmental consequences and using resources efficiently and sustainably.
3. Complying with or exceeding all legal and statutory requirements related to health, environment, safety, security and sustainability throughout our business activities.
4. Assigning HESS and sustainability matters the same priority as other critical business matters.

#### **3.2 Resources, Roles, Responsibilities, and Authority**

1. The HES manager is responsible for the effective operation of the EMP and for compliance with commitments made in the EIA and EMP. Senior management is responsible for providing sufficient resources that are essential to the implementation, control and improvement of the EMP.
2. The HES manager, or designate, will implement and maintain the EMP with the assistance of Carnival Corporation's environment professionals, if needed. The HESS manager will report quarterly on the performance of the EMP to the senior management team. This report will include proposed recommendations for improvements to the EMP.

### **3.3 Revisions, Authorizations and Document Control**

The EMP and associated procedures are subject to review and changes as deemed necessary based on conditions. The EMP is a living and dynamic document and revised editions are noted in the procedures. Revisions to the EMP are approved by the Port Director and/or General Manager. Revisions to the EMP will also be made with the coordination of the relevant agency as new issues come to light and that the relevant agency may initiate revisions. A revised EMP will be submitted for approval before the facility is opened.

1. Documents, including procedures, policies, and forms will be developed and maintained according to document revision procedures. The document revision procedure will define the process for:
  - Reviewing and updating as necessary and re-approving documents
  - Ensuring that changes and current revision status of documents are identified
  - Ensuring that relevant versions of applicable documents are available at points of use.
2. Documents will be reviewed periodically and revised as necessary as a result of program or legislative changes, or internal audit findings. New or revised documents will be approved and made available electronically. Revisions will be communicated to managers, supervisors and employees.

### **3.4 Safety Data Sheets**

As part of the EMP, safety data sheets (SDS or MSDS) shall be maintained for all chemicals stored at Grand Port. This includes SDS for laboratory reagents. A folder containing all SDS shall be maintained by the HES Department with copies circulated to the appropriate departments and/or staff. The SDS folder will be updated as necessary.

## 4.0 ENVIRONMENTAL POLICY

Grand Port is located in a fairly unique location characterized by a very sensitive environment. Consequently, we are committed that this port will be the greatest model for environmental sustainability of all the ports Carnival Corporation has ever developed, further enhancing best practices in this field applied in the development and operation of all Carnival ports. Grand Port's Environmental Management System (EMS) will adhere to the following principles:

### ➤ **Compliance**

Complying with or exceeding all legal and statutory environmental requirements, including but not limited to all applicable laws of the Commonwealth of The Bahamas, Freeport Bylaws, Bahamas Government Policies as well as applicable international laws and regulations. Moreover, it will honor the commitments made in the EIA and in the corresponding EMP approved by BEST and the GBPA Environmental Department as well as all the conditions imposed by all the environmental licenses/permits granted to Grand Port. Grand Port's EMS will also implement Carnival's corporate HESS policy (**Appendix 1**).

During construction of Grand Port, monthly progress reports will be submitted to BEST and GBPA, including photo-documentation reports. Should any environmental incidents occur, the relevant agency will be notified as soon as possible.

Internal audits will be conducted to ensure compliance to the commitments made in the EIA and EMP and Carnival's corporate HESS policy. Audits will be conducted both in the construction phase and the operational phase by the a "Grand Port's: environmental officer or representative. The audits will make sure that the various contractors are in compliance with their EMPs as well as the Grand Port's. Non-compliance issues will be document and forwarded to the Grand Port's Environmental Manager for corrective action. Corrective actions recommendations will be documented and checked to ensure the issue is brought into compliance. The audits will include but not limited to issues including:

- Waste Management – Storage, transportation and disposal
- Management of used oil and batteries
- Disposal of Oil and Batteries
- Fuel Storage Management
- Mobile Fueling Procedures
- Protection of Sensitive Areas and Conservation Areas
- Protection of Wetland
- Spill Prevention and Counter Measure Plan Issues

Compliance checks will be conducted on a daily basis and audits will be conducted once per month and documented. Copies of checks and audits will be retained in log books along with the corrective action recommendations and confirmation that the issue is resolved and in compliance.

➤ **Prevention**

Implementing design, construction guidelines and procedures striving to prevent activities and/or conditions that could adversely impact the environment as well as to use resources efficiently and sustainably.

➤ **Environmental education and awareness**

Promoting an Environmental Education Program that will raise awareness on the importance of conserving natural resources by learning about the Port's ecosystems as well as providing environmental training to all individuals participating in the design, construction and operation of the port, including tour operators. This program will also encourage learning about the culture of Grand Bahama and The Bahamas, as well as will promote community involvement and stakeholder participation.

Based upon the zoning and different uses defined by the coastal environment the Environmental Education Program will include a visitor protocol addressing the increased number of visitors across the marine environment and efforts to minimize their impacts.

The Environmental Education Program will also include systems for the education of guests, including but not limited to excursions (dive trips /fishing trips), risk of spreading SCTL, use of reef friendly sun lotions and avoidance of sensitive areas.

This program will be similar to the ones implemented at other Carnival ports in the Caribbean and Central America. For example, the Roatán Cruise Terminal. Environmental Education and Awareness Raising Program is attached in **Appendix 2** (RCT. Environmental Education Program).

➤ **Continuous improvement**

Establishing a system for controlling the implementation of all guidelines and procedures as well as for their periodic update.

Prior to construction, all contractors and employees will be required to participate in an environmental awareness and safety session so that information can be disseminated on the Grand Port EMP and procedures as well as safety training.



## 5.0 DETERMINING ENVIRONMENTAL LOADS

Grand Port is a new facility that will be the model for future Carnival ports. Therefore, an important starting point for effective environmental management is determining the waste volumes generated by the facility. A waste flow diagram will be prepared for the facility identifying waste streams and volumes. The process main flows and liquid and solid waste streams should be updated annually. During the environmental audits the documentation of the generation and disposal of waste will be checked. Section 7.0, Waste Management, describes detailed and specific measures and protocols for waste management including but not limited to specific protocols for the collection and recording of data for solid waste streams.

Section 6.0 Wastewater treatment plant describes detailed and specific measures and procedures for managing wastewater in the facility.

It is the duty of the HES manager or his designee to ensure that the volume of waste generated and characterization of waste streams are documented. Log sheets or books will be used to track waste.

## 6.0 WASTEWATER TREATMENT PLANT (WWTP)

As stated in the EIA, the facility will operate its own membrane bioreactor (MBR) technology to treat onsite wastewater. This technology is designed to provide a very high quality of water capable of operating within varying and at higher pollutant loading. Biologically treated wastewater is filtered using MBRs to produce reuse quality effluent. The MBR system will have effluent requirements intended to exceed the standard set in The Bahamas.

The Bahamas Government standard for WWTP effluent water quality based on The Bahamas Building Code is biological oxygen demand (BOD) maximum of 35 mg/L and total suspended solids (TSS) maximum of 30 mg/L. The Grand Port proposed water quality criteria for treated wastewater amply exceeds the Bahamas Government standard. The proposed Grand Port effluent water quality criteria is provided in **Table 6.1**.

**Table 6.1 – WWTP Effluent Water Quality Criteria**

PARAMETER	EFFLUENT
Ave. Annual Daily Flow, GPD	TBD
cBOD5	<10 mg/L
TSS	<2 mg/L
TKN	<30 mg/L
NH3-N	<2 mg/L
TP	<10 mg/L
FOG	<15 mg/L
Max. Water Temp	30 °C
Min. Water Temp	24 °C
E.Coli	<25 mpn

Taking into consideration the recent introduction of new higher performance membranes (Silicon Carbide membranes) by the MBR supplier of Carnival Ports in the Caribbean and Central America ports, Carnival will use this kind of membrane in Grand Port. The main characteristics of these membranes are summarized in **Appendix 3** (OVIVO MBR System with SiC technology). Their operational procedures are described in **Appendix 4** (Operational Procedures SiC).

To minimize the fluctuations in the influent to the WWTP, an equalization tank will be sized to store at least the peak day flow. The last lift station from the wastewater collection system pumps raw wastewater (influent) passing through the fine screens to this equalization tank. Equalized influent (raw wastewater) is then pumped to fill the MBR process.

Process oxygen is delivered by membrane aeration. If required for increasing hydraulic throughput, a supplemental oxygen system could be employed which consists of an oxygen concentrator, looped pumps and a saturation system. Biologically treated wastewater is filtered using the membranes to produce reuse quality effluent. Air scouring and a cleaning in place system are used to clean the membranes.

When required, waste activated sludge is conveyed to a storage tank where it can be digested, dewatered and used for the nursery/landscaping purposes and/or hauled to the Pine Ridge Landfill for disposal.

Disinfection is achieved through a UV system, and to provide residual disinfection (for safe reuse of the permeate for irrigation), a calcium hypochlorite feeding system will prepare and automatically deliver a consistent accurate dose of chlorine. Chemical dosing systems will provide either alum for phosphorus reduction or supplemental carbon to assist in adjusting the BOD-to-total nitrogen ratio for the required reduction of total nitrogen.

The control system is equipped with programming necessary for seamless integration.

WaterExpert™ will be included in the MBR system. WaterExpert™ is a platform provided to help better maintain and operate the equipment and harness the power of cloud to provide real time data insights into the equipment. Included in the WaterExpert™ plan are data trending charts, alerts, maintenance calendars, digital documentation of the wastewater treatment plant scope of supply, drawings, IOM manuals and generic videos of basic process, operation and maintenance of the MBR equipment. These tools can be accessed from any smart phone, tablet or computer. Although WaterExpert™ is the main tool for record keeping regarding the performance of the WWTP, each HES manager will keep a log recording all the daily oversight operations carried out as well as the results of the monitoring of all the parameters reflected in **Table 6.2**.

As one of the main activities of the WWTP commissioning a full training for the HES manager and his staff in charge of the operation of the plant will be carried out.

As in the other Carnival facilities where MBR are installed the HES manager is tasked with daily supervision and management of the WWTP and a technical service agreement will be signed with the manufacturer-supplier. This technical service agreement will include:

- Telephone Hotline Support: Unlimited, 24/7 phone support;
- WaterExpert™ instant live data and charts.
- Technical auditing, Functional Inspection, Service, Regular Training and Support: 2 visits per year, 2 days onsite per trip; including, but not limited to, the following activities:
  - Mechanical, Electrical, and Functional Inspection;
  - Drain and Inspect OMU basins;
  - Visually inspect submerged membrane units;
  - Visually check functionality of all Instrumentation and reading back to HMI;
  - Confirm controls are performing as designed, check settings;
  - Perform maintenance as required with the support of plant personnel;
  - Optimize Cleaning in Place procedures to ensure consistent performance;

- Check and verify sludge quality;
  - Camera inspection of permeate pipe to identify if there is growth of any kind.
- Emergency Service and Repairs: Priority scheduling.

**Table 6.2** lists the main wastewater parameters that will be tested to evaluate the performance of the wastewater treatment plant.

**Table 6.2. WWTP Test Parameters and Sample Locations**

Parameter	Required Monitoring Frequency	Sample Locations IN/ EFF/MBR	Notes
DO	1/min	MBR	Logged at SCADA
Mixed Liquor TSS & VSS	2/week	MBR	Method 2540D
pH	2/week	IN/EFF/MB	Method 4500-H
FOG	1/week	IN/MBR	Method 5520-BF
Filterability	1/day	MBR	Per system commissioning manual
Turbidity	1/week	EFF	Method 2130 B
BOD 5	1/week	IN/EFF	Method 5210 B
COD	2/week	IN/EFF	Method 5220
NH <sub>3</sub> -N	1/week	IN/EFF	Method 4500-NH <sub>3</sub>
NO <sub>3</sub> -N	1/week	EFF	Method 4500-NO <sub>3</sub>
TKN	1/week	IN/EFF	Method 351.2
TP	1/week	EFF	Method 4500-P
E. Coli	1/week	EFF	Method 9221-F

The high quality permeate will either be used for irrigation purposes in areas less prone to foot traffic or injected into a deep well. The deep well will also be utilized for the disposal of backwash from the pool amenities, hot tubs and brine from the Sea Water Reverse Osmosis (SWRO) plant.

## 6.1 Water Management

Grand Port's potable water was planned to be supplied fully by GBUC. However, considering the impacts of Hurricane Dorian on GBUC's well fields, Carnival decided to invest in an onsite (SWRO) desalination system sized to be able to supply Grand Port's total demand of potable water (**Appendix 5** -Desalination Plant Basis of Design-Specifications of the RO system). Both the SWRO and the wastewater treatment systems will be the responsibility of Grand Port.

Considering Carnival's commitment to preserve Grand Bahama's natural resources, a water conservation program will be implemented, which among other measures will include use of alternative sources for certain non-potable uses: rainwater harvesting and the high quality permeate (treated effluent) of the WWTP with MBR. This water conservation program will also contribute to important operational cost savings.

Water management in Grand Port will be based upon assigning to each use the source of water which quality is more appropriate for it, preserving for the highest quality requirements for the desalinated water.

## 6.2 Designated Water Uses for each Source

The designated uses for these water sources are:

1. Desalinated water. Drinking, ice production, hand washing and recreational water facilities.
2. Rainwater harvested from the building roofs. Toilet flushing and firefighting. Could be also utilized in certain areas for irrigation.
3. MBR permeate. Irrigation in areas with less potential of contact with guests and staff.
4. Groundwater. Some wells could be also drilled to supply water for firefighting and irrigation for certain areas.

The distribution system for each type of water shall be color coded to prevent cross-contamination. The designer shall submit for approval a coloring code. This code must be available for all commercially manufactured pipe.

**Appendix 12** includes detailed design guidelines for Water Supply, Fire Protection, Wastewater, Irrigation and Stormwater.

## 6.3 Public Health

Public health procedures for the operational phase have been prepared based upon the experience of all Carnival ports in the Caribbean and Central America (see Procedures - Section 11).

The conceptual basis for developing these procedures is mainly contained in the Vessel Sanitation Program and World Health Organization (WHO) guidelines for drinking water quality and for swimming pools and similar environments, harmonically integrated with applicable Bahamian National Standards. These procedures will preserve water quality and food safety. These procedures will be adjusted once the design of the water and food and beverage infrastructure are completed and will be implemented from the first day of operation of the Port. The potable water will be routinely tested in key sampling points following these protocols:

- Daily pH and free chlorine concentration.
- Weekly microbiological sampling for *E. Coli* and total coliforms (this includes ice samples).
- Monthly external certified lab analysis

The sampling plan for the supply and distribution system will be defined once the specific designs of the water supply and distribution systems are completed to be able to specify the location of the sampling points accordingly. USEPA Drinking Water Monitoring and Sampling Plan guidelines will be the basis for developing the sampling plan and the system for record keeping of the test results.

To ensure the application of an integrated pest management (IPM) approach to the prevention and control of pests in Grand Port and to minimize the public health and safety impact, procedures will be implemented for IPM at Global Port & Destination Development Group (GPDDG) ports in the Caribbean and Central America (see Attached GPDDG IPM Procedures Section 11). These procedures describe the design and implementation of a comprehensive IPM plan which includes all aspects of prevention and control throughout the port operations.

#### **6.4 Beach Microbiological and Chemical Water Quality**

Several sampling points will be located in the beach as well as in the interior beach areas (in the canal) once the design of these facilities is concluded, according to Blue Flag standards which require at least one sampling point, which must be located where the concentration of bathers is highest. However, considering the extension of the beach and the canal it is anticipated that the beach will have approximately three sampling points and the canal approximately two sampling points. All these sampling points will be located in the areas where the highest concentration of bathers is expected. The sampling points will be identified upon final design (including the management plan of the coastal environment) and consideration of industry standards. These areas of highest concentration of bathers are highly dependent upon the final design and especially upon the coastal environment management plan which will define carrying capacities and zoning for different uses. The EMP will be updated upon final design and the coastal environment management plan to identify the specific sampling locations.

The sampling frequency will be twice a month.

The beach areas must comply with the Blue Flag requirements (<https://www.blueflag.global/criteria>) for microbiological and chemical parameters (Statistical Threshold Value) as follows:

*Escherichia coli* < 250 cfu/100 ml

Intestinal Enterococci < 100 cfu/100 ml

pH 6 to 9

#### **6.5 In-House Analytical Laboratory**

Consistent with all Carnival ports in the Caribbean and Central America, Grand Port will have an in-house analytical laboratory equipped for testing several important potable and wastewater quality parameters. Standard Operating Procedures (SOPs), for this laboratory will be developed including analytical methods and protocols (based upon EPA's Clean Water Act analytical methods) as well as quality assurance and quality control procedures. The results of this in-house analytical lab will be systematically verified by an external certified laboratory.

The equipment for this lab will be similar to Grand Turk Cruise Center's (GTCC's) lab (see following pages).

The following is a list of the main parameters that the in-house analytical lab will measure.



- COD
- BOD
- Total Nitrates
- Total Phosphates
- Nitrates
- Nitrites
- Nitrogen Ammonia
- Free Chlorine
- Turbidity
- pH
- Dissolved Oxygen
- Temperature
- Conductivity
- Salinity
- TSS

Oil & Grease will be tested by an external lab.

### **Equipment for microbiological tests**

Incubator

Exterior dimensions -

13"W x 14"D x 16.25"H -

Operating temperature: 5°C to 60°C -

One adjustable steel wire shelf -

Chamber Volume 0.8 cu. ft. -

Shelves Included 2

Chamber Dimension. (11½ x 12 x 10½in.)

115 volt / 50-60 Hz

### **Reagents**

1. Colilert 2. Enterolert 3. Pseudoalert

**Equipment List for Laboratory (Chemical tests based on other Carnival Port Operations)**

Test	Item	Vendor	Part Number	Quantity
<b>DO/pH</b>	HQ40d portable meter kit w/ LDO101 Rugged DO probe 3 meter cable & PCH101 Rugged pH probe 3 meter cable	Hach	HQ40D53103303	1
	Buffer solution pH 4,7, 10 3 pack 500 ml	Hach	2947600	1
<b>Conductivity</b>	HMP-4 Portable conductivity meter	Hach	HMP-4	1
<b>Chlorine</b>	Colorimeter II Pocket Chlorine Test Kit	Hach	5870062	1
<b>Total Calcium/ Magnesium Hardness</b>	Total calcium test kit	Hach	145701	1
<b>FPT (Filter Paper Test)</b>	Prefolded Filter paper 2-3um Package 100	Hach	189457	1
	Funnel Analytical 65 mL	Hach	108367	2
	Cylinder, Graduated, Polypropylene, 50 mL	Hach	108141	2
	Cylinder, Graduated, Polypropylene, 10mL	Hach	108138	2
<b>MLSS/SS</b>	Balance Scale 200 X .001	AWS	PN-201C	1
	Lab Oven 120V 60Hz	Hach	1428900	1
	Desiccator	Hach	1428500	1
	Desiccant, Drierite w/o indicator 454g	Hach	2285901	1
	Galss Fiber Filter Dia. 47mm Preweighed Package 100	Hach	2546100	1
	Tweezers	Hach	1428200	2
	Filter Holder, 47 mm, with Receiver	Hach	2254400	1
	Vacuum Pump Portable	Hach	2824800	1
<b>COD</b>	DRB200 COD Reactor	Hach	DRB200-01	1
	DR 900 Multiparameter Handheld Colorimeter	Hach	9385100	1
	COD digestion vials LR 3-150 mg/l	Hach	2125815	1
	COD digestion vials HR 0-1500 mg/l	Hach	2125915	1
	Tensette 1.0 to 10ml	Hach	1970010	1
	Pipet 1.0 to 10ml Pkg 250	Hach	2199725	1
<b>Nitrite/Nitrate</b>	Nitraver , Nitrite vials pk45	Hach	26083-45	1
	Nitraver , Nitrate vials pk45	Hach	26053-45	1
	Tensette 0.1 to 1ml	Hach	1970001	1
	Pipet 0.1 to 1 ml Pkg 1000	Hach	2185628	1
<b>Ammonia</b>	Amver, high range ammonia pk45	Hach	26069-45	1
<b>Phosphorus</b>	Total phosphate digestion HR pk 45	Hach	27426-45	1
	Total phosphate digestion LR pk 45	Hach	27427-45	1
<b>Miscellaneous Lab Ware</b>	Cylinder, Graduated, Polypropylene, 100 mL	Hach	108142	2
	Beaker, Polypropylene, Low Form, 50 mL	Hach	108041	2
	Beaker, Polypropylene, Low Form, 150 mL Pkg 12	Hach	108074	1
	Brush, Test Tube	Hach	69000	4
	Brush, Cylinder, 2-in diameter for General Glassware	Hach	68700	4
	Stop Watch	Hach	2630200	1

**6.6 Stormwater Management**

A detailed storm drain plan for the facility will be submitted in building permit phase of the project to the GBPA Building and Development Services Department. Storm drains will be constructed to GBPA building code specifications outlined in this section. Where necessary and required by GBPA, interceptor traps will be

installed for the collection of any petroleum hydrocarbons. The main goals for stormwater management in Grand Port will be:

- To maximize stormwater recharge to the underlying aquifer in order to mitigate the impacts from the canal on the freshwater lens, which, as concluded from the Hydrogeological study implies a movement of the fresh/saltwater interface area several hundred feet landward. Maximizing stormwater recharge will also mitigate the reduction of natural infiltration associated with paved areas, including the access road. This particular aspect can be illustrated by Puerta Maya Cruise Center, in Cozumel (Mexico) with similar geological characteristics like Grand Bahama, where all the runoff of the paved areas is drained by infiltration wells (Appendix 12).
- To prevent runoff to be discharged to the canal in order to preserve its water quality. This goal will be achieved by designing the areas surrounding the canal with an adverse slope, diverting runoff away from the canal.

The use of swales and “ponds” is not desirable as they will become mosquito breeding areas. Swales are acceptable for conveyance of storm water, but it should be conveyed, not held.

Runoff will be calculated using the rational method. As in Grand Bahama there are no reliable rainfall Intensity-Duration-Frequency (IDF) records, South Florida records will be utilized. The design storm event will be a 5-year storm event, although for certain specific areas requiring higher protection against flooding a 10-year storm event could be considered.

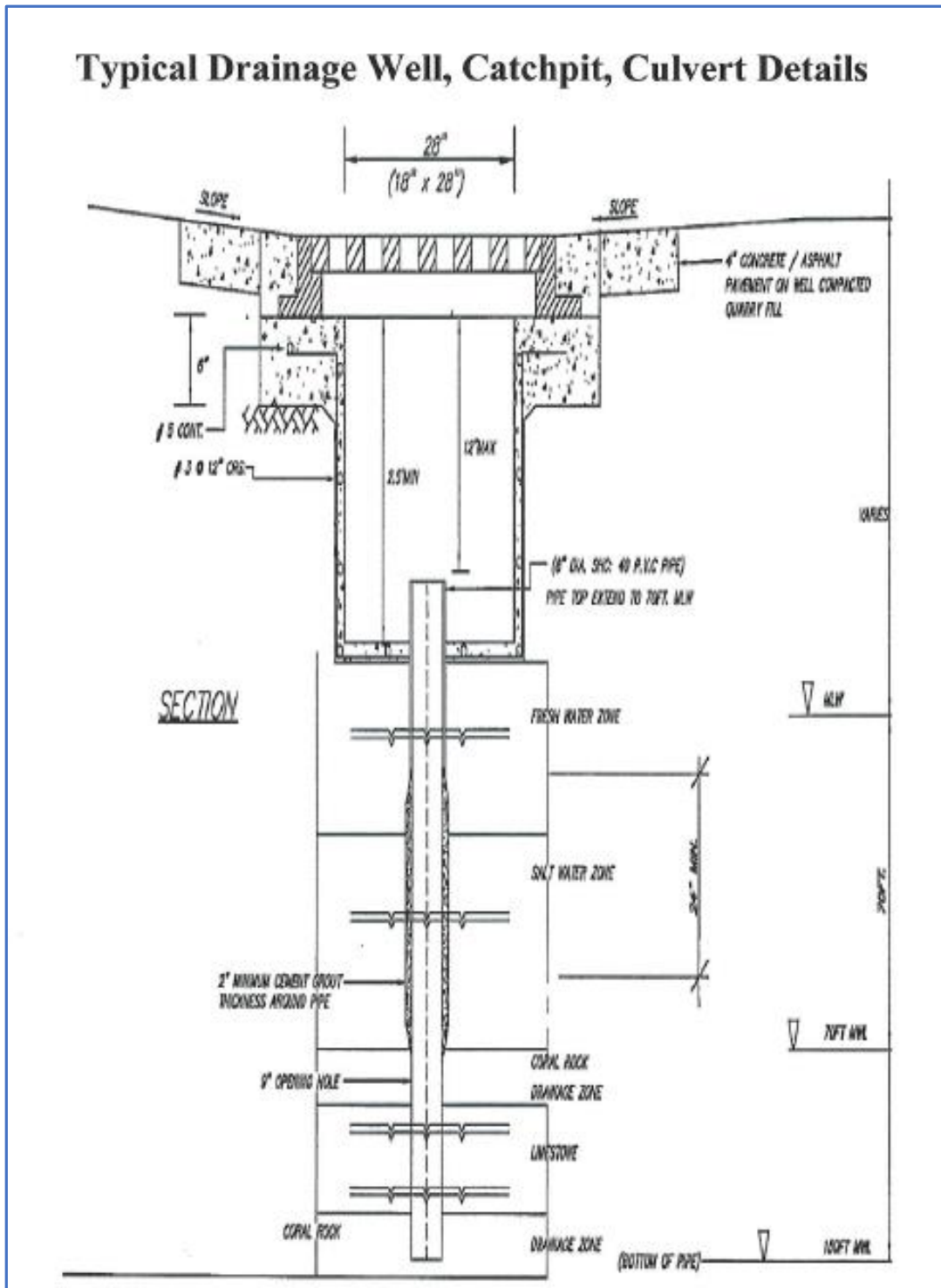
Given the geometry of the site, the following should be considered:

1. For the impervious areas north of the lagoon - the back of house, the parking area, shops, etc. – all of the stormwater should be collected and directed to storm drains (drainage wells) per GBPA Building and Sanitary Codes. The GBPA code stipulates the following:

“Drainage wells to be constructed using an approved drilling contractor, with adequate measures to retain spill water on site. Well to have a minimum diameter of 9-inches and drilled to a minimum depth of 150 ft and verified by Inspector/Engineer of Building & Development Services of the GBPA prior to installation of well casing. Where required and necessary interceptor traps will be constructed to collect petroleum hydrocarbons for removal and disposal.

Casings to be installed and grouted to a minimum depth of 40 ft below the fresh water/ saltwater interface. Building & Development Services of the GBPA to ensure protection of the freshwater table, with an upstand of 6 inches and covered with a mesh basket.

Catch-pits for the well head to be constructed with concrete of strength 3,000 psi, poured in place, with a minimum dimension of 2-ft width, 3-ft length, 2-ft depth. Frame and covers for catch-pit and wellheads to have a minimum load rating of H-20, and to be of Neenah Foundry, U.S. Foundry or equivalent approved by Building & Development Services of the GBPA.”



**GBPA Building and Sanitary Code Typical Drainage Well**

2. In the portion of the site between the Mini Golf and Beach Volleyball, where there is fairly extensive impervious area:

- a. Grade to storm drainage collection structures and direct flow to drainage wells.
- b. If soils and elevation permit, utilize subsurface drain fields.
3. For the entire site, utilize pervious materials for paths and non-traffic areas wherever feasible.
4. For the roads and paths that are not large impervious areas, use swales to direct excess water away from paths and connect overflow to drainage structures and wells.
5. Drainage will be coordinated with landscape designer to avoid ponding.

A separate stormwater management plan will be developed for construction project phases. The construction contractor will be required to develop a stormwater management plan for construction specific project elements including procedures for land clearing, sediment control and transition from construction phase to the operational stormwater plan. This will include development of a project-specific Stormwater Pollution Prevention Plan (SWPPP) identifying protocols for selecting, implementing and maintaining appropriate Best Management Practices (BMP's) for minimizing erosion and sediment loss during construction and development of an Erosion and Sediment Control Plan (ESCP) identifying the location and type of BMP's for specific project phases.

### **6.7 Deep Well Injection**

Deep well injection will be used for the disposal of water from: 1) MBR, 2) backwash from pool amenities and hot tubs, and 3) concentrate and backwash from the SWRO plant. The injection well is designed and shall be constructed and maintained in such a manner to: 1) protect the quality of underground sources of drinking water, 2) eliminate the impact of the operations at other facilities in the area and/or residential neighbors, and 3) ensure that the injected fluid remains in the injection zone.

The deep well location once selected will be placed on the appropriate drawing submitted to the regulatory agency responsible for water resources in Freeport.

- The deep well design incorporates a 16-inch surface casing to a minimum depth of 40 ft and 8-inch injection casing both sealed with grout to a depth of approximately 260 ft below grade. The final amount of casing to be installed will be determined on conditions encountered while drilling. The final depth of the borehole is approximately 350 ft. The is designed for an average injection flow rate of 391 gallons per minute (gpm), with a fluid velocity of 5 ft./sec. under normal operating conditions.
- A report shall be prepared and submitted to include the following information: 1) All driller's logs, borehole video surveys and hole caliper logs made during the course of well drilling and well construction; 2) Total depth of the completed injection well including the extent of the open borehole injection zone; 3) Depth and location of the loss of any drilling fluid, drilling materials, and/or drilling tools and equipment; 4) Annulus volume calculations for each borehole and casing string and the actual volume of cement grout placed; 5) Depth and description of each casing string; 6) Description and results of the injection test; and, 7) Other pertinent data
- An acceptance test of the injection well shall be carried out in accord with the Injection Well Test Procedure set forth by the Water Resources Management Unit of the Bahamas Water and Sewage Corporation dated November 1996. This is a six-hour pump test to ensure the well is capable of accepting the water with no pressure build up.

- The deep well functional and technical specifications for the deep well permit application to the Grand Bahama Port Authority and Grand Bahama Utility Company is presented in **Appendix 6**.
- A pressure gauge will be installed on the well to monitor pressure to check on the integrity of the well. A log sheet will be prepared to record the pressure, date, on a daily basis post construction. Should an increase in pressure over time be encountered a hydrogeologist will be consulted to determine if the borehole needs clearing by a drilling company.



## 7.0 WASTE MANAGEMENT

Environmentally sustainable collection and disposal of all solid waste generated by the operation of the Port will be in coordination with Sanitation Services Company Ltd. (SSC) with the goal of minimizing the wastes disposed of to the Pine Ridge Landfill located on Rock Plant Rd. SSC is responsible for the collection and disposal of solid waste in Freeport. Sanitation measures for Grand Port are below.

- Contractors to provide portable toilets during construction sufficient for the number of employees on site. Portable toilets are managed through the vendor, The toilets when near full are taken to the vendor's facility and emptied. In the event of a severe storm or hurricane the toilets will be removed by the vendor and taken back to their facility. Portable toilets will not be placed near wetlands or other sensitive areas. The environmental officer, during construction will coordinate with the contractor the movement of portable toilets around the site.
- No ship waste will be accepted at the Port for disposal in Freeport.
- Ban of single-use plastics bags, plastic utensils, plastic straws, and styrofoam containers and cups per Bahamas Government regulations effective January 2020. Products where alternatives are readily available and affordable will be utilized and measures implemented to reduce usage.
- Minimizing use of aluminum, glass, etc. (reduce utilization instead of focusing on recycling; we will use less things that will become solid waste).
- Implementation of the Environmental Management of Waste Vendors at GPDDG ports in the Caribbean and Central America procedures (see Procedures - Section 11) to ensure that all wastes generated by the operation of Grand Port that should be disposed of outside their boundaries are disposed of in GBPA and/or Bahamas Government permitted land-based facilities by vendors duly licensed by the GBPA and/or Bahamas Government and approved by the Port's general manager (note this includes not only sanitation services but other vendors for different types of wastes).
- We are committed long term to implement appropriate advanced waste reduction technologies as a result of the evaluation of such technologies being carried out by GPDDG. For instance, Frictional heat systems such as OMPECO Converter®, and others are innovative technologies that can reduce solid waste volumes by 80% and weight by 50% to create a zero to landfill solution. With this technology, unsorted solid waste can be transformed into a sterile, inert flock, which can be used as a refuse derived fuel for the cement industry or safely disposed in landfills (see **Appendix 8**).
- If is not possible to implement advanced waste reduction technologies at the initial stage of the operation of the facility, a recycling program will be implemented considering the lack of recycling facilities in Grand Bahama Island. Sands branded beer bottles could be recycled in Freeport, but other recyclables would be embarked to the corporate cruise ships based upon the experience of the pilot project currently being carried out at GTCC (see below, GTCC Waste Generation Summary, where all wastes generated by this port in several days are logged and also the recyclables embarked in several Carnival cruise ships). For this purpose, proper equipment such as glass crushers, can densifiers, waste compactors, etc., will be installed. All waste generated from gardening maintenance will be used to create compost heaps, based mainly upon the experience at Mahogany Bay Cruise Center (see **Appendix 7**).

- Construction materials debris will be stockpiled during construction activity and will be disposed at the Pine Ridge Landfill. This will be the contractor’s responsibility.
- Used Oil and Batteries during the construction phase are the responsibility of the individual contractors. Used oil must be collected into labelled storage containers and not drained to ground. Oil should be transferred into appropriate containers using funnels if necessary to avoid spills. The used oil should be sent to a used oil collection depot or transported for final disposal. Batteries must be taken off-site for disposal, either to the Pine Ridge Landfill or to a used battery recycling facility. Such as Epic Batteries located in the bonded warehouse area off Queens Highway. It is noted that Epic battery pays for used batteries. Additionally, auto parts stores collect used batteries from clients when a new battery is purchased and provide a core charge credit. The generation and disposal of used oil and batteries collection will be document by the facility. The site environmental officer will check for compliance on the handling, storage, transportation and disposal of used oil and batteries. The developer will include a copy of the EMP into the contractor’s agreement to enforce adherence to the agreed upon guidelines. Post construction used oil and batteries generated by the facility should be stored in the assigned location and clearly labelled. The collection and disposal of used batteries and oil will be documented. The information will include but not limited to; date generated, volume and/or quantity, storage location, transportation date, and place of disposal.

**Example of Waste Log Sheet**

GTCC Waste Generation Summary				
Date:				
Ship:				
Ship Time:				
Waste Type	MV (lbs)	Froots (lbs)	General Collection (lbs)	Total (lbs)
<b>Total waste generated</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## 7.1 Hazardous Materials Storage

A list of Hazardous materials will be kept including weight and volumes and the corresponding Safety Data Sheets (SDS) added to the SDS binder. Contractor will be required to undertake the same safeguards. This list will be prepared and included in the revised EMP prior to construction activities and operations. Hazardous materials will be stored in a secure location using appropriate storage cabinets, if applicable. Non-compatible chemicals (i.e., acids and bases) will be segregated to prevent mixing in the event of a spill. Employees are to read information on labels and SDS. Storage areas are to be kept clean with isles kept clear. Instructions on signs must be obeyed. Appropriate personal protection clothing must be worn if necessary.

Employees will be provided the appropriate personal protection equipment and training in the handling and storage of hazardous material including the OSHA HAZWOPER 40-hour training course before handling hazardous waste and annual 8-hour refresher course. This includes the use of gloves, safety glasses, respirators, boots, and clothing. Training will also be provided for understanding the Hazardous Materials Identifications System and reading and understanding SDS.

“The Hazardous Materials Identification System (HMIS) which is a numerical hazard rating that incorporates the use of labels with color developed by the American Coatings Association as a compliance aid for the OSHA Hazard Communication (HazCom) Standard will be utilized if not already present on the purchased products.

The four bars are color-coded, using the modern color bar symbols with blue indicating the level of **health hazard**, red for **flammability**, orange for a physical hazard, and white for Personal Protection. The number ratings range from 0 to 4.

Chemical Name	
<b>HEALTH</b>	0
<b>FLAMMABILITY</b>	0
<b>PHYSICAL HAZARD</b>	0
<b>PERSONAL PROTECTION</b>	0

### Blue (Health)

The Health section conveys the health hazards of the material. In the latest version of HMIS, the Health bar has two spaces, one for an asterisk and one for a numeric hazard rating. If present, the asterisk signifies a chronic health hazard, meaning that long-term exposure to the material could cause a health problem such

as emphysema or kidney damage. According to NPCA, the numeric hazard assessment procedure differs from that used by NFPA.<sup>[4]</sup>

- 4. Life-threatening, major or permanent damage may result from single or repeated overexposures (e.g., [hydrogen cyanide](#)).
- 3. Major injury likely unless prompt action is taken and medical treatment is given.
- 2. Temporary or minor injury may occur (e.g., [diethyl ether](#)).
- 1. Irritation or minor reversible injury possible.
- 0. No significant risk to health.

### Red (Flammability)

For HMIS I and II, the criteria used to assign numeric values (0 = low hazard to 4 = high hazard) are identical to those used by NFPA. In other words, in this category, HMIS I & II are identical to NFPA.<sup>[4]</sup> For HMIS III, the flammability criteria are defined according to OSHA standards (which add elevated flammability ratings for aerosols).<sup>[5]</sup> (HMIS II descriptions, excluding the new aerosol criteria, are shown below)

- 4. Flammable gases, or very volatile flammable liquids with flash points below 73 °F (23 °C), and boiling points below 100 °F (38 °C). Materials may ignite spontaneously with air (e.g., [propane](#)).
- 3. Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 °F (23 °C) and boiling points above 100 °F (38 °C), as well as liquids with flash points between 73 °F and 100 °F.
- 2. Materials which must be moderately heated or exposed to high ambient temperatures before ignition will occur. Includes liquids having a flash point at or above 100 °F (38 °C) but below 200 °F (93 °C) (e.g., [diesel fuel](#)).
- 1. Materials that must be preheated before ignition will occur. Includes liquids, solids and semi solids having a flash point above 200 °F (93 °C) (e.g., [canola oil](#)).
- 0. Materials that will not burn (e.g., [Water](#)).

### Yellow/Orange (Reactivity/Physical Hazard)

Reactivity hazards are assessed using the OSHA criterion of physical hazard. Seven such hazard classes are recognized: Water Reactives, Organic Peroxides, Explosives, Compressed gases, Pyrophoric materials, Oxidizers, and Unstable Reactives. The numerical ratings are very similar to NFPA's [yellow "Reactivity/Instability" rating](#) according to the publicly available data, which is limited to "hazard statements" intended to accompany each rating (as shown below).<sup>[6]</sup> However, HMIS is a proprietary system, and without referring to the actual criteria for each rating, it is not clear how similar they are.

- 4. Materials that are readily capable of explosive water reaction, detonation or explosive decomposition, polymerization, or self-reaction at normal temperature and pressure (e.g., [chlorine dioxide](#), [nitroglycerin](#)).
- 3. Materials that may form explosive mixtures with water and are capable of detonation or explosive reaction in the presence of a strong initiating source. Materials may polymerize,

decompose, self-react, or undergo other chemical change at normal temperature and pressure with moderate risk of explosion (e.g., [ammonium nitrate](#)).

- **2.** Materials that are unstable and may undergo violent chemical changes at normal temperature and pressure with low risk for explosion. Materials may react violently with water or form peroxides upon exposure to air (e.g., [potassium](#), [sodium](#)).
- **1.** Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors (e.g., [propene](#)).
- **0.** Materials that are normally stable, even under fire conditions, and will not react with water, polymerize, decompose, condense, or self-react. Non-explosives (e.g., [helium](#)).

### **White (Personal Protection)**

This is by far the largest area of difference between the NFPA and HMIS systems. In the NFPA system, the white area is used to convey special hazards whereas HMIS uses the white section to indicate which personal protective equipment (PPE) should be used when working with the material.

Potential Hazardous Materials at Facility. List to be revised based on inventory before start-up.

- Gasoline
- Used Oil
- Batteries, sealed and Lead Acid Type
- Acids
- Cleaners
- Diesel
- Gasoline
- Liquid Propane Gas
- Paint Solvents
- Motor Oil

## **7.2 Hazardous Waste**

Hazardous wastes and/or materials such as batteries, lamps, etc., will be collected, stored and disposed by specialized companies. Should any hazardous waste be exported for disposal, Grand Port staff will liaise with the Department of Environmental Health Services and other relevant Bahamas Government Departments following the Basel Convention on the Transboundary Movements of Hazardous Waste and Their Disposal. All hazardous waste transportation, storage and disposal will be documented. Hazardous waste/materials will be disposed of on a monthly basis during construction and semi-annual basis post construction or on a as necessary basis.

Hazardous Materials disposed in Freeport is done through Sanitation Services Company Limited, which is a subsidiary of Waste Management. Sanitation Services requires completion of the Special Waste Profile Sheet. The Special Waste Profile Sheet is presented on the following page. The completion of the sheet also requires chemical analysis as specified by Sanitation Services.



**Sanitation Services**  
*Service First. Safety Always*

PROFILE #  
(SSC office only)

**SPECIAL WASTE PROFILE SHEET**

**A. Generator**

Name \_\_\_\_\_  
Site Address \_\_\_\_\_  
City, State, Zip \_\_\_\_\_  
Contact \_\_\_\_\_  
Phone \_\_\_\_\_  
Fax \_\_\_\_\_

**B. Billing**

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City, State, Zip \_\_\_\_\_  
Contact \_\_\_\_\_  
Phone \_\_\_\_\_  
Fax \_\_\_\_\_

**C. Description of Waste**

Name of Waste \_\_\_\_\_  
Process Generating Waste \_\_\_\_\_  
Estimated Volume \_\_\_\_\_ Frequency \_\_\_\_\_  
Special Handling Instructions or Other Waste Data \_\_\_\_\_

**D. Chemical Composition/Physical Properties**

Constituents	Concentration	Physical State _____
		Color _____
		Free Liquids _____
		Flash Point _____
		pH _____
		Total Solids _____
		Reactive Cyanide _____
		Reactive Sulfide _____

**E. Sample/Analysis Information**

Check that all apply:  
 Sample submitted with profile  
  Laboratory Analysis submitted  
  Material Safety Data Sheet Submitted

Laboratory Name \_\_\_\_\_ Sample Date \_\_\_\_\_ Sample I.D. \_\_\_\_\_

**F. Sample/Analysis Information**

1. This waste is not a hazardous waste as defined by federal, state, or local laws and regulations.
2. This waste does not contain regulated quantities of PCBs as defined by federal, state, or local laws and regulations.
3. This waste does not contain infectious wastes as defined by federal, state, or local laws and regulations.
4. To the best of my knowledge, all information submitted in this and all attached documents contain true and accurate descriptions of this waste. Any analysis submitted was performed on a representative sample as defined in 40 CFR 261 – Appendix 1 and was obtained by using this or an equivalent sampling method. All relevant information regarding known or suspected hazards in the possession of the generator has been disclosed.

Generator Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Approval Signature: \_\_\_\_\_ Date: \_\_\_\_\_

If wastes cannot be accepted locally the Grand Port facility will communicate with Sanitation Services to determine if Waste Management can assist in disposal in the United States.

If Sanitation Services or Waste Management cannot be of assistance then Clean Harbours Waste Disposal Services or Clark Environmental located in Mulberry, Florida should be contacted.

Employees handling hazardous waste will be provided the OSHA HAZWOPER 40-hour training course before handling hazardous waste or a disposal firm with appropriately trained personnel will be utilized. Employees will undergo annual refresher courses. Employee training will be documented in their personnel files.

All personal protection equipment necessary to conduct the operation will be supplied to the by the Grand Port. All necessary safety precautions and warning signs will be posted. A job risk analysis will be performed for any hazardous waste operation for storage, transportation, and disposal.

A logbook will be kept for the storage transportation and disposal of all hazardous waste.

### **7.3 Recycling and Reuse**

While there is no formal recycling program through the local municipal garbage collection company (Sanitation Services Company Ltd.) some opportunities exist on the island. Where recycling opportunities exist, they will be taken advantage.

Below are companies that offer recycling or reuse opportunities:

**Epic Batteries:** Located in Bonded Warehouse off Queens Highway

They buy back used motorcycle, automotive and marine batteries.

**KMW Batteries and Tires:** Located on West Atlantic Road near traffic circle by Kelly's Lumberyard.

They take used batteries if a new one is purchased from them.

**Carquest:** Located on West Settlers Way

They provide a core charge fee on return of battery when purchasing a new one.

**Sanitation Services Company Ltd:** Collects large volumes of used oil.

**Municipal Motors Automobile Repair Shop** – located behind Municipal Motors Gas Station, East Sunrise Highway. Collects small quantities of used oil.

**Bahamian Brewery and Beverage Company:** Located at corner of Queens Highway and Grand Bahama Way. Empty bottle buyback program for their brand beer bottles.



## 8.0 STORAGE OF FUEL

There is a zero-tolerance policy for spills at Grand Port. Therefore, all fuel containment tanks will be on a concrete pad with secondary containment. All fuel storage tanks and fuel lines will be aboveground and the tank double walled. The fuel line to the generator will be aboveground and hard piped, with shut off valves at both ends. The capacity of the concrete containment dike shall be 110% of the tank volume and meet any GBPA building code specification. The secondary containment dykes will be gravity fed drains. Any fuel that is spilled in the secondary containment structure or filling pad will be cleaned immediately with absorbent pads from the spill kit stationed at the fuel tanks. Fire extinguishers will also be present in the fuel storage areas. The prevention of spills and keeping the secondary containment clean will avoid having to treat petroleum contaminated water. The use of aboveground storage tanks and piping will allow for the visual monitoring of any leaks on a daily basis by staff and the checks documented on a daily basis through the use of a logbook. Any leaks detected will be reported immediately to the environmental supervisor so that immediate action can be taken. The fuel type will be displayed on the tank with the appropriate NFPA diamond sign displaying health hazard, fire hazard, instability, and specific hazard if any. The drawings for the fuel storage areas and connection to the generator will be permitted through the GBPA Building and Development Department. Where required by the building code emergency shut off switches will be incorporated into the design. Any fuel spills of 5 gallons or more will be documented and reported to management and to the environmental department of the GBPA.

Grand Port will prepare a specific Spill Prevention, Control, and Countermeasure (SPCC) Plan once the design of the entire facility is completed, based upon the experience of other Carnival Ports in the region. **Appendix 13** provides the example of Roatan Cruise Terminal (MBCC) SPCC Plan.

The construction manager will designate an area for fuel storage tanks for contractors. These aboveground fuel storage tanks will have secondary containment. For the movement of small volumes of fuel for generators, small equipment etc., fuel will be required to be stored in approved five-gallon or less containers. For gasoline, the most common type of storage containers are made out of plastic and are colored red (diesel is colored yellow; kerosene is blue). All portable fuel storage containers must have a cap for sealing to prevent the emission of vapors. Small volumes of fuel will not be allowed to be stored or transported in milk jugs, glass, or other inappropriate containers. Fuel storage trucks and fuel tanks will not be allowed to park within 75 ft from wetland, sensitive, or protected areas. The identification of these areas will be submitted to the GBPA once a site construction drawing is produced showing the location of temporary construction offices, portable toilets, staging areas, fuel storage, heavy equipment parking, truck parking, etc. This will be done and included into the EMP before construction. The Contractor Environmental Awareness Session will include this drawing and information to eliminate or minimize any adverse environmental impacts. The environmental officer or consultant will monitor the contractor's fuel storage areas and any maintenance areas on a daily basis and periodically monitor heavy equipment refueling operations to make sure the EMP is being followed. Any non-compliance issues will be documented and reported to Grand Port management so that corrective action can be taken.



The appropriately size and class fire extinguisher will be placed in a suitable location at or near the fuel storage containers in the event of an incident. Below is the table of classification for fire extinguishers.

**Table 8.1. Classification of Fire Extinguishers**

Comparison of fire classes				
American	European	UK	Australian/Asian	Fuel/heat source
<b>Class A</b>	Class A	Class A	Class A	Ordinary combustibles
<b>Class B</b>	<a href="#">Class B</a>	<a href="#">Class B</a>	<a href="#">Class B</a>	Flammable liquids
	Class C	Class C	Class C	Flammable gases
<b>Class C</b>	Unclassified	Unclassified	Class E	Electrical equipment
<b>Class D</b>	Class D	Class D	Class D	Combustible metals
<b>Class K</b>	Class F	Class F	Class F	Cooking oil or fat

Below is the proposed fuel Delivery Procedure for filling bulk tanks from the fuel supplier on land. This procedure may be revised in the EMP before construction begins.

#### **PORT TERMINAL FUEL DELIVERY STANDARD OPERATING PROCEDURES**

PROCEDURE- Bulk diesel or fuel product delivery to either aboveground fuel tank

PURPOSE- To assure the safe and proper transfer of diesel or other fuels

SCOPE- This procedure covers control and management procedures for bulk transfer of diesel or other fuel

The Director of Engineering dredge contractor will verify continued compliance with this procedure.

1. Client Note tanker arrival time and any circumstances which may cause a delay in its prompt off-loading
2. Delivery driver Report volume of product to be delivered
3. Client Gauge the receiving storage tank to verify that the volume available is greater than the volume to be delivered
4. Delivery driver Block/chock wheels and verify setting of vehicle brake
5. Client will protect storm drains and sewers which are with in less than 100' with spill containment barriers/berms/dikes or storm drain covers
6. Client Check safety and emergency equipment. Verify that equipment is readily available and easily accessible.
7. Client and Ensure precautions to prevent local traffic interference with delivery driver

8. Delivery driver where appropriate, place buckets underneath connection points to catch drippings to connection hose/fittings. Show Client personnel where cut-off actuator valve is located on truck
9. Delivery driver commence delivery. Inspect all visible fill lines, valves and connections for leaks
10. Client remain within visual contact of tanker throughout entire operation. Delivery driver monitor the amount of diesel dispensed against the volume available in tank.
11. Client and Delivery Driver when transfer is complete, disconnect hoses, catching any residual Delivery driver product in buckets. Dispose of residual product in a safe and appropriate manner as directed by the operator-- this product often may be simply added to the fuel tank.
12. Client will review tank gauge to verify gallons delivered
13. Client will collect delivery receipt receipts. Note tanker departure time.
14. Client Mgmt. Audit compliance of this procedure through periodic delivery observation. Take appropriate actions when exceptions are noted.

## 9.0 MANAGEMENT OF THE TERRESTRIAL ENVIRONMENT

The Environmental Specialist shall identify protected species, habitats and sensitive areas. A pre-construction survey will be conducted to document current conditions. Additionally, a Vegetation Management Plan has been developed and is provided as **Appendix 15** to this document. This appendix includes recommendations for the treatment of specific exotic and endemic species observed on the site. In addition, the plan addresses vegetative issues relative to the condition of the project site post-Dorian. In general, the plan recommends procedures for the removal and eradication of exotic species, most notably the large stands of *Casuarina Equisetifolia* (Australian Beefwood) present on the property. The plan provides for preservation of large portions of mangrove habitat, minimization of construction impacts to mangroves where practicable, and re-planting of mangroves in areas disturbed by construction and impacts from Hurricane Dorian. The plan also calls for the transplantation of sable palms and appropriate species of coppice hardwoods from areas impacted by the project.

Specific plant species that will be prioritized for collection and reuse are:

- 1) *Sabal palmetto*
- 2) *Coccoloba argentea*
- 3) *Rhizophora mangle*
- 4) *Agave braceana*

The upland contractor will be required to develop a site specific Stormwater Pollution Prevention Plan (SWPPP) that will include soil stabilization for disturbed areas including BMPs. This will include discussion of transition from construction to operational phases.

Post construction ecological surveys of the upland project area will be conducted on an annual basis during the winter to capture potential use by migratory birds for two years following project construction. Surveys will identify flora and fauna present within the project area, in particular any listed or protected species. Surveys will be conducted by a biologist or ecologist with relevant experience with the habitats and species present within the project area. These surveys will provide an assessment of habitat loss and fragmentation and identify any possible corrective or mitigative actions to minimize impacts.

## 10.0 MANAGEMENT OF THE COASTAL AND MARINE ENVIRONMENTS

- We will promote coral reef conservation.
- Discharges of any wastes to the coastal and marine environments will be strictly forbidden.
- Docking at the facility by non-cruise vessels will only occur under special circumstances and will require formal approval by the Cruise Port Operator.
- Onboard incineration will be forbidden while in port.
- Coastal clean-ups will be systematically organized, encouraging the participation of the community and crew members.
- Measures to preserve natural longshore and cross-shore sand transport, will be implemented.
- We will establish zoning for different uses to protect sensitive habitats, to separate incompatible uses and to ensure the safety of users.
- We will establish visitors' carrying capacity of beaches, and other sensitive areas, such as dive and snorkeling sites.
- We will publish a snorkeling and swimming etiquette (see the RCT example in the educational program).

### 10.1 Marine Mitigation

Mitigation is proposed for marine project impacts, and EMPs associated with these actions are summarized within this section. It is noted that two distinct mitigation strategies are proposed: relocation of reef mound substrate, and construction of additional mitigation reef substrate with coral relocation. These are addressed separately in the following sections.

#### Listed and Common Stony Corals

The primary resource of note is both low and high profile hardbottom substrate, and the primary species of concern are stony corals. Three coral species listed as threatened under the US ESA are present within the dredge footprint. Whitestar sheet coral (*Agaricia lamarki*) is present on vertical surfaces on the reef mound substrate. This substrate will be relocated in sections, so relocation of individual colonies will not be required. These colonies will remain attached (in-situ) to the relocated substrate. Three colonies of pillar coral (*Dendrogyra cylindrus*) were observed and their locations identified. These colonies will be relocated to the mitigation reef, and any additional colonies identified during the relocation surveys will also be relocated. An undetermined number of star coral (*Orbiella* sp.) are present within the dredge footprint. Colonies of sufficient size to withstand relocation (nominally 10 cm in diameter) will be relocated to the mitigation reef.

Substantial colonies (nominally of 30 cm diameter or greater) of common stony corals within the dredge footprint will be relocated to the mitigation reef. Dominant species representative of these corals include starlet corals (*Sidastrea* sp.), brain corals (*Diplora* sp.) and other corals common to the area. Adoption of a larger nominal size than that for listed ESA species is proposed to maintain diversity and prevent overcrowding by more dominant common coral species on the mitigation reef.

## 10.2 Relocation of Reef Mound Substrate

The dredge footprint includes approximately 1.09 acres of reef mound substrate. This represents, in general, the most significant benthic resources within the area of impact. These structures are largely undercut discrete rock formations that can be dislocated and transplanted in large boulder sections utilizing lift bags or barge/crane equipment (similar to that proposed for pier construction operations). This will allow for preservation of the substrate structure in addition to the established benthic communities on the mound structures, including soft coral and macroalgal communities that cannot be practically transplanted on an individual basis and established coral communities on vertical structure.

A 5.81-acre receiver site has been identified approximately 1.5 miles east of the impact area, which provides conditions similar to the existing site (**Figure 10-1 and Figure 10-3**). The area consists of an open sand area within a bathymetric low of similar depth surrounded by similar isolated mound features.

1. Pre-Removal Survey: A pre-construction bathymetric survey of the receiver site will be conducted prior to construction (bathymetric data for the donor site currently exists). A benthic resource survey of the reef mounds will be conducted to document conditions prior to removal. Only healthy resources shall be relocated.
2. Site Conditions: Substrate relocation will only occur during site conditions conducive to relocation including nominal water temperature ranges (neither too hot or cold), and periods of elevated background turbidity.
3. Survey Control: Equipment location will be continuously monitored utilizing GPS control. Locations of mound removal and placement will be documented based on GPS position.
4. Equipment: All equipment shall be in good working order, with appropriate certifications and safety equipment onboard. All barge and tug equipment shall be ABS rated for ocean use.
5. Weather: Mound relocation operations shall only occur during daylight hours and during acceptable weather conditions. Equipment shall be removed from the project site to safe harbor (Freeport) during severe weather conditions.
6. Staff: Staff and crew shall be sufficiently trained and provisioned for their respective roles and duties.
7. Means and Methods: The construction contractor shall provide a description of proposed means and methods to the Engineer-of-Record for review and approval prior to work initiation. This submission should include a list of equipment proposed and appropriate certifications.
8. Oversight of Construction Operations: Oversight of construction operations will be a shared responsibility of all relevant construction parties, including the construction contractor, the Engineer-of-Record and monitoring support staff. The roles and responsibilities between all parties will be clearly delineated at the pre-construction meeting.
9. Daily Reporting: The construction contractor will prepare a daily report of project progress during active construction in a format agreeable to the project engineer. This daily report will be distributed to relevant parties and will include a summary of the previous day's progress, including details of any issues or accidents.
10. Mound Relocation: Each individual mound will be lifted from its current position and suspended within the water column during transportation to the receiver site. This will limit stress and damage to the biota

during the transplantation process. The mounds will be transported to the receiver site and placed on open sandy bottom. Location of each mound will be documented based on GPS coordinate location.

11. Placement Location: The mound features will be placed randomly within the area, leaving open sand areas between the mounds that will result in a habitat similar to that impacted by the project.
12. Post-Construction (As-Built Survey) and Project Certification: A post-construction bathymetric survey of both the donor and receiver sites will be conducted. The Engineer-of-Record will certify project construction. Corals will be monitored for success for a period of 2 years following transplantation.

### 10.3 Mitigation Reef Construction and Coral Relocations

The construction of additional substrate is proposed to offset project impacts to hardbottom and to serve as a receiver site for the relocation of individual coral colonies. A mitigation reef will be constructed on a 5.18-acre receiver site in the nearshore adjacent to the western property boundary (**Figure 10-2**). The reef will be constructed of limestone boulders of approximately 4-foot diameter in random groupings interspersed with open sand areas between groupings. This site will serve as a receiver site for suitable coral colonies from areas of direct impact.

#### 10.3.1 Mitigation Reef Construction

1. Reef Construction: The reef will be constructed of locally sourced, clean limestone boulders of nominal 4-foot diameter. Boulders will be transported to the site by barge and individually placed in random groupings within the delineated reef area.
2. Pre-Removal Survey: A pre-construction bathymetric survey of the receiver site will be conducted prior to construction (bathymetric data for the donor site currently exists). A benthic resource survey of the reef mounds will be conducted to document condition prior to removal. Only healthy resources shall be relocated.
3. Survey Control: Equipment location will be continuously monitored utilizing GPS control. Locations of mound removal and placement will be documented based on GPS position.
4. Equipment: All equipment shall be in good working order, with appropriate certifications and safety equipment onboard. All barge and tug equipment shall be ABS rated for ocean use.
5. Weather: Reef placement operations shall occur only during daylight hours and during acceptable weather conditions. Equipment shall be removed from the project site to safe harbor (Freeport) during severe weather conditions.
6. Staff: Staff and crew shall be sufficiently trained and provisioned for their respective roles and duties.
7. Means and Methods: The construction contractor shall provide a description of proposed means and methods to the Engineer-of-Record for review and approval prior to work initiation. This submission should include a list of equipment proposed and appropriate certifications.
8. Oversight of Construction Operations: Oversight of construction operations will be a shared responsibility of all relevant construction parties, including the construction contractor, the Engineer-of-Record, and monitoring support staff. The roles and responsibilities between all parties will be clearly delineated at the pre-construction meeting.

9. Daily Reporting: The construction contractor will prepare a daily report of project progress during active construction in a format agreeable to the project engineer. This daily report will be distributed to relevant parties and will include a summary of the previous day's progress, including details of any issues or accidents.
10. Reef Boulder Transportation: Reef boulders will be transported to the receiver site by barge and placed individually on open sandy bottom within the designated reef boundaries.
11. Boulder Placement: Boulders will be placed randomly within the area, leaving open sand areas between the boulders that will result in a habitat similar to that impacted by the project.
12. Post-Construction (As-Built Survey) and Project Certification: A post construction bathymetric survey of the reef site will be conducted. The Engineer-of-Record will certify project construction.

Relocation of individual coral communities to the mitigation reef is proposed under the following protocol.

1. Baseline Survey: A coral survey will be conducted before coral removal and relocation. The number, type and relative size of corals to be relocated will be documented.
2. Coral Selection: Only healthy coral colonies with no visible signs of overt stress, disease or tissue necrosis will be considered for relocation. The number, type, size and description of non-candidate corals will be documented.
3. Site Conditions: Coral relocation will only occur during site conditions conducive to relocation including nominal water temperature ranges (neither too hot or cold), and periods of nominal background turbidity.
4. Threatened Coral Species: Three coral species listed as threatened under the US ESA are present within the dredge footprint. Whitestar sheet coral (*Agaricia lamarki*) is present on vertical surfaces on the reef mound substrate. This substrate will be relocated in sections, so relocation of individual colonies will not be required. These colonies will remain attached (in-situ) to the relocated substrate. Three colonies of pillar coral (*Dendrogyra cylindrus*) were observed and their locations identified. These colonies will be relocated to the mitigation reef, and any additional colonies identified during the relocation surveys will also be relocated. An undetermined number of star coral (*Orbiella* sp.) are present within the dredge footprint. Colonies of sufficient size to withstand relocation (nominally 10 cm in diameter) will be relocated to the mitigation reef.
5. Common Stony Corals: Substantial colonies (nominally of 30 cm diameter or greater) of common stony corals within the dredge footprint will be relocated to the mitigation reef. Dominant species representative of these corals include starlet corals (*Sidastrea* sp.), brain corals (*Diplora* sp.) and other corals common to the area. Adoption of a larger nominal size than that for listed ESA species is proposed to maintain diversity and prevent overcrowding by more dominant common coral species on the mitigation reef.
6. Techniques and Protocols: Coral relocation will be conducted based on accepted NMFS and USFWS techniques and protocols. Corals will be removed, transported and affixed in a manner to

minimize stress and physical damage. Removal of corals from the water will be minimized as much as practicable. Corals will be transported to the receiver site either while remaining in the water (utilizing transport cages or if removed from the water will be transported in tanks or with a continuous spray of water. Each coral colony will be firmly affixed to substrate utilizing an appropriate epoxy or special mix concrete aggregate.

Monitoring will be conducted continuously during active relocation and summarized following completion. Corals will be monitored for success for a period of 2 years following transplantation. Relocation of individual colonies to the mitigation reef will be the primary process for coral relocation. Previous experience with similar projects suggest that the ledge feature created at the dredge interface will provide suitable substrate for corals and will naturally recruit. Relocation to this feature may be conducted following construction if there is a need, although it is noted that the bulk of coral relocation must occur prior to initiation of dredging.



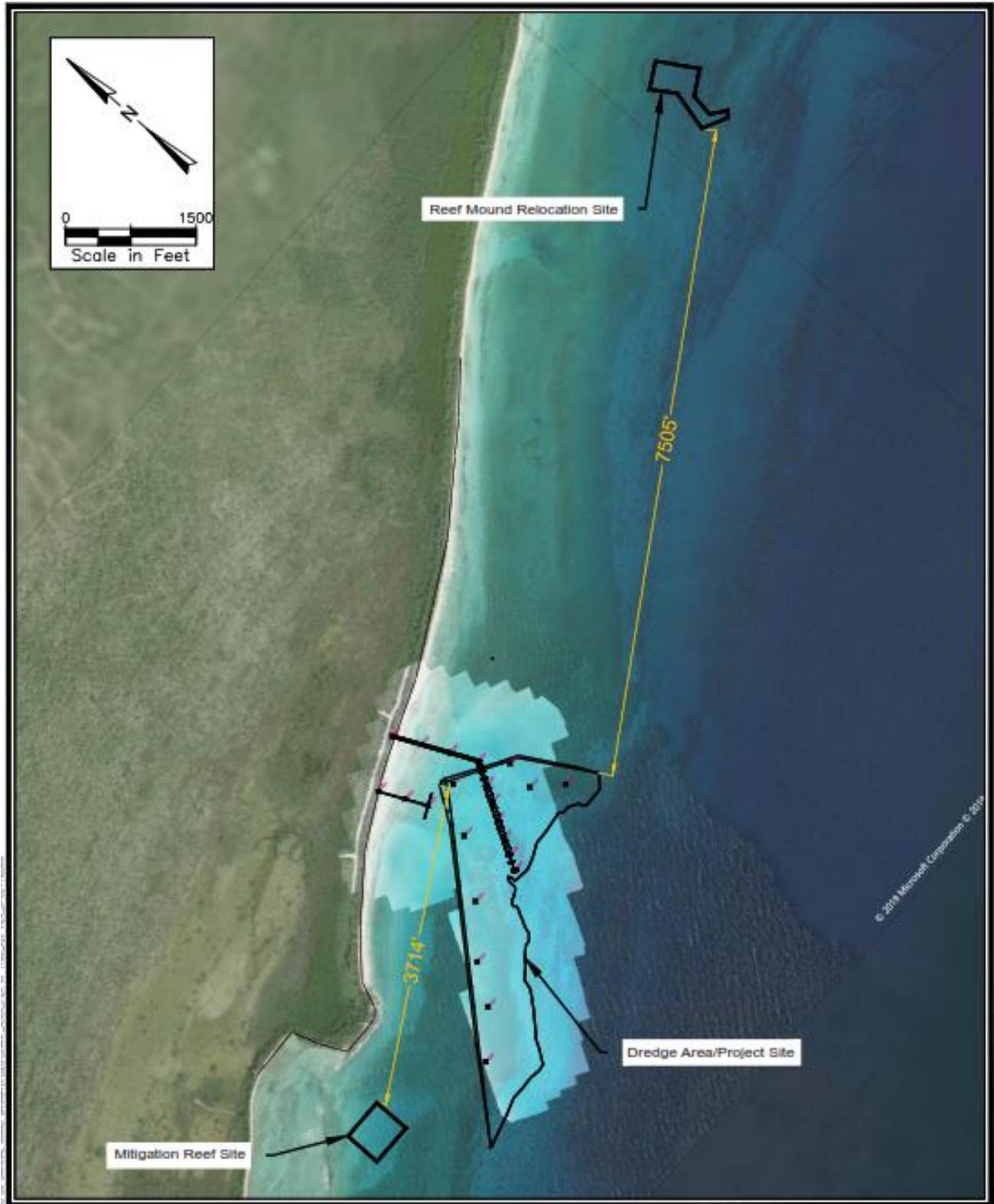


Figure 10-1. Reef Mound Relocation and mitigation Reef Locations

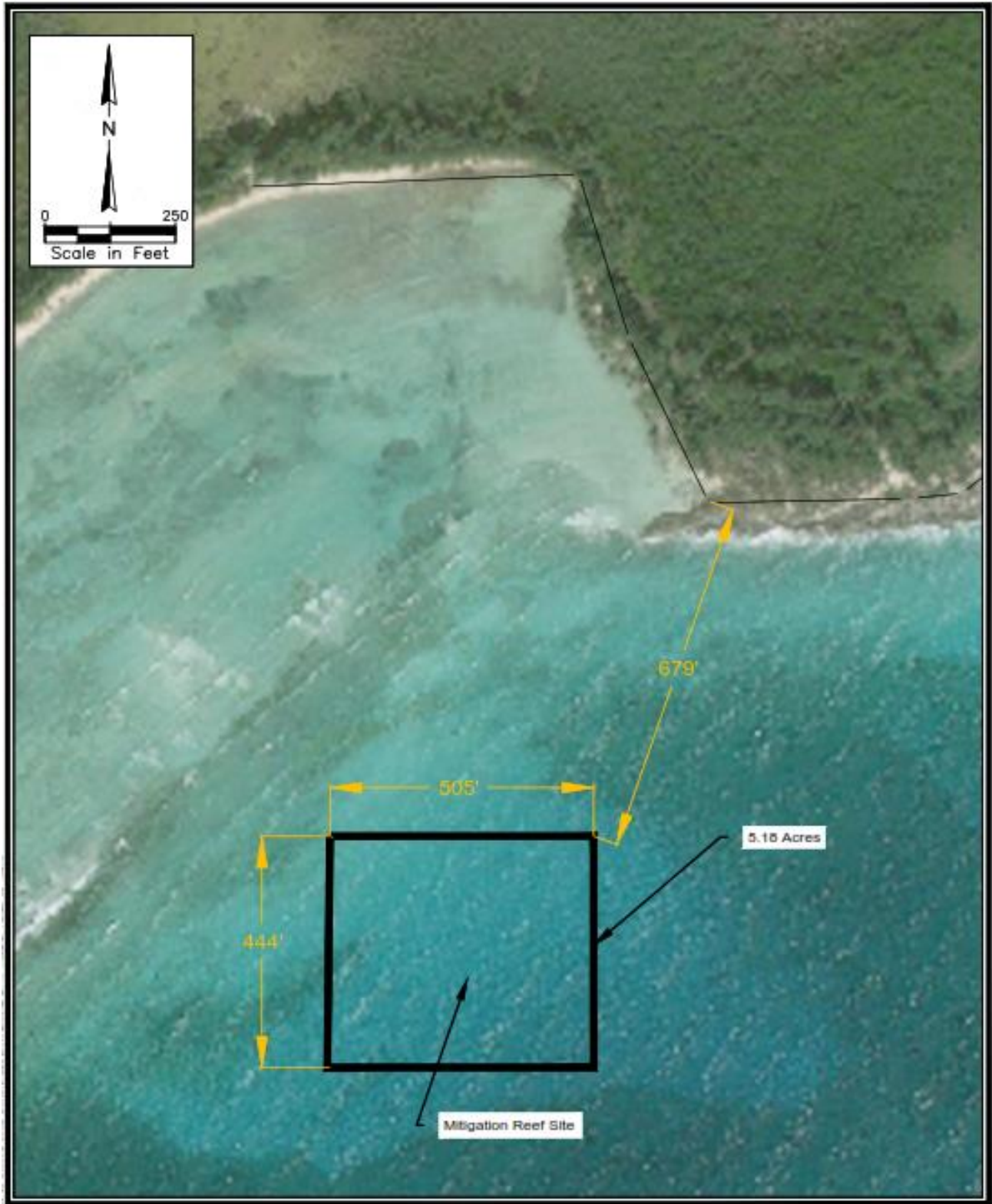


Figure 10-2. Mitigation Reef Sites

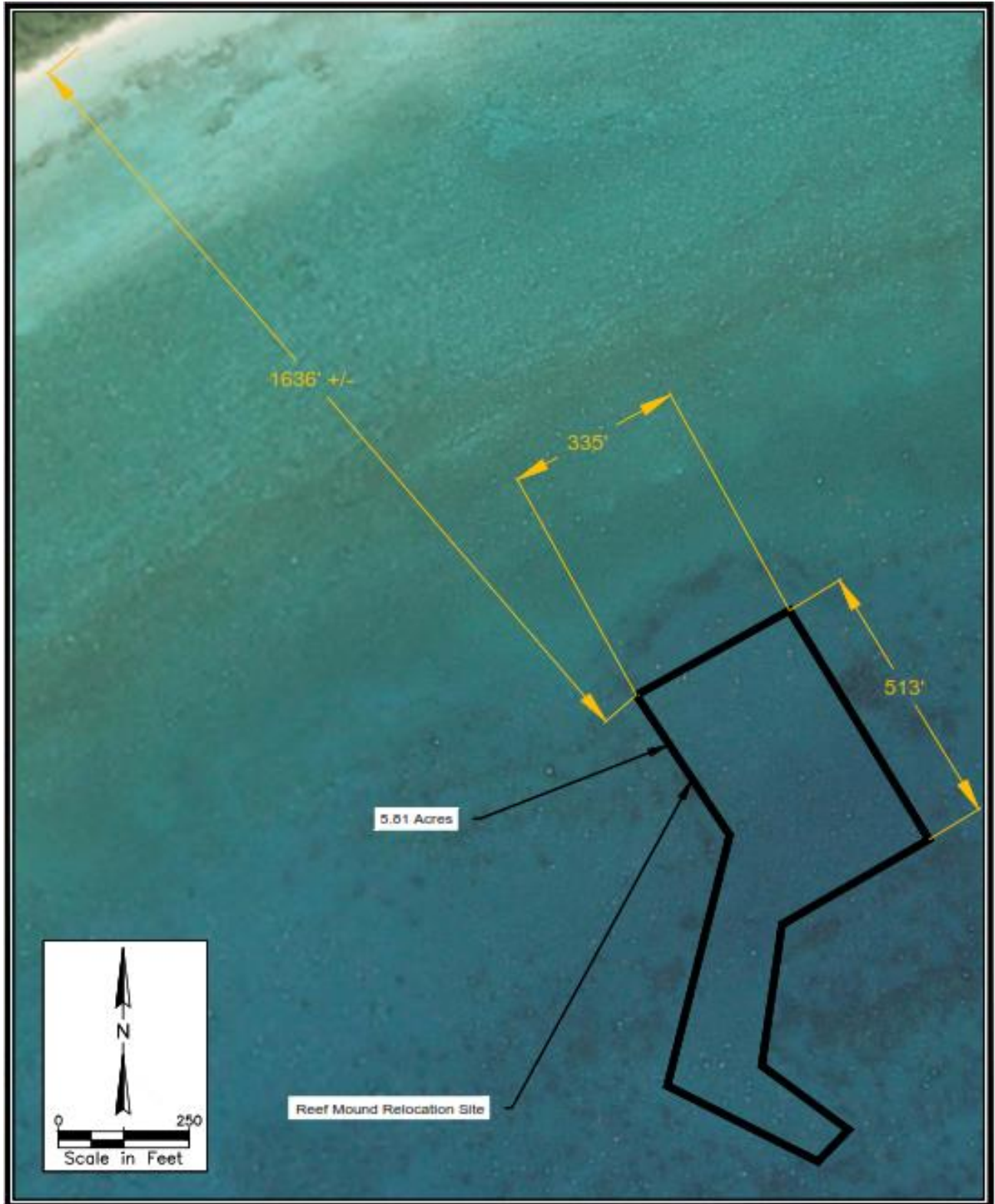


Figure 10-3. Mitigation Reef Site – Reef Mound Receiver Site



### 10.3.2 Installation of Mooring Buoys

The installation of mooring buoys reduces the potential for anchor-related impacts to benthic substrate. Mooring buoys will be installed in conjunction with the creation of the reef mound transplant reef and the nearshore mitigation reef. Installation of mooring buoys with Peterson Cay National Park will be considered in coordination with the Bahamas National Trust. These deployments have been shown to reduce the potential for user impacts and are commonly installed in high-usage reef areas. Deployments also facilitate the efficient ingress and egress of vessels, which can increase the rate of turnover of vessels and reduce the potential for user conflicts. The installation of mooring buoys eliminates the need for anchoring in the vicinity of hardbottom resources and is a mitigative measure that will be implemented during the operational phases of the project. During construction, the Contractor will develop and implement an anchoring plan which will minimize the potential for construction related anchoring impacts to hardbottom resources.

### 10.3.3 Removal of Marine Debris and Invasive Species

Benthic field studies identified the presence of marine debris within the study area, including in portions of Peterson Cay. It is likely that marine debris within the area has increased due to Hurricane Dorian. Marine debris has the potential to become mobile during significant storm events, resulting in impacts to benthic species. Removal of marine debris from the study area, including Peterson Cay, is proposed as a mitigative measure to offset marine project impacts. This effort will be conducted in concert with preconstruction field and coral relocation efforts. Debris removal will also be incorporated into the long-term benthic monitoring effort and operation agreements with marine excursion vendors marine vendors approved by the Owner will be required to remove any observed marine debris as part of their operations on an ongoing basis. Marine debris surveys will be conducted following impacts from significant hurricane events and will include both bathymetric surveys of the channel and approach and visual/diver surveys. Marine debris associated with hurricanes will be removed as a post-storm restoration measure.

The presence of Lionfish (*Pterois volitans*) was noted during the benthic field studies. This species is a non-native, invasive fish that competes with native species. Removal of specimens encountered during marine field efforts is proposed as a mitigative measure and will be encouraged as an ongoing management effort by marine excursion vendors. Additional eradication measures may be further proposed if field monitoring efforts indicate excessive populations, particularly within the Peterson Cay area.

### 10.3.4 Peterson Cay Management Plan

Increases in site visitation represent the most significant long-term potential impact to resources within Peterson Cay. In concert with the Bahamas National Trust, Carnival will support the development of a long-term management plan for the area. Carnival supported a similar initiative associated with the development of a cruise port in Grand Turk, which is also in the vicinity of a marine park. The Grand Turk plan has been in place for more than a decade and can provide a template for the development of a site-specific plan for Peterson Cay. Support for plan development is proposed as a mitigative measure for project cumulative impacts to the marine environment. This plan will be developed by individuals with specific training and expertise associated with marine construction and operations in the vicinity of coral resources.

### **10.3.5 Marine Construction**

Dredging – General: Material will be excavated using a cutter-suction-head hydraulic dredge with discharge to upland containment. Construction will conform to accepted marine and international standards of hydraulic dredging.

All EMP requirements as delineated within this document relative to marine operations (dredging) shall apply to both initial construction and any future maintenance dredging.

## **10.4 Contractor Monitoring and Environmental Protection Requirements**

The Dredging CONTRACTOR shall prepare an Environmental Protection Plan including, but not limited to, the specifications provided in this EMP. The plan will be discussed at the pre-construction meeting. The CONTRACTOR's Project Superintendent shall be responsible for the implementation of the plan and shall attend the pre-construction meeting. The plan shall include, but not be limited to, the following specifications.

Turbidity Control: The CONTRACTOR shall adopt all reasonable and practical means and methods to limit project-related turbidity and shall execute all project-related efforts in compliance with the project EMP. Regular monitoring of turbidity will be conducted under the direction of the Engineer independent of the CONTRACTOR. The CONTRACTOR shall provide full access to the project site, including reasonable support for regular turbidity monitoring (by others). If turbidity monitoring indicates levels not in compliance, the CONTRACTOR shall modify construction means and methods as directed by the Engineer. This direction may include temporary secession of excavation consistent with project permit conditions. No additional compensation shall be provided to the CONTRACTOR for turbidity-related modifications to construction means and methods. The CONTRACTOR shall provide suitable transportation to and from the nearest public dock as requested by the Engineer to monitor the collection and analysis of turbidity samples as well as to collect and analyze comparative samples. All monitoring shall be conducted in accordance with the CONTRACTOR's Quality Assurance Plan and the terms of the EMP.

Property and Vegetation Protection: The Engineer or qualified environmental specialist shall identify protected species, habitats and sensitive areas as well as property resources to be preserved within the CONTRACTOR's work area, which is defined as staging areas, access areas, and the beach. The CONTRACTOR shall not remove, cut, deface, injure, or destroy land resources including, but not limited to sand dune or berm vegetation, trees, shrubs, vines, grasses, topsoil, structures, pavement, fencing, roadways, irrigation equipment and land forms unless directed to do so in the plan. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. The CONTRACTOR shall place all pipeline discharges 15 feet or more from dunes, structures, seawalls, or vegetation in a manner to minimize erosion. Mechanical or manual means shall be used to place material in these areas and compaction equipment will not be used in these areas. The Engineer will identify habitats of significance in the vicinity of the CONTRACTOR's work area including beach areas conducive to sea turtle nesting.

Pollution Prevention: The CONTRACTOR shall continuously monitor and manage all construction activities to comply with the following environmental requirements for pollution prevention. In addition, the CONTRACTOR must coordinate all construction efforts with the Engineer.

Pollution Control Facilities: The CONTRACTOR shall maintain constructed facilities and portable pollution control devices for the duration of the contract or for that length of time construction activities continue.

Air: The CONTRACTOR shall make all possible efforts to minimize air pollution. All activities, equipment, processes, and work operated or performed by the CONTRACTOR in accomplishing the specified construction shall comply with the applicable EPA air pollution standards<sup>1</sup>.

Noise: All hauling and excavating equipment, including dredges and booster pumps, used on this work shall be equipped with satisfactory mufflers or other noise abatement devices. The CONTRACTOR shall conduct these operations so as to minimize construction noise. The use of horns, whistles, signals, and handling of dredge pipelines shall be held to the minimum necessary to ensure as quiet an operation as possible while maintaining safety on the job site. Dredges and booster pumps used on this work shall be equipped with satisfactory mufflers and/or other sound abatement devices to reduce engine noise. Noise is not anticipated to be an issue to others outside. Construction noise shall conform with the project limits as there is only a single residence located approximately 1.5 miles away from the eastern boundary of the site. There are no residences to the north. The nearest dwelling to the west is over 3 miles away and to the south is the Northwest Providence Channel. Project noise will conform to the most recent IFC – General EHS guidelines on noise.

Marine Noise: Pile driving shall only occur when turbidity curtains are in place and shall be initiated with a 'soft start' progression. Pile driving operations shall cease if marine mammals are observed within the immediate pile driving area and shall only be re-initiated when the area is clear of marine mammals. A wildlife observer shall be designated and present during all active pile driving operations and shall have the authority to cease operations upon identification of a marine mammal (cetacean) within 2 km of the active construction area. Operations will be suspended until the observed animal has on its own accord left the 2 km buffer zone surrounding the active worksite. The primary cetaceans of note within the area are bottlenose and spotted dolphin. Larger species of *baellena* whales are rarely present within the region.

Sanitary Facilities: The CONTRACTOR shall supply and maintain, at minimum, one temporary sanitary facility for the use of land-based employees and subcontractors for beach-side operations. The facility shall be conveniently located in the vicinity of the beach disposal operation. Sanitary facilities shall be of an approved chemical type with regular servicing, as approved by the ENGINEER, and shall move with the discharge point. The facility shall be removed at the end of the project.

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<sup>1</sup> EPA. National Ambient Air Quality Standards (NAAQS)

Solid Wastes: Solid wastes (including clearing debris) shall be placed in containers that are emptied on a regular schedule. All handling and disposal shall be conducted to prevent contamination of water, soil, or air. No steel, cables, wire, pipe, drums or any other debris shall be disposed overboard. No burial of waste materials by the CONTRACTOR will be permitted. The CONTRACTOR shall at all times keep the project area free from accumulations of waste material or debris caused by his or her employees or work and shall remove same when necessary or required by the ENGINEER.

Fuel Transfer: Transfers of fuel, oil or any hazardous material shall be conducted in accordance with U.S. Coast Guard regulations (including, but not limited to, 33 CFR 156).

Fuel Dispensing: Secondary containment, which is capable of holding 110 percent of the tank contents, must be provided for each fuel storage tank and placed on a level surface. Fuel dispensing areas shall have available a 4-foot-square, 16-gauge metal pan with borders banded up and welded at corners directly below the bibb. Edges of the pans shall be 8-inch minimum in depth to ensure that no contamination of the ground takes place. Pans shall be emptied immediately after every dispensing of fuel. If any fuel spill occurs, the CONTRACTOR shall immediately excavate the contaminated ground and dispose of it offsite in an approved area.

Oil and Hazardous Material Spills and Containment: The CONTRACTOR shall ensure that all hazardous material spills including hydraulic fluid spills are immediately reported to the Engineer. All hazardous material spills shall be immediately cleaned up in accordance with the *USACE Safety and Health Requirements Manual*, document number EM 385-1-1 dated 3 September 1996. In accordance with EM 385-1-1, the CONTRACTOR shall use suitable methods to prevent the spread of hazardous materials from above-ground storage tanks and piping in case of leakage.

Bilge Water: CONTRACTORS are warned that pumping oil or bilge water containing oil into navigable water or into areas that would permit the oil to flow into such waters is prohibited. Non-compliance with this prohibition is subject to penalties provided for under Bahamian Law.

Historical, Archeological, and Cultural Resources: If during construction activities, the CONTRACTOR observes items that may have historical or archeological value, such observations shall be reported immediately to the Engineer, so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition is required. The CONTRACTOR shall cease all activities that may result in the destruction of these resources and shall prevent his/her employees and subcontractors from trespassing on, removing, or otherwise damaging such resources.

The Grand Port will have an Environmental and Safety Awareness Orientation for all contractors prior to the beginning of work. The contractors will be informed of possible artifacts that have been found in the past on Grand Bahama near West End. These artifacts were related to the Lucayan Indians.

Should any artifacts be discovered the work will cease and the Grand Bahama Port Authority will be contacted to make a determination on the significance of the finding and to determine the appropriate government agency to be contacted. Work will not resume until cleared by the relevant agency.

However, it is noted that during the field work conducted to date for the preparation of the EIA no artifacts have been discovered.

Construction Lighting: The CONTRACTOR shall provide a lighting plan for review and approval prior to project initiation. The plan will address both marine and beach project elements. Marine lighting shall conform to accepted international and Bahamian standards for equipment lighting, but shall be the minimum required to meet accepted standards. Beachside lighting shall be the minimum required to meet safety requirements. If construction occurs during turtle nesting season, beachside lighting shall conform to accepted turtle season construction standards including shielding of light plants and directing of light sources towards the ocean.

The dredge contractor will be required to provide an Environmental Management Plan that will address operations on their floating equipment including BMP's for fuel and hazardous waste.

A minimum of seven (7) days prior to the Pre-Construction Meeting, the CONTRACTOR shall submit the following items for review and approval by the Owner and Engineer of Record:

Operations Plan. The Operations Plan shall describe the proposed equipment and construction methods including the following information:

Letter of Appointment designating a Project Superintendent(s), describing responsibilities and providing qualifications.

Proposed Equipment List including the specifications for horizontal and vertical positioning equipment and also including calibration information and limits of accuracy.

Proposed Construction Sequence and Methodology describing mobilization, demobilization and daily operations referenced to the work areas and access areas delineated in the Construction Plans.

Proposed Subcontractors and the segment(s) of work for which they will be responsible. Each subcontractor shall provide a list of a minimum of four (4) similar previously-conducted projects including the name of the project, the year(s) of construction, project description, dollar amount of contract award, excavation/fill volume, and name and phone number of the contractor's agent.

In addition, each subcontractor shall provide the following:

- Monitoring Plan
- Workers' Coverage Affidavit
- Environmental Protection Plan
- Quality Assurance and Quality Control (QA/QC) Plan.
- Accident Prevention Plan
- Safety Plan



- Copies of all required licenses, permits and certifications.
- Other Items as may be specified by Owner

#### **10.4.1 Exclusion of the Public**

The CONTRACTOR shall exclude the public from the immediate work area at all times during construction. The CONTRACTOR shall post a minimum of one dedicated employee for the sole purpose of full-time security at the discharge location. The project coordinator will provide guidance to the contractor on securing the site to prevent unauthorized persons from entering the facility during construction and operation. This guidance may include producing a list of persons authorized to enter the site and the issuance of identification badges for contractors and employees. The route and schedule for security patrols. The distance a watercraft may approach work areas and dock area. by sea and procedures to limit access by sea for safety and security reasons.

Post construction the facility will be International Ship and Port Facility Security (ISPS) complaint The ISPS Code is a comprehensive set of measures to enhance the security of ships and port facilities, developed in response to the perceived threats to ships and port facilities in the wake of the 9/11 attacks in the United States of America.

#### **10.4.2 Night Operations**

Night operations shall be limited to hydraulic dredging operations only. All other construction shall occur during daylight hours only. During nighttime dredge operations, the CONTRACTOR shall provide lighting necessary to safely accomplish the work and fully comply with all OSHA requirements. The CONTRACTOR shall shield or orient the lights to minimize light on the dune crest and landward, which could disorient drivers or disturb residents. The CONTRACTOR shall limit placed material dressing, grading, and tilling to daylight hours. The CONTRACTOR shall minimize noise during night operations and conform to noise limits as delineated in the most recent version of the IFC- General EHS guidelines for noise.

Throughout construction, direct lighting of the beach and nearshore waters must be limited to the immediate construction area and shall be the minimum allowed to comply with safety requirements. Lighting on offshore or onshore equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the water's surface and nesting beach while meeting all U.S. Coast Guard, EM 385-1-1, and OSHA requirements. Light intensity of lighting plants must be reduced to the minimum standard required by OSHA for general construction areas to avoid misdirecting sea turtles. Shields must be affixed to the light housing and be large enough to block light from all lamps from being transmitted outside the construction area.

#### **10.4.3 Signal Lights**

The CONTRACTOR shall display signal lights and conduct operations in accordance with the General Regulations of the Department of the Army and of the U.S. Coast Guard governing lights and day signals to be displayed as approved by the Secretary of the Army and Commandant, U.S. Coast Guard. (33 C.F.R. 80.18.- 8-31a; 33 C.F.R. 95.51 - 95.66; 33 C.F.R. 9.22 - 90.36; 33 C.F.R. 82 and C.G. Pub. 169, Navigation Rules, International-Inland dated May 1, 1977) (DAR 7-603.33). All applicable regulations shall be observed

by the CONTRACTOR, including protocol for towing vessels with tows on which no signals can be displayed, vessels working on wrecks, dredges, and vessels engaged in laying cables or pipes or in submarine or bank protection operations, dredge pipeline, and vessels of more than 65 feet in length moored or anchored in a fairway or channel.

#### **10.4.4 Notice to Mariners**

Prior to construction, the CONTRACTOR is required to provide a Notice to Mariners describing the construction operations and work areas. If the CONTRACTOR encounters any unmarked hazards to navigation floating or on the ocean floor, it is the responsibility of the CONTRACTOR to provide a Notice to Mariners and to immediately notify the Engineer.

Hardbottom Communities: Hardbottom biological communities in the vicinity of project area are to be STRICTLY AVOIDED by the CONTRACTOR during all mobilization, demobilization, dredging and transit activities. Work and access areas, work exclusion areas, equipment requirements, and reef buffer zones are specified in the plans.

Limitations on Excavation: All excavation shall be performed within the specified dredge location and to the cut depth indicated on the plans. The CONTRACTOR shall be responsible for establishing controls as necessary to ensure that the specified excavation depth and delineated borrow areas are not exceeded.

Mobilization and Demobilization: Mobilization and demobilization to and from the project site shall be controlled by the CONTRACTOR to avoid contact with any and all hardbottom formations.

Mobilization: The CONTRACTOR shall perform the preparatory work and operations in mobilizing for beginning work on the project, including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site, and for the establishment of temporary haul roads, temporary offices, buildings, safety equipment and first aid supplies, and sanitary and other facilities, as required. The CONTRACTOR shall be familiar with the weight of all equipment and weight restrictions of all roadways and bridges that are necessary to mobilize to the site or transport spoil off the site. Signs will be posted with any weight restrictions for bridges or restriction for pedestrian traffic due to safety reasons. The EMP will be revised if there are any restrictions.

The CONTRACTOR shall notify the Engineer in writing one (1) day in advance of the mobilization of each piece of floating equipment. Mobilization into the work area shall be through the corridor limits shown in the plans. No anchors shall be deployed outside the work area. All floating equipment shall be self-propelled or directly pushed. The CONTRACTOR shall monitor the location of each piece of floating equipment mobilized through the use of horizontal positioning equipment that has an accuracy of at least +3 feet. Position data shall be recorded every 1 minute. A copy of the data and plots shall be provided to the ENGINEER daily in the Contractor's Daily Quality Control Report. If any floating equipment (barges, pipe strings, dredges, etc.), other than self-propelled vessels (tugs, survey boats, crew boats, etc.), leaves the project area and is remobilized into the borrow area, these mobilization procedures shall be repeated. Demobilization shall be according to the same requirements for mobilization.

#### **10.4.5 Equipment Positioning and Cut Depth Monitoring**

Accuracy and Precision: The CONTRACTOR shall have equipment on the dredge that continuously measures the vertical and horizontal location of the cutterhead, drag arms, dustpan, or clamshell and is interfaced with the cut depth positioning equipment. The specifications for this equipment, calibration information, and limits of accuracy are to be provided to the Engineer. The Engineer will approve or reject use of specific equipment based on accuracy. Horizontal accuracy for dredge positioning shall be within +3 feet. Vertical accuracy for dredge depth positioning shall be within +1.0 foot. This equipment shall provide a permanent record of the equipment's position referenced to State Plane Coordinates (NAD 83, Florida East Zone) and NGVD 29 datum.

During dredging, reports on the position (x,y) of and bottom elevation (z) of the cutterhead shall be recorded. This position shall give both horizontal and vertical (depth corrected for tide in feet referenced to NAVD 88 datum) position. The dredge depth (cutterhead, dragheads, or dustpan) shall be corrected for tidal fluctuations by a method pre-approved and acceptable to the Engineer. The tide measurements must be acquired and applied to the vertical control equipment on a real-time or hourly basis. At a minimum, the report shall give the location at 30-second intervals for cutterhead, hopper, clamshell or dustpan dredges. During unloading of hopper dredges and scows, data shall be collected at the time of the beginning of the unloading and immediately prior to departure to the borrow area. The CONTRACTOR shall also submit an ASCII file and a plot of the horizontal positions of the dredge for each day. The plot shall contain numbered position fixes that correspond to the positions discussed above.

#### **10.4.6 Transport of Excavated Materials**

Methods of Transport: The details of transporting the fill from the excavation area to the placement area shall be proposed by the CONTRACTOR for approval by the Engineer.

Pipeline Method: All in-water pipelines shall be submerged except at the dredge, mono-buoy, and/or boosters. The CONTRACTOR shall propose location(s) of the submerged pipeline that must be approved by the Engineer prior to submerging the pipeline. The CONTRACTOR shall avoid hardbottom or seagrass locations in the proposed pipeline route and shall provide a plan view drawing clearly indicating the route relative to the known locations of hardbottom/seagrass in the plans.

The CONTRACTOR shall maintain a tight discharge pipeline at all times. The joints shall be constructed to preclude spillage and leakage. Leaks shall be promptly repaired, and the dredge shall be shut down until complete repair has been made to the satisfaction of the Engineer. The CONTRACTOR shall transport the Engineer to the leak repair site for visual inspection if requested by the Engineer.

#### **10.4.7 Layout of Work for Fill Placement**

Layout: Control data and elevations are shown on the Contract Drawings. The CONTRACTOR shall complete the layout of the work and shall be responsible for all measurements that may be required for the execution of the layout of the work, subject to such modifications as the Engineer may require to meet changed conditions or as a result of necessary modifications to the contract work. The layout of the work shall be based on the cross-sections and not the plan views in the Construction Plans. The CONTRACTOR

is responsible for verification of all horizontal and vertical control provided in the Contract Drawings. The CONTRACTOR must verify all horizontal and vertical control for all monuments within the project limits prior to construction.

Placement Template: Material placement shall occur in a continuous placement along the entire extent of the project area. Placement shall not occur outside of the lines and grades delineated within the project plans. Placement density shall be continuously monitored and adjusted as necessary to ensure that material is placed along the entire extent of the project placement area.

Environmentally Sensitive Areas: Environmentally sensitive resources (vegetation, habitats, wetlands, etc.) in the vicinity of fill placement will be flagged and identified for avoidance. No fill shall be placed within areas delineated as sensitive and both corrective action by the contractor and contractor sanction shall occur if material is placed within these areas. Oversight by an independent environmental monitor will occur during construction to assure compliance.

Responsibility: The CONTRACTOR shall provide all stakes, templates, platforms, equipment, tools, materials, and labor at the CONTRACTOR's expense as may be required in laying out any part of the work from the monuments, control data and elevations established by the plans. The CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, stakes for pipe locations and other working points, lines, and elevations. The CONTRACTOR shall be responsible for maintaining and preserving all monuments, stakes and other markers established by the Engineer unless and until authorized to remove them.

Construction Stakes: All fill grade stakes shall be steel pipe approved by the Engineer and shall be completely removed in their entirety immediately after final acceptance of the section. Stakes must be long enough to extend a minimum of 6 feet above finished grade without the use of mechanical joints. The CONTRACTOR shall be responsible for removing, in their entirety, all construction stakes, ranges, and other devices utilized to delineate the beach construction template. The CONTRACTOR shall record all stakes deployed and removed on a daily basis on a Construction Stake Inventory.

Debris: Prior to placement of fill, the CONTRACTOR shall remove from the placement area of the work all non-compatible material, vegetation, and other debris lying within the foundation limits of the fill section. All materials removed shall be disposed of in an appropriate and legal manner. Grading and other construction equipment shall not be permitted outside the construction limits except for ingress to or egress from the site via the designated mobilization areas.

Lines and Grades: The excavated material shall be placed onto the lines, grades, and cross-sections indicated in the plans, unless otherwise directed by the Engineer. The fill profile shall be the same as indicated on the plans. The CONTRACTOR is to place the fill in such a manner as to establish a uniform and straight grade between adjacent profile lines.

Dikes: Temporary containment and longitudinal dikes and spreader and pocket pipe shall be used as necessary to contain and dewater hydraulically placed material within the limits of the fill template cross-section and to minimize and control water turbidity. Dikes or mounds shall be constructed along the waterline as necessary and/or as required to direct the pipeline discharge longitudinally along the beach for the purpose of minimizing transverse gully formation from the point of discharge. The Engineer may direct the CONTRACTOR to raise or extend dikes, if necessary, to control turbidity. The CONTRACTOR shall not permit dredge-return water to flow landward of the fill section or water to form ponds outside of the fill placement areas. The CONTRACTOR shall protect existing drainage operations. Any material permitted to flow into or restrict the flow of an existing ditch, canal, or drainpipe shall be promptly removed. Structures within the fill section shall be protected by the CONTRACTOR to prevent potential damage by the CONTRACTOR's operations.

Grading and Dressing: Upon completion of all filling operations within an acceptance section, the fill shall be graded and dressed so as to eliminate any undrained pockets, ridges, and depressions in the fill surfaces and as necessary to further comply with this EMP. As a condition of acceptance, the CONTRACTOR is to grade and dress the fill in such a manner as to establish a uniform berm grade between adjacent profile lines. The CONTRACTOR shall not be required to dress the fill below mean high water.

Tolerances: The vertical tolerance is 0.5 feet below the template and 0.5 feet above the template. Unless approved by the engineer, fill placement must at least meet the 0.5-foot tolerance below the template.

Materials Placed Outside the Work Area: If any material is deposited outside the work area, the CONTRACTOR may be required to remove such misplaced material and redeposit it as directed by the Engineer, at the CONTRACTOR's expense.

Misplaced Material: The CONTRACTOR shall minimize loss and/or misplacement of fill material. If, during the progress of the work, the CONTRACTOR should lose, dump, throw overboard, sink, or misplace any material, plant, machinery, or appliance which, in the opinion of the ENGINEER, should be removed, the CONTRACTOR shall recover and remove the material(s) immediately. The CONTRACTOR shall provide immediate notice to the Engineer including a description of and GPS coordinates for such obstructions. If the Engineer observes such obstruction, the Engineer shall record the position or mark the obstruction and notify the CONTRACTOR. Removal of the obstruction and all associated costs shall be the responsibility of the CONTRACTOR. The Engineer shall monitor any removal operations. Should the CONTRACTOR refuse, neglect, or delay compliance with the above requirements, such obstructions may be removed by the ENGINEER, and the cost of such removal may be deducted from any money due or to become due to the CONTRACTOR or may be recovered under the CONTRACTOR's bond.

#### **10.4.8 Quality Assurance**

The CONTRACTOR shall be solely responsible for assuring the quality of all work conducted by the CONTRACTOR or its subcontractors in association with the contract for this project. The CONTRACTOR shall designate a Quality Assurance (QA) Officer for this contract, and the QA Officer shall assume responsibility for compliance with all requirements of this contract, including permit conditions, easements,

statutes, laws, and applicable regulations. The CONTRACTOR shall prepare a Quality Assurance Plan specifying quality control (QC) procedures for all critical components of the work. The CONTRACTOR shall provide the Engineer access to all QC procedures, data, and reports at any time at the request of the ENGINEER. All activities associated with QA/QC shall be included in the costs for the dredge and fill bid item.

Unless otherwise noted, the CONTRACTOR shall conduct all QC procedures. The QA Plan will be discussed at the pre-construction meeting and the CONTRACTOR shall revise the QA Plan at the discretion of the Engineer. Engineer approval of the QA Plan shall be a required prerequisite to the start of construction. The CONTRACTOR shall maintain the QA Plan and all QC procedures in accordance with any changes made by the ENGINEER throughout the term of the contract.

The QA Plan shall include but not be limited to the following elements.

Letter of Appointment: A Letter of Appointment designates a QA Officer(s), describes responsibilities, provides qualifications, and delineates the line of authority and organizational reporting requirements of the QA Officer.

Personnel Training: Personnel responsible for initial training and dissemination of updated information throughout the term of the contract shall be specified as well as a comprehensive list of training issues covered. Training shall include review of all applicable EMP, permit conditions, licenses, easements, statutes, laws, and other regulations, environmental resource protection, methods of detecting and avoiding pollution, statutory and contractual pollution standards, and installation and care of facilities to ensure adequate and continuous environmental pollution control. QA/QC and supervisory personnel shall be thoroughly trained in the proper use of pollution monitoring devices and abatement equipment, and shall be thoroughly knowledgeable of applicable laws, regulations, permits, easements and other applicable requirements.

Quality Control Methods: Quality control methods shall include those requirements specified for monitoring and environmental protection, equipment calibrations, verification of the position of all dredging equipment, duplicate sample analyses (turbidity monitoring) and any other methods the CONTRACTOR proposed to assure the quality of their work (**Appendix 14**). These methods shall also be used for any and all work that will be performed by subcontractor(s).

QC Reporting Requirements: QC reporting requirements shall be specified in the QA Plan. The CONTRACTOR shall be required to prepare and submit to the ENGINEER the Contractor's Daily Quality Control Report. The Contractor's Daily Quality Control Report shall include as attachments the following: Dredge Position Printouts, Construction Stake Log, Turbidity Monitoring Reports and Chart, and Sea Turtle Observer's Report. The Contractor's Daily Quality Control Report with attachments is due to the Engineer on a daily basis by noon on the following day. Reports shall be provided from the first day of mobilization to the last day of work, including site restoration. The Daily Quality Control Report shall be filled out every day, regardless of whether work was accomplished. Failure to provide Daily Quality Control Reports to the



Engineer shall result in delay in payments to the CONTRACTOR until the Daily Quality Control Reports are received and are acceptable to the ENGINEER.

QA Inspections: All compliance inspections conducted by the CONTRACTOR, or the Engineer, shall be individually recorded on the Contractor's Daily Quality Control Report, including but not limited to, the specific items required in this EMP. The inspector shall also record the recommended corrective action to be taken and shall conduct a follow-up inspection within 24 hours to ensure compliance with the corrective action. The Contractor's Daily Quality Control Report with recorded inspections are to be furnished to the Engineer daily.

QA/QC Deficiencies: The CONTRACTOR is responsible for implementing any corrective actions recommended by the QA Officer or the ENGINEER. Reported deficiencies shall require follow-up inspection within 24 hours by the CONTRACTOR's QA Officer, the ENGINEER. Recurring deficiencies in an item or items may indicate inadequacies in the QA Plan and the CONTRACTOR may be required to revise the QA Plan as directed by the ENGINEER and advise appropriate personnel of any modifications required.

#### **10.4.9 Safety Requirements**

The CONTRACTOR shall specify all safety inspection procedures and designate personnel responsible for supervising accident prevention activities and ensuring compliance with safety measures. At the time of the pre-construction meeting, the CONTRACTOR shall submit to the ENGINEER a Safety Plan. The Safety Plan shall include but not be limited to the following elements.

Letter of Appointment: The CONTRACTOR shall provide a Letter of Appointment designating a Safety Officer(s), describing responsibilities, providing qualifications, and delineating the line of authority and organizational reporting requirements of the Safety Officer.

Accident Prevention Plan: The CONTRACTOR is required to submit to the ENGINEER an Accident Prevention Plan 10 days after the Notice of Award and prior to the pre-construction meeting. The Accident Prevention Plan must be in accordance with all government safety standards as specified in the latest EM 395-1-1, entitled "Safety and Health Requirements Manual." Submission of the Plan does not constitute an endorsement on the part of the ENGINEER or ENGINEER of the CONTRACTOR'S Accident Prevention Plan. The plan is intended to provide a method by which the CONTRACTOR demonstrates an awareness of government safety standards.

The Accident Prevention Plan will specifically address operations of marine equipment including monitoring of equipment and minimization of collision risk. All vessels will be required to maintain minimum speeds required for steerage within the immediate project vicinity. Vessels will be required to have a traffic observer while navigating within the project vicinity. The traffic observers' duties will include continuous observations of both vessel traffic and the potential for marine mammals within the project vicinity. Vessels shall maintain the greatest practicable distance from marine mammals if observed. All major equipment shall maintain active AES transponders and shall remain only within areas designated for marine equipment within the construction drawings including ingress and egress routes. All marine equipment shall avoid areas of environmental (hardbottom and seagrass) resources designated within the construction drawings. All staff

responsible for the operation of marine equipment shall be trained in the specific requirements for safe vessel operation including issues related to environmental resources and the potential for marine mammals.

OSHA Standards: The CONTRACTOR shall review the U.S. Army Corps of Engineers Manual, General Safety Requirements EM 385-1-1, and the latest Occupational Safety and Hazard Agency (OSHA) standards and become fully knowledgeable of the personal protective equipment that must be provided to workers and shall be familiar with the safety standards applicable to the prevention of accidents during the construction of this project and shall comply with all applicable provisions.

Medical Emergencies: The criteria for designating a medical emergency and the procedures to be followed shall be specified by the CONTRACTOR. These procedures shall include local information relative to emergency treatment facilities and methods of transporting personnel, if necessary.

Hurricanes and Severe Storms: The CONTRACTOR shall monitor the National Oceanic and Atmospheric Administration (NOAA) marine weather broadcasts and other local commercial weather forecasting services during construction operations. The CONTRACTOR shall notify the ENGINEER at the time of any decision to move equipment in preparation for potential storms. The CONTRACTOR shall be responsible for acquiring approval for the use of local safe harbors from local authorities. The CONTRACTOR shall include the following information in the hurricane and storm procedures.

Weather Conditions for Terminating Operations: The CONTRACTOR shall provide a list of the equipment scheduled for use on this project and specify the conditions (e.g., wind speed, wave height, etc.) under which operations will be terminated and equipment will be secured.

Prioritized Methods for Storm Preparations: The CONTRACTOR shall provide a prioritized list of actions to be taken in the event of a severe storm and assign personnel to each action. The CONTRACTOR shall specify how each piece of equipment will be secured in place or moved to a safe harbor, including the details of all equipment necessary (e.g., tugs: size, capacity; number; work boats: size, capacity, number; storm anchors: type, size, number; chain or line: size, lengths; etc.).

Personnel Evacuation: The CONTRACTOR shall provide a plan for evacuation of personnel, including their responsibilities prior to evacuation, methods of transportation, alternate accommodation, etc.

Emergency Response for Equipment Failure: The CONTRACTOR shall specify emergency operating procedures to be implemented in the event of mooring equipment failures during sudden and severe adverse weather or any other conditions. These procedures shall include actions to be taken in response to loss of a spud(s), swing wires, anchor wires, or other mooring equipment or facilities.

Fire Extinguishers: The CONTRACTOR is specifically required to provide a fire extinguisher on all mobile construction equipment with a basic minimum extinguisher rating of 80-B:C to 120-B:C; which is equivalent to a 10-20 pound dry chemical extinguisher, compatible to the hazard(s) including combustible materials, flammable liquids and materials used in areas remote to other fire extinguisher equipment.



Backup Alarms: The CONTRACTOR shall operate and maintain backup alarms on all land-based mobile construction equipment 24 hours per day, unless specifically directed by the ENGINEER.

Hurricane and Severe Storm Plan: The CONTRACTOR shall submit a Hurricane and Severe Storm Plan within 10 calendar days after the Notice of Award and prior to the pre-construction meeting. This plan shall include but not be limited to the following elements:

- a. Types of storms possible (winter storm, tropical storm, hurricane, and tornado).
- b. Time intervals before storms strike the project area when action will be taken and details of the actions to be taken. The plan should be specific as to what weather/wave conditions will require work shutdown, removal of dredge, etc.
- c. List of the equipment to be used on the job and its ability to handle adverse weather and wave conditions.
- d. List of safe harbors or ports and the distance from the work area to these harbors and the time required to move the equipment to these harbors or ports. Copies of letters of approval for the use of these safe harbors or ports (local authorities, U.S. Coast Guard, etc.) where applicable.
- e. Method of securing equipment in these safe harbors or ports.
- f. List of equipment to be utilized to make this move to safe harbors or ports (tugboats, work boats, etc.), to include the name and horsepower of this equipment. The plan will include only equipment capable of making the move to safe harbors or ports in adverse weather or sea conditions.
- g. Methods of securing equipment not moved; i.e., pipelines (floating or submerged), pumpout stations, etc.
- h. Plan of evacuation to include interim measures (i.e., immediate reaction plans to be taken for all storm occurrences, particularly sudden/flash storms).
- i. Operating procedures to be undertaken when critical dredge equipment fails during sudden and severe adverse weather conditions, to include breaking of spuds, swing wires, anchor wires, or other mooring equipment or facilities.

The CONTRACTOR shall continually monitor the NOAA marine weather broadcasts and avail themselves of such other local commercial weather forecasting services as may be available.

#### **10.4.10 Pier Construction**

Pier construction shall be conducted utilizing the same EMP for waterborne equipment as delineated for dredging operations, including equipment operations, ingress, egress and avoidance of hardbottom resources. Pier construction shall occur only during daylight hours.

#### **10.4.11 Turbidity Curtains**

The CONTRACTOR shall utilize upland containment to retain discharged dredge material within the areas designated for spoil disposal, and minimize the discharge of material into the nearshore to fine silt/clay fractions only. Coral fragments shall be retained within the upland containment areas.

Turbidity curtains shall be installed and maintained around active excavation, construction and discharge locations including both dredge operations and pier construction. The CONTRACTOR shall submit a turbidity curtain plan for review and approval prior to project initiation including the specific make and model of proposed curtains, the curtain mooring system and general curtain layout to meet project requirements. Curtains shall be in good working order and inspected on a daily basis, with documentation of function provided within the daily report by the CONTRACTOR. The CONTRACTOR shall maintain on-site sufficient curtain length in reserve to replace worn or damaged curtain sections.

Turbidity curtains should be installed at all sites of turbidity-generating activity, including the jetty construction area, dredge site and the dewatering site. The curtains may need to be removed during periods of rough weather to prevent damage to the curtain and surrounding habitat; however, storm conditions should also necessitate cessation of dredging activities.

Appropriate removable living organisms, such as anemones and urchins, from areas where the turbidity curtains are to be maintained. A sweep prior to the installation of the curtains and a final sweep once the curtains are in place will be undertaken. Areas for relocation should be established prior to this endeavor.

Placement of turbidity curtains will be adaptively managed based on sight and field conditions to meet the turbidity standards/testing requirements to ensure compliance with project turbidity standards. Curtains will be deployed in a manner not to impede marine species or present an entanglement risk. Curtains will be sufficiently secured and anchored so as not to pose a risk to hardbottom resources and where practicable will be located away from benthic resources.

Upland containment including settling ponds, diking and water control structures shall be implemented to minimize the potential for discharge of coral fragments into the marine environment. Turbidity curtains will be deployed around the return water discharge from upland disposal to minimize the potential for discharge of coral fragments (which may contain SCTL D) into the broader marine environment.

#### **10.5 Monitoring and Construction Oversight – Marine Elements**

The following construction oversight and monitoring tasks will be conducted in support of project construction. It is anticipated that a design-build contract will be negotiated by the Owner with an appropriate dredge and marine construction contractor. Given the scope of the construction and the type of equipment required, this contractor will need to be an international firm with sufficient experience, resources and expertise. Appropriate oversight of the construction contractor will be required, as will monitoring of the project throughout the construction process. The following major oversight and monitoring tasks will be implemented.

Pre-Construction Benthic Surveys: A pre-construction (baseline) marine benthic survey will be conducted to supplement existing site data and document pre-construction conditions. Survey effort will include identification and relocation of suitable resources within the project footprint to appropriate receiver sites outside the zone of influence of the project.

Pipeline Corridor Survey: A diver survey will be conducted of the proposed temporary submerged pipeline route to the shoreline to ensure that the route avoids hardbottom and seagrass resources to the greatest extent practicable. This effort will include demarcation of the route to support pipeline deployment by the construction contractor and will include a post-deployment visual assessment of placement to document site condition after pipe deployment.

Pre-Construction Meeting: The Owner will facilitate a pre-construction meeting to review salient elements of construction with all relevant parties. At a minimum, this meeting will include representatives from Carnival, the construction contractor, the Engineer-of-Record, monitoring support staff, and relevant governmental entities. The conference will be held in Grand Bahama with the ability to participate by conference call.

Identification of Key Staff Roles and Responsibilities: The pre-construction meeting will include identification of key points of contact for all relevant parties and a contact list will be prepared and distributed, delineating each key staff member and his or her role and responsibility. The role and responsibility of each key staff member will be discussed at the pre-construction meeting and will include identification of staff with the contractual authority to suspend construction operations as a result of impacts. The pre-construction meeting will provide a review of major project elements, appropriate means and methods of construction, BMPs, and monitoring.

Review and Training of Oversight Monitoring Personnel: To the extent practicable, construction oversight will utilize local, on-island resources to provide daily observations of construction. Oversight procedures and responsibilities will be reviewed with individuals identified to support construction operations. This will include project-specific training of local staff to support construction oversight monitoring.

Review and Training of Staff Regarding listed and protected species: Relevant staff associated with both construction and operations will receive training regarding species of concern in the vicinity of the project. This includes consideration of upland species (primarily plants) and marine species (most notably corals, sea turtles, and marine mammals).

Construction Noise: All construction noise shall conform to the most recent IFC – General EHS guidelines on noise including maximum levels. If issues regarding noise are identified during construction, ambient levels will be determined by measurement.

### **10.5.1 Oversight and Monitoring during Marine Construction**

The following listing provide a summary of oversight and monitoring activities that will occur during marine construction operations.

Oversight of Construction Operations: Oversight of construction operations will be a shared responsibility of all relevant construction parties, including the construction contractor, Carnival, the Engineer-of-Record and monitoring support staff. The roles and responsibilities between all parties will be clearly delineated in the EMP and discussed at the pre-construction meeting.

Daily Reporting: The construction contractor will prepare a daily report of project progress during active construction in a format agreeable to the project engineer. This daily report will be distributed to relevant parties and will include a summary of the previous day's progress, details of any issues or accidents, and assurance that turbidity curtains are in place and functional.

### **10.5.2 Turbidity Monitoring**

Turbidity Monitoring: Turbidity monitoring will be conducted to ensure that values will not exceed a maximum increase of 15 nephelometric turbidity units (NTU) above background concentration during dredging at all sampling locations. Monitoring details are outlined in the following paragraphs.

Sampling Locations: Sampling locations should include the following areas: 1) jetty construction area, 2) dredge areas and 3) discharge site. Background sample points shall be taken at least 1,000 meters from the project site outside of the zone of influence of the project. The GPS coordinates of each turbidity sample location should be recorded, and samples should be taken from about the middle of the water column at each location.

Pre-construction in situ turbidity measurements shall be taken weekly within the month prior to the commencement of dredging. Turbidity samples (in NTUs) shall be collected and analyzed at each sample location at mid-depth within the water column. The distance between the sample locations will be at least 500 feet. These measurements will help to characterize the conditions existing immediately prior to construction.

Turbidity monitoring will be conducted on a daily basis by a trained individual. The following protocol will be utilized.

Equipment and Monitoring Protocol: Samples will be measured in NTUs per the device manufacturer's guidelines. The device shall be factory calibrated within at least the previous year. Field calibration shall be conducted at least every week or if warranted, based on a reading comparison to a standard. A QA check to a 10 NTU standard shall be conducted prior to each sampling event to ensure the device is calibrated and reading properly. Samples shall be collected mid-depth utilizing a niskin bottle or comparable sampling device. Samples shall be tested within 10 minutes of sample collection.

Frequency: Two sampling events will be conducted per day, nominally one in the morning and one in the afternoon, at least 4 hours apart. Samples will be taken during active construction, when the dredge has been operational for a minimum of 2 hours. Samples will not be taken if the dredge is not operating for a period greater than 4 hours, and this condition will be noted in the daily sampling report. Additional sampling

will occur if a significant increase in the turbidity plume size, extent or visual magnitude is observed between regular sampling intervals.

Background: A representative background sample will be collected a minimum of 1,200 feet up-current of the project in an area free of project influence prior to each compliance sampling event.

Compliance Sampling (Dredge): The dredge compliance sample will be collected at a distance of 500 meters (1,640 feet) down-current of the operational dredge, within the densest portion of any visible turbidity plume. Compliance stations should be altered if the plume is heading for the reef wall resources (sample should be taken at the location of the resource regardless of distance). Levels should be below the 15 NTU above background standard in this event.

Compliance Sampling (Discharge): The discharge sample will be collected a distance of 500 meters (1,640 feet) from the discharge, within the densest portion of any visible turbidity plume. Levels should be below the 15 NTU above background standard in this event.

Compliance Sampling (Jetty Construction and Pier Construction): The discharge sample will be collected at a distance of 500 meters (1,640 feet) from the turbidity curtain perimeter, within the densest portion of any visible turbidity plume. Levels should be below the 15 NTU above background standard in this event.

Compliance Standard: Compliance will be demonstrated through a compliance turbidity reading of no more than 15 NTUs above background at each compliance station.

If an exceedance is observed at any compliance station, the monitor will immediately notify the Engineer, who will notify the Owner, the construction contractor and relevant governmental parties. If an exceedance is observed, the contractor will immediately cease the relevant construction operations until turbidity values fall within operational parameters. The CONTRACTOR will then make whatever practical modifications to the construction means and methods necessary to achieve turbidity compliance. Means and methods of construction are at the discretion of the CONTRACTOR, however, the CONTRACTOR must operate in compliance with the turbidity monitoring and turbidity levels established for this project.

A daily report delineating each sampling event will be prepared and will include the following items:

- Date, time, and location of sampling.
- A schematic map with the sample site(s) shown.
- Water depth at sample site.
- Sample depth.
- Weather, wind, and current conditions.
- Approximate tide (e.g., incoming or outgoing).

- General dimensions of the visible turbidity plume (delineated on a map) including relative distance to environmental resources.
- Documentation of any additional controls or practices that have been implemented to achieve compliance of the monitoring interval.
- Discussion of any exceedances, work cessation, or other corrective action that has been taken over the monitoring interval to achieve compliance.

Each report shall include a summary of turbidity values and a map delineating sample locations and relative extent of the turbidity plume. Reports will be submitted to relevant governmental entities for review on a weekly basis.

Once construction is completed, the removal of the turbidity curtains should occur only when turbidity levels inside and outside the curtain are reasonably equal and consistent with background samples.

In addition to turbidity sampling at discharge sites, turbidity samples should be taken at each of the biological monitoring sites during bi-weekly monitoring events. Samples at these locations should be taken at the surface, mid-depth and near the seafloor.

The waterway system will be primarily excavated prior to connection to the ocean, which will occur at the jetty/inlet area. Turbidity curtains will be deployed around the inlets when the connection is excavated and will implement the same turbidity protocols and compliance standards applied to hydraulic dredging operations.

#### **10.5.2.1 Weekly Reporting**

A weekly onsite progress meeting will be conducted between the contractor, owners' representatives, the engineer, and relevant governmental entities, with the ability to attend the meeting by conference call. This meeting will review construction progress to date and identify any issues or required corrective actions. A meeting summary will be prepared including action items and will be distributed to relevant parties.

#### **10.5.3 During Construction Benthic Surveys**

On a bi-weekly (every 2 week) basis following the initiation of construction and continuing until the completion of dredging operations, a reconnaissance survey of benthic resources within the project vicinity will be conducted including the immediate project area and Peterson Cay. This survey will be conducted by individuals with specific expertise in coral resources (marine biologist or similar) in the vicinity of marine construction. This survey will focus on the general health and levels of stress and sedimentation observed on these resources. The survey will include screening protocols for coral disease, specifically with regard to the potential occurrence of SCTL. A summary report will be prepared and distributed to the project team. The engineer will be notified of any excessive sedimentation or visible stress of coral resources and, if deemed significant, will direct the contractor to alter construction means and methods to further reduce project turbidity and sedimentation.

#### **10.5.4 Post-Construction Oversight and Monitoring**

The following post-construction tasks will be conducted to document post-project conditions and certify that construction was completed in compliance with project plans and specifications.

##### **10.5.4.1 Post-Construction Bathymetric Survey**

A post-construction bathymetric survey of the excavation area will be conducted and compared to the pre-construction survey. The survey will be utilized to document contractor conformance with the project specifications and as a basis for payment and project acceptance. A comparison plot of the two surveys will be prepared to quantify the volume of material removed and to verify that all excavation occurred within the depths and spatial limits of the dredge template. An allowable (over dredge) tolerance of 0.5 meters will be applied to final depths with all depths required to meet minimum design depths. The contractor will not be compensated for excavation beyond tolerance and will be required to continuously measure and report ladder depth during construction. The volume excavated will be utilized as the basis for payment.

##### **10.5.4.2 Post-Construction Upland Survey**

A post-construction survey of the upland disposal area will be conducted and compared to the pre-construction elevations. The survey will be utilized to document contractor conformance with the project specifications and as a basis for payment and project acceptance. A comparison plot of the two data sets will be prepared to quantify the volume of material placed and to verify that all placement occurred within the spatial limits of the delineated disposal area. An allowable tolerance of 0.5 meters (plus or minus) will be utilized as a basis for acceptance. The contractor will be required to re-grade sections that are demonstrably out of tolerance. It is noted that cut volume will be utilized as the basis for payment. Beach profile surveys will be utilized to evaluate beach width and volume and the need for additional corrective action. The survey will also serve as a management tool for future assessments of beach condition.

##### **10.5.4.3 Post-Construction Benthic Survey**

A post-construction benthic survey will be conducted to document post-construction condition. The survey will include the project vicinity, including the pipeline corridor (following pipe removal) and will include an assessment of any transplanted resources.

#### **10.6 Project Certification**

Following a review of all project data, the Engineer-of-Record will prepare a project certification attesting to the completion of the project in conformance with the project plans and specifications. Any deviations from the project plans will be identified, including justification, and any incidences or unanticipated project impacts will be identified and discussed. The certification will include a summary of project construction, including final volumes, dates of construction, and turbidity monitoring values.

#### **10.7 Long-Term Monitoring**

Two additional benthic monitoring surveys will be conducted at Year 1 and 2 post-construction, utilizing the same protocols as the previous surveys. These surveys will include any coral relocation sites. The surveys will document recovery and recruitment within the areas of project impact and will identify any secondary or operational issues observed relative to this project or the facility in general. Surveys will include assessments



of general coral health and the occurrence and prevalence of coral disease (specifically SCTLD). Surveys will include species observations include fish, marine mammals and sea turtles.

### **10.8 Monitoring Based Contingency**

Benthic Monitoring will include an assessment of the loss and fragmentation of habitat attributable to the project. At any time, if monitoring surveys suggest impacts beyond those anticipated within the EIA, relevant governmental entities will be notified of the nature of the impacts and consulted regarding corrective or mitigative actions. This may include the implementation of additional monitoring or specific mitigative action as determined through consultation with relevant governmental entities.

### **10.9 Beach Management**

Beach conditions will be monitored post-project and, if there is a need, the implementation of beach nourishment will be considered.

Beach Profiles and Nearshore Bathymetry: A pre-construction survey of the adjacent beach and bathymetry in the vicinity of the project area will be conducted along the monitoring stations previously established to document pre-construction conditions and provide a basis for the contractual determination of excavation volumes.

Post Project Shoreline Monitoring: Beach profile surveys will be conducted immediately post construction, at Year 1 and Year 2 post-construction to quantify beach volume relative to pre-project conditions. Beach profile surveys will be utilized to evaluate beach width and volume and the need for additional corrective action.

Beach nourishment will only be considered if there is a demonstrable need and a plan will be development in concert with appropriate government entities. Where practicable nourishment will be accomplished outside of turtle nesting season, and if conducted during nesting season, appropriate protocols for monitoring will be implemented.

### **10.10 Management of Turtle Nesting Habitat**

The approximately 1.6 miles of beach within the property represents a potentially significant habitat for nesting sea turtles. The proposed development will likely enhance habitat potential through the removal of non-native vegetation and the establishment of a recreational beach and dune. Since the area is within the development security zone, protection of nests from poaching and predation is feasible, as is monitoring of nests for occurrence and success. A long-term sea turtle nesting management and monitoring plan is proposed as a mitigative measure for marine project impacts. The turtle nesting management plan will adaptively manage the beach resource and may include marking/avoidance of nesting areas, restrictions on nighttime activities on the beach, and other reasonable management actions to encourage successful nesting. Operators utilizing the facility will be required to operate in a manner to minimize the potential for impacts to sea turtles including the distribution of materials associated with sea turtles during marine excursion activities.

### **10.11 Waterway Flushing**

Water quality sampling is proposed within the canal and beach areas and is further described within the water sampling portions of the EMP. Mechanical flushing of the interior waterway is proposed, and a performance criterion of 90 percent exchange within a 24-hour period for the semi-enclosed lagoons within the waterway has been established as the performance standard for waterway flushing. This rate of exchange will be met through mechanical means through input of ocean water in the vicinity of the interior swimming areas. The final design will be confirmed through numerical modeling of the waterway system and confirmed through current measurements within the lagoon following construction. Details of the mechanical system will be developed in concert with the selected system contractor including pumping system technical and performance specifications. Opportunities for system improvement including alternative measures for increased flushing and circulation will be conserved within the final design process. The EMP will be updated following development of these system specifications.

The waterway inlet will include a barrier to prevent unauthorized ingress and egress into the waterway. This floating barrier will be specific to the prevention of vessel access and will be deployed in such a manner not to be a barrier or entanglement risk to megafauna.

A waterway management plan will be developed in concert with the selected system contractor, including required maintenance schedules and contingency plan if the system is compromised. The contingency plan will include exclusion of the public from utilizing the waterway for swimming if the flushing system is inoperable or if water quality testing indicates an issue.

### **Pier and Overwater Structures – Hurricane Design Standard**

The main pier will be constructed to withstand forces equivalent to a Category 5 hurricane event, including consideration of wind, surge, waves and sea level rise (SLR). The structure will be designed so that the main structural elements will remain intact during major storm events and not result in functional loss of the structure or production of additional storm-related debris. The pier may be inundated during such a storm event; in which case it will be designed to withstand wave forces associated within inundation. This design standard will not apply to incidental (non-structural) elements such as light fixtures and hand railings.

The use of dredge spoil to raise the developable upland is a mitigative strategy to address SLR. Upland structures will be built above the 100 year floodplain (inclusive of SLR) and will be built to Dade County Code standards for wind loads. Stormwater design will be based on anticipated loads including the potential for increased precipitation due to climate change.

Potential environment and socioeconomic impacts attributable to the project relating to climate change and SLR have been discussed within the EIA and are beyond the scope of the EMP document to specifically address. It is noted that the EMP is a living document, and could over the long term be modified to address a demonstrable impact that is specific to the development if observed. This may include adverse socioeconomic or environmental (climate related) aspects of the project if they are deemed as significantly negative and actionable.

### **Coastal Management**

Monitoring of shoreline condition will be conducted based on the baseline monitoring beach profile stations established within the EIA. A pre- and post-construction survey of the beach will be conducted, and additional surveys will be conducted at 1 year and 2 years post-construction. These surveys will be utilized to quantify beach volume and shoreline position change within the project area and adjacent beaches. Results of these surveys will be summarized within a monitoring report that will be submitted to relevant regulatory parties. Additional surveys will be conducted following impacts from major storm events.

### Inlet Cut Management

All beach-compatible material removed from the coastal inlets or their vicinity shall be placed on the beaches adjacent to the inlets to mitigate for impacts from the inlets to the adjacent beaches.

### Beach Tilling

Removal of debris or seaweed accumulations from the beach must be conducted based on accepted general practice. Removal should minimize the loss of sand from the beach. All non-beach-compatible material removed from the beach shall be disposed of in an appropriate manner based on the type of material removed. All beach tilling or raking operations should avoid areas of active turtle nesting.

### Beach Nourishment

Based on the coastal impact analysis conducted in support of the EIA, impacts to the beach are anticipated to be minimal under typical conditions and not require additional beach nourishment other than the replacement of material from the coastal inlets on the beach. Major impacts to the beach would most likely occur due to a major hurricane event. If impacts from such an event occur within the project area, a post-storm beach monitoring survey will be conducted to quantify impacts. Based on this survey, the potential for natural recovery will be assessed and, if warranted, consultation with relevant regulatory agencies will occur regarding potential additional restoration efforts.

## **11.0 ENVIRONMENTAL PROCEDURES**

## LOT CLEARING, GRADING AND CLEANING

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

### 1.Purpose

The purpose of this procedure is to ensure the developer and contractor abide by GBPA Planning and Development Regulations identified below.

### 2.Requirements

- No lot of land should be cleared unless a building permit has been approved and issued by the Building and Development Department of the Grand Bahama Port Authority. In the event that a lot of land is cleared without first having a building permit from GBPA the lot owner shall pay double the cost of the total amount of the building permit fees.
- Special permission must be requested in writing from The Director of The Building & Development Services Department to clear any lot or plot or partial lot of land in the absence of a building permit being issued.
- Contractors should stake lots and work within these boundaries to avoid offsite impacts.
- If there is an opportunity to preserve native vegetation such as the Caribbean Pine (*Caribaea vs bahamensis*) and the Sabal Palmetto (*Coccothrinax argenta*) this is encouraged. Areas to remain undisturbed should be flagged or fenced before clearing commences. A goal of preserving up to 25% of Caribbean Pines and Sabal Palmetto. However, given the seawater flooding from Hurricane Dorian the survival ability of the trees is unknown at this time.
- Cleared vegetation should be situated into an organized pile at the front or side of the lot for disposal, with at least 50' buffer of cleared area around it (buffer may be negotiated based on the lot size).
- Buffer zones should be created between construction area and perimeter of canal boundary. To clearly define the buffer zones, these areas could be planted with native vegetation e.g., wild hibiscus (*Phymosia abutiloides*) or sea grape (*Coccoloba uvifera*), mulch material or compacted with gravel.
- Disposal of brush into adjacent unoccupied areas is prohibited.
- Areas devoid of vegetation and exposed fine soils should be established with plantings or other landscape features as within 14 days or earlier and depending on the availability of fresh water.
- Erosion prone areas should immediately be planted with grasses, shrubs or ground cover to minimize erosion within 14 days or sooner.
- Properties should be graded in such a manner to avoid direct runoff into the surface waters, utilizing natural vegetative mechanisms for buffering and filtering purposes.
- Sweeping of small debris should not be directed into the street or any possible storm drains. Dust or other collected sweepings should be collected and disposed into an appropriate waste container.

- Construction materials should be stored in a dry safe place.
- Debris including all waste resulting from construction should not be stored in an open area or unsealed container – and must always be secured against storm and hurricane winds.
- A temporary construction dumpster should be located onsite for necessary disposal items.
- Rinsing of trucks, wheelbarrows or other equipment should be performed only within enclosed graded berms fitted with a small sediment catch – to prevent entry of soils on to neighboring properties. Materials should be periodically cleaned from the sediment catch.
- Paint, solvent and cleaning waster should not be dumped or poured down drains.

Disposal of any construction debris into the adjacent canal, neighboring lots or dump anywhere offsite is strictly prohibited – and liable to prosecution.

- A Concrete washout area will be identified for the contractor to use before construction starts. This area will be away from wetlands or any other protected or sensitive area. An EMP procedure will be added once the contractor has been selected. The use of the washout area will be discussed in the environmental awareness session for contractors before construction begins. The EMP will be submitted to the GBPA for approval.

## DELINEATION OF CONSERVATION AREAS

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

### 1. Purpose

The purpose of this procedure is to protect areas designated for conservation to ensure that there are no inadvertent impacts during site clearing activities.

### 2. Description

There are two primary areas designated for conservation. The first is approximately 103 acres of mangrove wetland located from the near center of the property extending westward. The second is an approximately 55-acre nature trail located on the northeast corner of the property. If any other areas are identified such as, additional wetlands, critical habitat, protected species, and protected flora they will also be surveyed and flagged and set aside for conservation or will be mitigated if necessary.

### 3. Procedure

Before site clearing activities, the two areas will be surveyed and flagged or staked. The wetland area, where possible should have either a wetland delineation flagging stake or vinyl tape identifying the boundary of this area closest to the site clearing activity. Additionally, the nature trail area will be delineated and flagged or staked.

### 4. Requirement

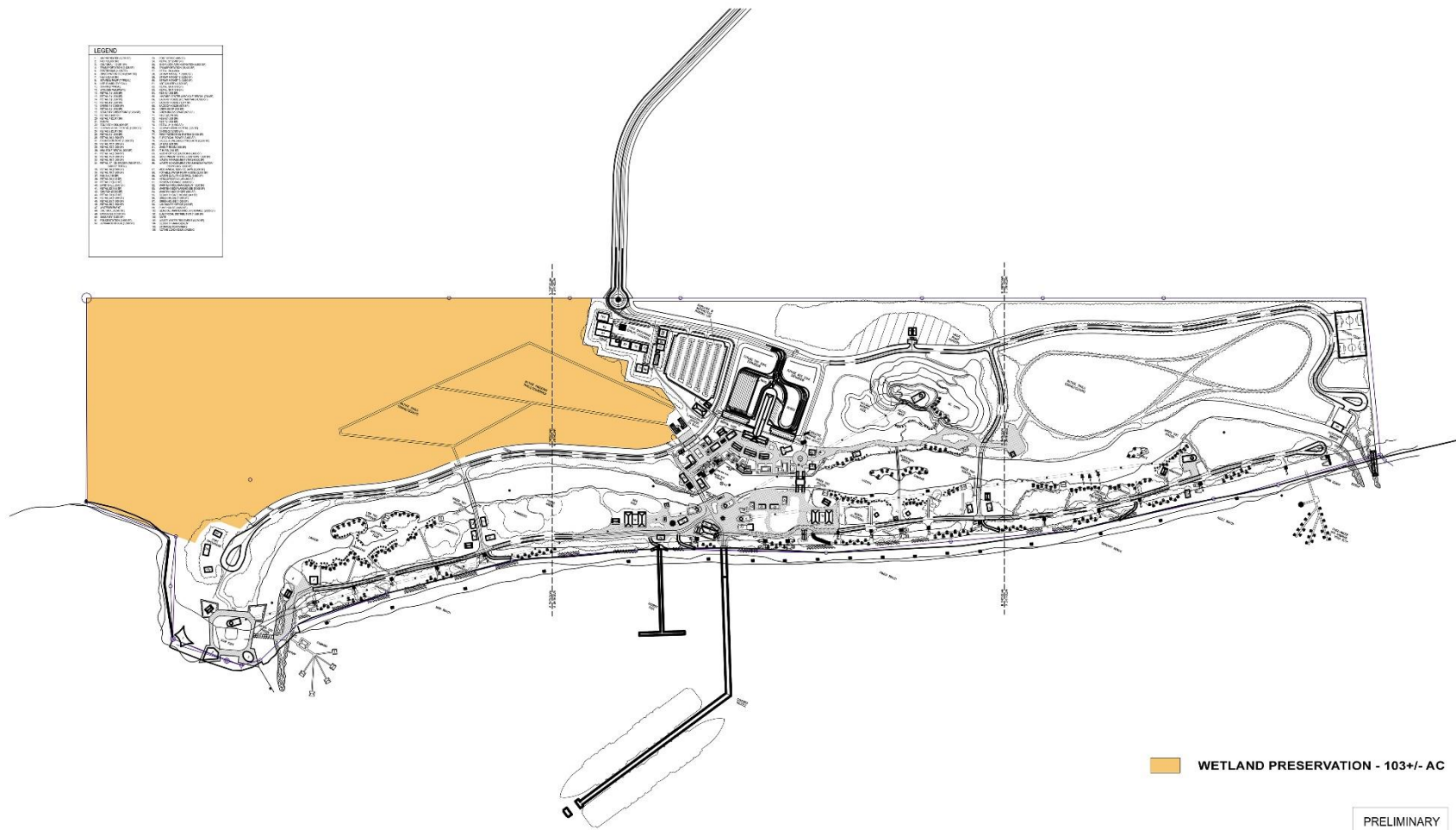
Contractors and staff responsible for site clearing activities will be made aware of the two conservation areas or any other sensitive area (s) or any other protected species so that they are not impacted during the construction phase. The sensitive or protected area (s) will be flagged and identified for the contractor so that the information can be conveyed to the work crews in that area. Flagging will be done using the appropriate tape: do not cut, native tree (protected) and/or wetland delineation flag or tape. They will be informed that under no circumstance other than those approved by Grand Port management that these areas are not to be cleared. Also, there should be no stockpiling of construction debris or trash in or near these areas or refueling of heavy equipment nearby. Construction debris should be taken to the designated area for collection by Sanitation Services. See following pages for drawing of the wetland conservation area and nature trail.

Additionally, the contractor will be informed that under no circumstance should the hydrology of the wetland be altered in areas to be protected.



**LEGEND**

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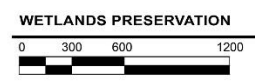


WETLAND PRESERVATION - 103+/- AC

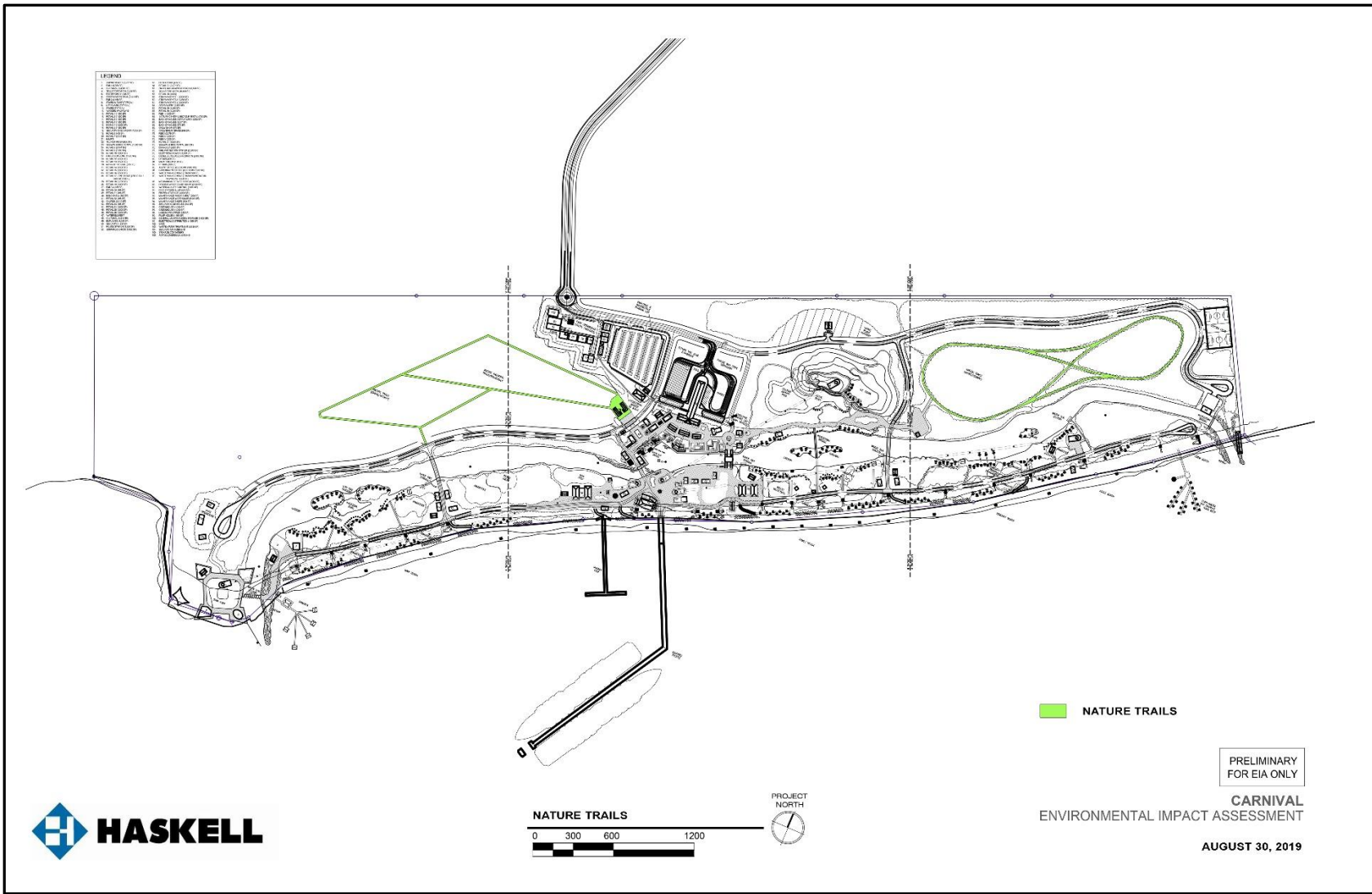
PRELIMINARY FOR EIA ONLY

CARNIVAL ENVIRONMENTAL IMPACT ASSESSMENT

AUGUST 30, 2019



Wetland Conservation Area

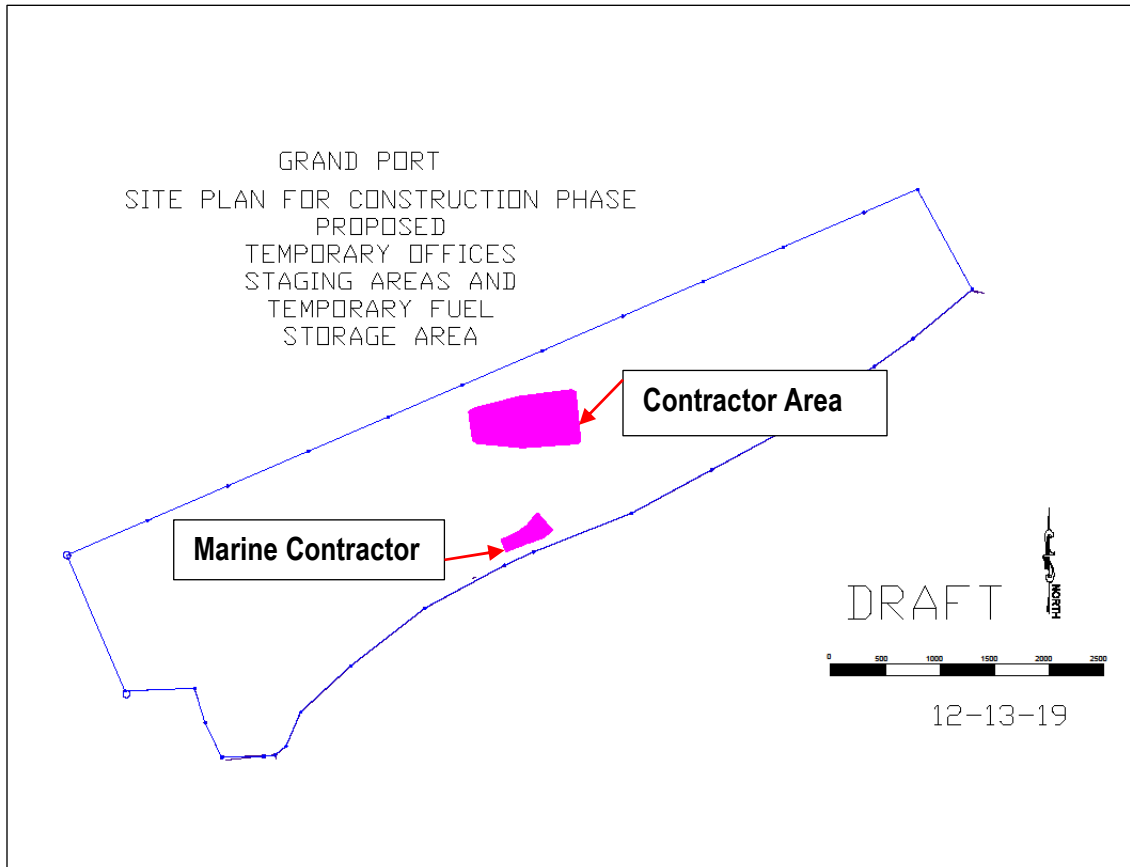


Nature Trail Area (Upper Right)

### DESIGNATED CONTRACTOR AREAS

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

Presented below are the designated contractor staging areas. These areas have been identified for the construction phase and are where contractors can set-up temporary offices, store equipment and materials, maintenance areas and fuel storage.



## MOBILE FUELING PROCEDURE

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

### 1. Objective

To use best management practices for the fueling of heavy equipment in the project area to prevent and minimize fuel and petroleum hydrocarbon spills.

### 2. Project Activities

This procedure is for the use of the mobile fuel truck including parking, inspection and the dispensing of fuel to heavy equipment during construction and operation.

### 3. Responsibilities

It is the responsibility of the Port manager, fuel truck operator, and all employees to prevent and reduce the release of petroleum hydrocarbons into the environment.

### 4. Fuel Truck Parking and Inspection

- When not in use, the mobile fuel truck shall be parked in a shallow earthen depression. The earthen depression shall be kept free and clear of debris. The area shall be inspected regularly for drip marks, soil staining, or other signs of leakage from the fuel truck. The Grand Port and the various contractors will have on-site Collapse-A-Tainers Spill Containment Berms on-site to contain any leaks until they can be repaired.



Collapse-A-Container

- An equipment inspection safety check list shall be completed daily for the fuel truck. At a minimum, the check list will include inspection of all routine operating features, such as:
  - Blinkers
  - Headlights
  - Wipers
  - Break lights
  - Seat belts
  - Brakes
  - Parking brakes
  - Wheel stops stored on vehicle
  - Fire extinguisher (s) present and full
  - Spill Kit present

In addition, the check list shall include for the inspection of:

- On board fuel tanks, such as rust, pitting, and paint condition.
- Hoses and fittings will also be inspected for potential foul wearing and being in a sound operable condition. Any leaking equipment and/or hoses will be replaced immediately.
- Presence of spill containment kit, including adequate quantity of absorption pads and containment devices.

## **5. Operation of Fuel Truck**

- Fueling of equipment is prohibited near wetlands or any other sensitive and/or protected area. This will be discussed in the environmental awareness session with contractors.
- The fuel truck shall be operated at slow speeds and cautiously driven to and from fueling activities.
- Upon approaching other operators of machinery in need of fuel, they will be contacted ahead of time by radio to make sure the machine is parked, the brakes are set, the wheel stops are in place, and the machine is not running.
- The fuel truck will park along side of the machine's fuel tank. The fuel truck will be parked with wheel stops. The dispensing hose will be deployed from the fuel truck to the machine to allow enough length to support itself on the ground, and not stretched in a suspended fashion. The fuel dispenser will be of the automatic shut-off to prevent overfilling and prevent spills which could result in groundwater contamination.
- A secondary containment pan will be positioned underneath the dispensing equipment and tank of the machine being filled. Example:



- Additionally drip pans or absorbant pads may be placed below the fueling area to collect drips that may occur during fueling operations.
- While fueling, the operator should check the volume of the tank to make sure it is not overfilled.
- Upon completion of fueling, the dispensing equipment will be wound back up into the fuel truck with the nozzle tip facing up. Any potential ancillary petroleum drips will be wiped up with absorbent materials.
- The secondary containment pan will be inspected for petroleum drips, wiped down if needed, and returned to the fuel truck for proper storage.
- Eliminate potential sources of ignition such as open flames or sparks or use of cell phones.

## 6. Spill Response

The following is a description of the immediate actions to be taken by facility personnel or the operator of the fuel truck in the event of a spill discharge.

- Shutdown pumping in event of a spill during fuel transfer operation.
- A spill kit should be on board of the fuel truck. A second spill kit should be available at the maintenance shop.
- If determined unsafe or if inadequate response training is not in place for response, contact relative response authorities.



## 7. Notification

The following personnel shall be notified when a spill occurs.

- The onsite contractor lead person, foreman, assistant manager and manager.
- The Freeport Harbour Company, safety and security manager and designated emergency response personnel.
- In addition, if the spill is 25 gallons or greater, GBPA Environmental Department.



## STATIONARY FUELING PROCEDURE

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

### 1. Objective

To use best management practices for the fueling of automobiles, containers, ATV's or other land-based equipment and machines during the construction and operation of facility to prevent and minimize fuel and petroleum hydrocarbon spills.

### 2. Project Activities

This procedure is for the dispensing of fuel to automobiles, containers, ATV's or other land-based equipment and machines.

### 3. Responsibilities

It is the responsibility of the Port manager, employees and contractors to prevent and reduce the release of petroleum hydrocarbons into the environment.

### 4. Operation.

- The fuelling area will have a concrete floor to minimize impacts from spills. The fuel dispenser shall be of the automatic fuel shut – off type which automatically shuts off once the fuel tank is filled. As gasoline is a flammable liquid this type of device will prevent spills and the risk of fire.
- A fire extinguisher shall be kept near the fuel dispensing area and shall be checked weekly to make sure it is filled.
- All vehicles must be turned off while fuelling.
- Cell phones are not allowed be used while dispensing fuel.
- Only appropriate fuel containers for storing and carrying fuel can be used. No glass bottles, water bottles, milk jugs, or any other inappropriate container may be filled.
- Small spills should be cleaned immediately with absorbent pads, which should be bagged appropriately and set aside for disposal at the Pine Ridge Landfill.
- Keeping the secondary containment dyke will eliminate the need to treat rainwater contaminated with fuel.

## INTEGRATED PEST MANAGEMENT (IPM)

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

### 1. Purpose

To ensure the application of an IPM approach to the prevention and control of pests at the Port and to minimize the public health and safety impact.

### 2. Scope

This procedure describes the design and implementation of a comprehensive IPM plan which includes all aspects of prevention and control throughout port operations.

### 3. Responsibilities

#### 3.1. Port General Manager

- Ensure an IPM program that controls pests, protects guests, staff and crew, and safeguards food and beverage supplies in accordance with the requirements of this procedure.
- Ensure a qualified and experienced outside pest contractor is hired to provide a complete service of identifying all areas needed to be considered for pest control. All documentation such as certifications and permits by government entities, list of products used and product MSDS information, materials suggested to deal with pests, standard operating procedures for applications and a detailed calendar of application and follow up should be provided by the third-party to Port General manager for verification.

#### 3.2. HES Manager

- Ensure compliance with the IPM procedures and plan described below. This includes supervising outside contractor on visits and schedule routine inspections when visits are being done.
- Ensure a procedure is in place for any pest control being done at the port, detailing information of pesticide that will be used (MSDS data sheet, PPE material, fumigation equipment and any other consideration), elaborate control sheets and calendars for activities to take place and records of results.
- Ensure a periodic review of the IPM plan and updates or changes are made as appropriate.
- Report any important pest outbreak to Port General manager with details of how the problem is being managed and controlled.

#### 3.3. Third Party Contractor

A third-party pest contractor should be engaged to provide expert advice, training and a suitable range of pest control services for the prevention and control of pests including rodents, flying insects, termites and mosquitoes for specified areas under the Port General manager's supervision. The pest contractor must be in compliance with the applicable local government regulations and have the licenses for pesticides application up to date.

## 4. Process

### 4.1. IPM Plan

- An evaluation of the port should be conducted with the advice of an expert pest contractor to identify all areas and services that need to be included in the IPM plan. These areas should include all storage rooms, food services areas, electrical rooms, gardens, attics and basements in buildings, garbage rooms and areas, open market areas where tenants may store merchandise, administration offices and other places that could harbor pests.

The IPM plan must include the following:

- The specific responsibilities of outside contractor and additional designated port staff with IPM duties (if this applies).
- Details on the common pests which may affect the facility including applicable insects, rodents and birds found in the port. For example, termites, cockroaches, flies, mosquitoes, bedbugs, fleas, bees, mites, ants, beetles, stored product pests (such as weevils and moths), fruit flies, rodents and any other commonly found pests.
- Records and logs of findings and actions. All records or logs will be kept in the Pest Control Activity Report.
- A schedule for periodic monitoring inspections including some at night or during periods when the areas are not in use should be done by outside contractor accompanied by the HES manager.
- All potential key 'risk areas' must be included (for example food preparation, storage and service areas, garbage storage areas, cabanas, technical spaces, open and leisure water areas and vegetation, etc.). All findings should be included in IPM logs. When pests are observed during an inspection, the log must include the action taken as well as follow-up inspection results.
- Provisions for 'active monitoring' including pest sighting logs which should include a record of the time of the active monitoring inspections completed by contractor.
- Provisions for 'passive surveillance' such as glue traps and other monitoring tools, as well as the location of each one. This may be a diagram showing the trap locations marked or a list of the locations and trap types provided by contractor and verified by HES manager.
- A passive device monitoring log to document when pests are found. The log must include action taken as well as follow-up inspection results. This is to be completed by outside contractor and supervised by the HES manager.
- Pest control will be carried out with biological alternatives/biological controls that are less persistent, less broad-spectrum, minimizing adverse environmental impact.
- Label instructions on pesticides will be followed.
- Store pesticides in a cool, dry, well-ventilated area, protected from heat sources and direct sunlight. Pesticides should be stored away from fertilizer, food, feed, potable water supplies, veterinary supplies, seeds and personal protective equipment to avoid contamination.
- Dispose of pesticides as instructed on the product label. Look for the "Storage and Disposal" statement on the pesticide label. If any product remains in the container, it must be disposed of as hazardous waste. After emptying a pesticide container, rinse it properly for disposal or recycling. Never reuse a pesticide container for any purpose.
- Equipment should be washed occasionally with warm, soapy water. After rinsing, equipment should be reassembled, partly filled with water and tested to make sure there are no blocked nozzles or hoses and no pesticide left in them. The equipment should be stored so that any water still in it will drain out.

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- A record of pesticides used to control pests and how effective treatment has been. All 'in house' pesticide treatments and fumigations performed by port employees must be recorded in the IPM logs. Copies of any activities completed by outside pest contractors must also be kept with the IPM plan.
  - A record of all pesticides currently used and those applied in the previous 12 months. This record should include copies of the MSDS sheets for the pesticides.
  - Provisions for training of staff in charge of and involved in IPM and log completion, as well as the documentation of their training. Employees who apply pesticide must be trained on the correct PPE equipment to be used, the type of product to be used for specific areas and pests, the locations which can be treated or fumigated, all safety measures that need to be considered in case of spillages or accidents and any other relevant safety, security and handling issues.
  - Established health and safety procedures to protect all port guests and staff. These should include:
    - Supervision of pesticide application.
    - Suspension of pesticide application on rainy days and in adverse weather conditions since the chemicals may run off to water sources and/or to the sea.
    - Checks and maintenance of PPE in good condition and to ensure it fits correctly etc.
    - To prevent accidental handling or ingestion of any pesticides by guests by closing and protection any treated areas as necessary.
    - Secure pesticide storage.
    - Safe cleaning and storage of any pesticide application equipment.
    - It is important that in house fumigations be supervised to confirm all proper PPE equipment is utilized.
  - Documentation of a review of the IPM plan and any updates and changes made. The HES manager, in consultation with the Port manager and outside pest contractor, must review the IPM plan at least once a year and additionally if any new facilities are added which could affect the plan. The plan should be evaluated more frequently if there are any areas where pest control has not been effective.
  - The IPM plan, monitoring records, and all reports and additional information of outside contractor should be available for review during any public health inspections by health authorities and Company auditors.
  - Approved pesticides should be evaluated by the HES manager to confirm they are safe to use and will not adversely affect the environment (for example water supplies, recreational water facilities, food supplies, etc.). Based on this assessment prior approval must be given for all pesticides used in the port (including those by third-party contractors and food and beverage outlets) by the HES manager.
  - Any significant pest infestations found within the port (in particular rodents or cockroaches), must be reported to the Port manager. Infested areas must be treated and, where feasible, use suspended until the infestation has been safely removed.
  - Include information on the pest management plans of each food and beverage facility, such as application schedule, type of chemicals used, MSDS, number of baits or traps against rodents and their verification, proof that the supplier is authorized and their current certification documents by the Government Health Department.
  - Measures for safe disposal of pesticides residuals in accordance to local regulations.

## 4.2 Pest Control Services

### 4.2.1 Mosquito and Biting Insect Prevention Measures

- Measures to prevent and control mosquitoes and biting insects are a key part of the IPM strategy. A number of diseases are transmitted to humans primarily through the bites of infected mosquitoes, ticks, sand flies, or midges. These include Chikungunya, Dengue fever, Lyme disease, Malaria, Sand-fly fever, Yellow fever, West Nile fever and Zika virus.
- Routine surveillance for the presence of mosquitoes should be conducted by the HES manager or outside pest contractor. Where mosquito problems are identified, then suitable action should be taken in consultation with the pest contractor and where feasible the local health authorities. This may include the application of suitable pesticides as well as taking the steps detailed below. Guidance on the safe and effective use of pesticides is available at the following link: [http://www.cdc.gov/zika/vector/integrated\\_mosquito\\_management.html](http://www.cdc.gov/zika/vector/integrated_mosquito_management.html)
- The following routine checks should be conducted by the HES manager and any other responsible staff to help minimize mosquitoes by ensuring the following:
  - Standing water does not remain in outdoor containers (for example flowerpots, bottles, etc.) which could become mosquito-breeding sites.
  - All water tanks/sources of water are covered or protected so that mosquitoes cannot get in.
  - There are no accumulations of open waste, or unsealed garbage stored on site.
  - Any blocked drains are immediately repaired to avoid standing water. The walls of the stormwater collection chambers for the drainage infiltration wells should be chlorinated after storms confining the chlorination within the chamber to avoid infiltration of chlorinated waters.
  - Offices, which do not have air conditioning, are fitted with insect screens or have self-closing doors.
  - A periodic assessment is conducted by the HES manager and/or pest contractors to identify any potential mosquito breeding areas. Advice should be provided where appropriate to try and minimize the conditions highlighted above, or reported to local health authorities to recommend action. For example, nearby locations with stored car tires which may collect water.
- Recommend to certain stores that suitable insect repellents are made available (<https://www.cdc.gov/zika/prevention/prevent-mosquito-bites.html>) for visitors to purchase at the port. Insect repellents must also be made available for port staff, especially those working outside or in locations without air conditioning.
- Guidance and information must be provided to all port staff regarding general insect bite avoidance and details of risks from Chikungunya, Dengue, Zika and any other common mosquito transmitted illnesses. Information may be provided using advisory posters (in appropriate languages) and by way of written advice to all staff. It is also recommended that third-party vendors and contractors also receive similar advice. Examples of guidance which may be provided are included at the following links:  
<http://www.cdc.gov/zika/fs-posters/index.html>  
<http://www.cdc.gov/zika/about/overview.html>  
<http://www.cdc.gov/Features/stopmosquitoes/index.html>  
[http://www.paho.org/hq/index.php?option=com\\_content&view=article&id=11554&Itemid=41715&language=en](http://www.paho.org/hq/index.php?option=com_content&view=article&id=11554&Itemid=41715&language=en)

### Records

The following records must be maintained in accordance with Grand Port record retention policies:

- IPM plan (includes annual review and details of changes made)
- IPM records and logs

### References

- Vessel Sanitation Program 2018 Operations Manual (VSP) – US Vessel Sanitation Program, Centers for Disease Control and Prevention
- European Manual for Hygiene Standards and Communicable Diseases Surveillance on Passenger Vessels (EU SHIPSAN) – European Union

## ENVIRONMENTAL MANAGEMENT OF WASTE VENDORS

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

### 1. Purpose

To ensure that all waste that is disposed of outside of the Grand Port boundary is disposed of in GBPA or government permitted land-based facilities by vendors duly licenced by the GBPA and/or government and approved by the Port manager.

### 2. Scope

This procedure describes the process that must be followed in selecting and vetting waste vendors.

### 3. Responsibilities

#### 3.1. Port General Manager

- Instruct the HES manager to implement these procedures taking into consideration the specific characteristics of the port's operations
- Approve vendors

#### 3.2. HES Manager

- Undertake as instructed by the Port General manager:
- Request to the corresponding GBPA and/or government authorities:
  - The list of waste vendors duly licensed to operate in the port's location.
  - Provisions and land-based facilities permitted for the safe disposal of wastes
  - Evaluation of licensed vendors and make recommendations.
  - Inspections to waste vendors and disposal facilities.
  - Assessment audits, when required.
  - Provide feedback to the Port General manager on waste vendors.

### 4. Process

#### 4.1. Duty of Care

The Port must meet its environmental responsibilities by establishing contractual agreements with the selected vendors. These agreements should as a minimum stipulate the following requirements:

- Compliance by the vendor with all GBPA and/or government regulations for health, safety and environmental performance for wastes disposal in land-based facilities outside the port's boundaries.
- Reports by the vendor enabling the Port to be aware that the wastes are disposed of in GBPA and/or government permitted facilities, so far as it is reasonably practicable.

In the case that waste vendors are directly contracted by tenants such as food and beverage outlets, the Port must require the tenants include the above requirements in their contracts.



In the case that waste vendors are:

- GBPA and/or government licensed entities.
- Vendors contracted by the GBPA and/or government.
- Vendors operating under a GBPA and/or government concession.

Grand Port must establish agreements with these vendors enabling the Port to be aware that the wastes are disposed of in permitted facilities, so far as it is reasonably practicable.

#### **4.2 Criteria for Selecting Waste Vendors**

Prerequisites for selecting vendors:

- Duly licensed by the GBPA and/or government authority.
- Ability to dispose wastes in permitted land-based facilities.

Other criteria:

- Appropriateness of equipment.
- Waste stream management.
- Financial liability.

#### **4.3 Monitoring of Waste Vendors**

The performance of the waste vendors must be evaluated based on assessed need. The HES manager must provide feedback on the service rendered when requested by the Port General manager if there are concerns.

The HES manager must timely verify that all permits for waste vendors are up to date.

If necessary, the HES manager must conduct or assist due diligence audits/visits to vendors as directed by the Port General manager.

### **5. Records**

Records of waste vendor assessments must be maintained.

### **6. Definitions**

**Waste Vendor:** Any company providing services for the disposal of waste outside Grand Port boundaries.

## GRAND PORT PUBLIC HEALTH PROCEDURES

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

### 1. Introduction

Grand Port water and recreational water systems will be designed and built in accordance with specific public health design guidelines for the infrastructure which were developed to guarantee the implementation from the design stage of the public health procedures based upon the experience at the Ports of Puerto Maya (Cozumel, Mexico), Grand Turk Cruise Center (Grand Turk, Turks & Caicos Islands), Mahogany Bay Cruise Center (Roatan, Honduras) and Amber Cove Cruise Center (Puerto Plata, Dominican Republic). Additionally, the experience gained in the successful implementation of the public health procedures in the above four ports has been incorporated in these procedures adapted to the specific characteristics of Grand Port. These procedures include measures intended to guarantee water and food safety.

### 2. Purpose of the procedures

The purpose of these procedures is to ensure that optimum management of drinking and recreational water is achieved, while maintaining the parameters established to guarantee the health and safety of the port's employees and tourists.

The conceptual basis for developing these public health procedures is mainly contained in the Vessel Sanitation Program<sup>2</sup> and the WHO guidelines for drinking-water quality and for swimming pools and similar environments<sup>3</sup>. These concepts were applied considering the differences between the cruise terminal (land-based facility, open to the elements and contractual relations with food and beverage tenants) and a cruise ship (more contained or controlled environment and full authority of the captain of the ship over all food and beverage facilities).

### 3. Potable Water Monitoring and Sampling Procedures<sup>4</sup>

The goal is to implement the standards set out in the WHO guidelines<sup>5</sup>. In order to help in achieving this objective, the water should be routinely tested following these protocols:

- Daily pH and free chlorine concentration.
- Weekly microbiological sampling (this includes ice samples).
- Monthly external lab analysis.

<sup>2</sup> U.S. Department of Health and Human Services. U.S. Public Health Service. Centers for Disease Control and Prevention. Vessel Sanitation Program, 2018.

<sup>3</sup> Guidelines for drinking-water quality: fourth edition incorporating the first addendum. WHO, 2017 and [http://whqlibdoc.who.int/publications/2006/9241546808\\_eng.pdf](http://whqlibdoc.who.int/publications/2006/9241546808_eng.pdf) . Volume 2. Swimming Pools and Similar Environments.

<sup>4</sup> Marine water quality is monitored by a specific monitoring plan carried out by EMPACA

<sup>5</sup> Guidelines for drinking-water quality: fourth edition incorporating the first addendum. WHO, 2017

The sampling plan for the supply and distribution system will be defined once the specific designs of the water supply and distribution systems are completed to be able to specify the location of the sampling points accordingly. U.S.EPA Drinking Water Monitoring and Sampling Plan guidelines will be the basis for developing the sampling plan and the system for record keeping of the test results.

Immediately after the start of operations and once a year, an external certified laboratory will sample and test the source of potable water for a full potability test for relevant parameters according to WHO Guidelines for drinking-water quality.

Appendix 1 (this Procedure) outlines the sampling protocol for daily and weekly sampling and external lab analysis as well as the sampling locations.

#### **4. Potable Water Standards**

##### *Chemical Parameters and Sampling*

Responsible: HES manager is responsible for achieving the recommended water standards.

The WHO guidelines<sup>6</sup> state that for effective disinfection<sup>7</sup>, there should be a residual concentration of free chlorine of  $\geq 0.5$  mg/L (ppm) after at least 30 min contact time at a pH <8.0. Grand Port supplies the Port facilities with potable water mainly from a Reverse Osmosis Plant and/or GBUC that supplies to storage tank. Potable water will be treated by a Culligan analysis/dosing/recording system comprised of Shipboard-style equipment.<sup>8</sup>

Please refer to Water Management Section in the EMP.

Appendix 2 (this Procedure) contains a summary of the main daily operations of Culligan automatic treatment systems.

- For the potable water system, the goal is to maintain a residual concentration of free chlorine of higher than 0.5 mg/L at the furthest outlet of the water supply system (the 'far point').

##### *Microbiological Quality Parameters and Sampling*

Responsible: HES manager is responsible for achieving the recommended water sampling standards.

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<sup>6</sup>Guidelines for drinking-water quality: fourth edition incorporating the first addendum. Geneva: World Health Organization; 2017.

<sup>7</sup> Idem Table A8.16.

<sup>8</sup> Culligan will sign a service agreement and for two yearly visits at GP, for a total of 4 days per visit. Schedules are to be worked out according to port's needs.

The WHO guideline<sup>9</sup> values for verification of microbial quality state that for all water directly intended for drinking, treated water entering and within the distribution system, *E. coli* must not be detectable in any 100-ml sample<sup>10</sup>.

- For microbiological sampling, a U.S.EPA approved test kit for drinking water, which provides presence/absence results (for example Colilert 18®/IDEXX), is to be used to check potable water safety<sup>9</sup>. A thermometer should be placed in a water bath solution inside the incubator and the temperature monitored/recorded to ensure the proper range is maintained.
- Testing for presence or absence of coliforms/*E. coli* is to be carried out weekly in the points established in Appendix 1 (this Procedure).
- In addition, microbiological water samples should be taken at any location when the potable water free residual chlorine levels are found to be below 0.5 mg/L.
- Samples will be scheduled to be sent monthly to an approved, certified, independent, laboratory for total coliform and *E. Coli* testing<sup>11</sup>, guaranteeing that the samples reach within a window of 24 hours from the time they were taken. The person responsible to carry these samples to the lab, will have to accompany the samples with a 'Chain of Custody'.
- Parallel samples will have to be taken of all the points sent to a certified laboratory to be analyzed in the Port's laboratory. The results of this analysis are to be compared with the results obtained from the certified laboratory. If results do not coincide, a follow up must be done by the Port to confirm any failures in 24 hours when practical.
- If any positive results are obtained from any of the samples, a second set of samples will have to be sent of that point in particular, making sure that all needed measures are taken to solve any possible causes of the positive results. If an ongoing positive result persists, measures will have to be taken to inquire and resolve what may be causing the issue. These measures are described below in the section General Public Health Procedures for Potable Water Systems, points 5 to 7.
- A summary of the analysis will have to be completed by the HES manager and be sent monthly to the Port General Manager.
- Additionally, any of the food and beverage outlets that implement further treatment systems, are to provide the results of their monthly microbiological tests to the Port General Manager.

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<sup>9</sup> Guidelines for drinking-water quality: fourth edition incorporating the first addendum. Geneva: World Health Organization. 2017.

<sup>10</sup> [Idem](#). Table 7.10

<sup>11</sup> Certified laboratory (to be determined before operations start)

Appendix 3 (this procedure) provides further guidance on the indicator organisms used for microbiological sampling.

#### *Reporting of Sampling Issues and Failures*

The HES manager will report water test and sample fail results daily to the Port General Manager. The Port General Manager will then report to the Director of Operations only if a problem is detected, including any microbiological sample failures.

### **5. General Public Health Procedures for Potable Water Systems**

Responsible: The HES manager is responsible for achieving the recommended water standards and reporting any issues and non-compliances. The Port General manager has the overall responsibility for safe water management and compliance.

1. Potable water supplied to the main water cisterns must be halogenated to a minimum of 2.0 mg/L (PPM) and a maximum of 5.0 mg/L (PPM) free residual chlorine and water maintained for a minimum of 2 hours before distribution.

2. The pH level is to be maintained between 6.5 and 7.8. If the pH measured is out of range, then the cause should be identified and the appropriate corrective measures should be implemented to restore the balance.

3. Potable water throughout the distribution system must be maintained with a free chlorine residual at the furthest outlet higher than 0.5 mg/L (PPM). If the free chlorine residual is found to be outside this limit, then the cause should be identified and the appropriate corrective action shall be taken immediately and recorded.

4. In the case of a chemical test failure in any of the potable water cisterns, then, before placing a cistern back into service, a test sample of water must be taken and the free chlorine residual and pH checked. If the test shows free chlorine residual levels below 2.0 mg/L (PPM) or the pH above 7.8, the water must be re-dosed to 2.0 mg/L (PPM) and held for at least an additional 2 hours before being used. To guarantee the implementation of this procedure, chemical test should be carried out with sufficient time the day before a ship call in the morning.

5. For microbiological sample test results, if any are subsequently identified as positive for *E. coli*, the use of this unit is to be suspended and action taken as follows:

- The affected water system is to be checked for any potential contamination risks including back siphonage/backflow or leaks within the system.
- The system and all affected outlets and equipment are to be cleaned and sanitised using at least 50 MG/L (ppm) chlorine solution throughout the affected area and maintained at this concentration for at least 4 hours or using a 200 MG/L (ppm) throughout the affected area for at least 1 hour.
- The disinfected parts of the system must be flushed with potable water until the tested free residual chlorine level  $\leq 5.00$  MG/L (ppm).
- The location must be re- tested and a negative sample achieved before the system/outlet is then re-used.
- All actions taken and results must be recorded.

6. If a single positive total coliform test is identified, then the outlet potable water supply is to be checked (for any back siphonage, leaks or potential contamination risks), and then flushed for 3-4 minutes before it can be re-used. However, if the failure is within a water supply used for drinking, preparation of food/beverages, ice or food handler hand washing, then its use should be suspended, flushed for 3-4 minutes multiple times until a negative result has been achieved in by re-sampling. All actions and test results should be recorded.

7. If multiple, consecutive, positive total coliform test results are identified from one location, then the use of the outlet should be suspended and the possible source of the contamination investigated. The affected parts of the system should be cleaned and sanitised using at least 50 MG/L (ppm) chlorine solution throughout the affected area. The location must be re-tested and a negative sample achieved before the system/outlet is then re-used. All actions and test results should be recorded.

8. The general potable water distribution system should be hyper chlorinated and flushed at least once a year. This action is to be recorded in a logbook. Rainwater storage and distribution line must be hyper chlorinated and flushed biannually. As in other Carnival facilities hyper chlorinated wash water will be stored in a tank and dechlorinated using Sodium metabisulfite. The residual concentration of chlorine will be tested before disposal to verify safety.

9. Hydrostatic tests in potable water and fire distribution lines will be carried out once a year to guarantee the hermeticity of the system. As in other Carnival facilities hyper chlorinated test water will be stored in a tank and dechlorinated using Sodium metabisulfite. The residual concentration of chlorine will be tested before disposal to verify safety.

10. To set up a weekly schedule (as a minimum) to flush the entire potable water distribution system (especially when there have been no ship calls) to produce circulation and remove any stagnant water. Ideally, if there are no ship calls for a few days, the water outlets should be flushed before use.

11. Appendix 7 (this procedure) establishes the disinfection procedures for the misting systems.

## **6. Recreational Water Facilities (RWF)**

Responsible: The HES manager is responsible for achieving the recommended water standards and reporting any issues and non-compliances. The Port General manager then has the overall responsibility for safe water management and compliance in the recreational facilities.

1. According to WHO guidelines for swimming pools and similar environments for the swimming pool and Plunge Pool, free chlorine levels well above 1.2 mg/l should not be necessary.<sup>12</sup> However in the conditions of GP, due to the large surface area of the RWF, evaporation rates, heat, and UV penetration, the facility should consider maintaining this level closer to 2.5 ppm to ensure minimal drop off when a large volume of passengers are expected.

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<sup>12</sup> [http://whqlibdoc.who.int/publications/2006/9241546808\\_eng.pdf](http://whqlibdoc.who.int/publications/2006/9241546808_eng.pdf). Volume 2. Swimming Pools and Similar Environments. Page 94.

The pH level is to be maintained between 7.2 and 7.8 in all water facilities<sup>13</sup>. If the supplied water has a pH above 7.8, then acid is to be used to reduce the pH to acceptable levels. Records are to be kept of any chemicals added and other maintenance tasks undertaken and checked and signed by the HES manager.

Culligan chemical analysis panels will be installed for all RWF. Daily operations should be carried out as summarized in Appendix 2 (this procedure).

2. If free chlorine levels are recorded below 2 mg/L, immediate action is then to be taken to check the possible reasons for the failure and to restore safe free residual chlorine levels where possible.

3. The RWF should be operated daily to ensure that free residual chlorine levels are maintained and that trends are being checked and recorded. Additionally, pH, alkalinity, TDS, cyanuric acid and calcium hardness should be measured and all recordings should be kept on file.

4. For microbiological test results, if any are subsequently identified as positive for *E. coli*, the Port General Manager should be informed and the corresponding RWF should be taken out of use. In these cases, the water should at a minimum, be hyper-chlorinated (shock dosed) to at least 10 mg/L (PPM) for an hour and then backwashed and levels reduced to normal operating standards.

5. The use of the RWF is to be suspended until the issue is fully resolved and levels meet the required safety standards again.

6. Once the water is re-tested and meets the required safety standards, the Port General manager should be informed so he can perform a site inspection and then approve the unit for reopening. Water should be tested as well if there are ongoing difficulties with the treatment system, if it has been shut down for repairs or cleaning and as part of any investigation into possible adverse effects on bather's health.

7. Routine, thorough cleaning of surrounding surfaces (trying to cover the bigger feasible area), should be carried out especially after a cruise ship day in order to help to minimize the risk of infections caused by *Pseudomonas*.

*RWF mechanical and chemical preventive maintenance plan, established in Appendix 5 (this Procedure).*

8. A fecal and vomit accident response procedure is established in Appendix 4 (this Procedure). A written or electronic record must be made of all accidents involving fecal material or vomit. The record must include if it happened in any of the RWF, date and time of the accident, type of accident, response steps taken, and free residual halogen level and contact time reached during disinfection. For a fecal accident, the record must also include whether the fecal material was formed or loose.

9. Decorative fountains must be maintained free of *Mycobacterium*, *Legionella*, algae, and mold growth. Should be supplied by potable water only

- For keeping the appropriate chlorine levels in the potable water supplied to the fountain provide a disinfection system in the fountain basin

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<sup>13</sup> Idem. Page 95.



- Ensure that nozzles are REMOVABLE for cleaning and DISINFECTION.
- Ensure that pipes and reservoirs can be drained when the fountain/system is not in use.

Appendix 9 (this Procedure) outlines fish therapy controls and procedures (in case they are installed)

## 7. Hot Tubs

Responsible: The HES manager is responsible for achieving the recommended water standards and reporting any issues and non-compliances. The Port General Manager then has the overall responsibility for safe water management and compliance in the recreational facilities.

1. All hot tubs must be cleaned and disinfected thoroughly before filling. Once filled, the tubs must be covered for protection of external debris. Measurements of the pH and chlorine levels should be made once the tub is filled. Levels should meet requirements.

Note: Outdoor hot tubs need to be chlorinated with a stabilized chlorine (ideally a fast-dissolving tablet). This is especially needed since the hot tubs are rented and private, and the only chance the operator has to ensure the water quality is when opening the tub.

2. Scheduled checking of filters and maintenance needs to be recorded and kept on file. The manufacturer's operation and maintenance instructions must be available to personnel that service the units. <sup>14</sup>

3. The limit for temperature on the hot tubs should be below 40°C.

4. The hot tub will be emptied and covered daily. Backwash water will be discharged to the deep injection well. Cleansing and disinfection will take place first thing in the morning, prior the operation. If there are no ship calls, cleaning and disinfection must be done and the hot tub covered.

*Please refer to Appendix 8 (this Procedure).*

## 8. Rainwater for non-potable uses

1. Toilet flushing will be carried out by rainwater supplemented with potable water when required. Some other non-potable uses like irrigation could be considered as well.

2. Rainwater should be stored in an independent tank completely separate from the main potable water tank.

3. Devices to minimize organic matter input into the rainwater tank should be installed in the rainwater collection system. These devices should be cleaned systematically.

4. An appropriate air gap should be left between the maximum level of rainwater in the tank and the potable water inlet<sup>15</sup>.

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<sup>14</sup> Recreation Water Facilities (RWFs); Vessel Sanitation Program - pg. 65

<sup>15</sup> The air gap must be 2 times the inside pipe diameter or a 25mm (1") minimum distance

5. The disinfection system (by chlorination) should be designed to guarantee that rainwater is free from *E. coli*.
6. All rainwater pipework should be separate from potable water piping and where possible not installed above potable water tanks or piping.

### 9. Potable Water Tanks/Cisterns

1. The interior surface/coating of all potable water storage tanks must be approved for potable water contact by a certified organization (for example NSF/ANSI, Standard 61). In addition, all items that penetrate the tank (e.g., bolts, pipes, pipe flanges) must be coated or lined with the same product used for the tank's interior.
2. All of the supplier or manufacturer's recommendations for applying, drying, and curing the tank coatings must be followed if a coating has to be applied to the interior surface of the tank. In addition, the following records must be held on site for the potable water tank coatings:
  - Written documentation of the approval from the certification organization (independent of the coating manufacturer).
  - The manufacturer's recommendations for applying, drying, and curing.
  - Written documentation that the manufacturer's recommendations have been followed for applying, drying and curing.
3. Ensure that all suction lines within potable water storage tanks are located at least 150 millimetres (mm) or 6 inches from the tank bottom or sump bottom.
4. Ensure that an access hatch for entry into the tanks is installed and provides a secure waterproof seal to protect the tank from contamination. At all time, all hatches must have functional locks and keys will be handled by the HES manager and team.
5. Do not install any storage tanks or pipes containing non-potable liquids (for example waste or grey water) directly over any potable water tanks.
6. Potable water tanks must be inspected, cleaned and disinfected at least annually or when the results of the monitoring plan indicate that is required.

If any damage or deterioration to the internal tank coating/interior surface is identified during the inspection, then this must be repaired, or replaced as necessary, using the procedures above. After internal coating repairs/replacements the tank must be cleaned, disinfected and flushed with potable water.

7. The routine tank cleaning and disinfection should be carried out, as follows:
  1. Remove (strip) all potable water from the tank ensuring that the tank walls and floor are dry.
  2. Clean all tank surfaces, including filling lines, with an appropriate detergent and remove all sludge etc.
  3. Rinse all surfaces of the tank thoroughly with POTABLE WATER.
  4. Remove (strip) then rinse water from the tank and then remove all this water.
  5. Wet all surfaces of the tank with at least a 200-MG/L (ppm) solution of chlorine (this can be done using new, clean mops, rollers, sprayers, etc.). Ensure the tank surfaces remain wet with the 200-MG/L (ppm)

chlorine solution for at least 2 hours. Check, monitor, and document the DISINFECTION concentration and contact time.

6. Flush with potable water and refill the tank. Verify the free residual HALOGEN is  $\leq 5.0$  MG/L (ppm) before placing the tank back into service. Document the free residual HALOGEN level.
7. The cleaning and disinfection and any repairs made should be recorded together with a cleaning/disinfection date.
8. As in other Carnival facilities hyper chlorinated wash water will be stored in a tank and dechlorinated using Sodium metabisulfite. The residual concentration of chlorine will be tested before disposal to verify safety.
9. Following any known or potential contamination problem, the water in the filled tank shall be disinfected by increasing the free residual chlorine to at least 50 MG/L (ppm) throughout the affected area and maintaining this concentration for a minimum of 4 hours. Maintain a pH value of 7.8 or less. The disinfected parts of the tank system are then to be flushed with potable water or otherwise dechlorinated until the free residual halogen is  $\leq 5.00$  MG/L (ppm). In an emergency, this contact time may be shortened to 1 hour by increasing the free residual chlorine level to at least 200 MG/L (ppm) throughout the affected area.

## 10. Provision of Potable Water through Trucking Systems

In case an emergency occurs with the current water suppliers, the Port will request water from a local potable water vendor through a certified trucking system.

1. The HES manager should be advised of time, date and address when a supplier will provision potable water through a trucking system. The HES manager must inspect the tank to detect debris and supervise the operation.
2. HES staff will follow the protocols outlined in WHO's "Technical Notes on Drinking-Water, Sanitation and Hygiene in Emergencies, Cleaning and disinfecting water storage tanks and tankers".
3. HES staff should accompany each truck trip from the source to the port and record each truck's plate.
4. Chlorine tablets or liquid chlorine should be used to disinfect the water in the tank and free Chlorine and pH levels monitored, recorded and adjusted to achieve ideally a minimum of 3 ppm of free chlorine and a range of pH between 6.5 and 7.8.
5. Samples for microbiological tests should be taken from the water of each truck. If the day of this operation is not coincident with the day scheduled for microbiological testing the water distribution system, samples should be taken in all the stations of the distribution system designated for microbiological testing.

## 11. Backflow Prevention and Cross-Connection Control

1. Use appropriate backflow prevention at all cross-connections including any outlets or connections to the potable water system where there is a potential health hazard. This may include non-mechanical protection such as an air gap or a mechanical backflow prevention device. Air gaps should ideally be used where feasible and when water under pressure is not required.

2. In particular, if any of the following items are connected to the potable water system, then it must be protected against backflow (back siphonage or backpressure) with either air gaps, or mechanical backflow prevention devices:

- Any connections to wastewater (sewage or grey water) systems. Note: An air gap only must be used for these connections.
- Boiler feed water tanks.
- Decorative water features and fountains.
- Food service equipment such as ice machines, some beverage dispensers and combination ovens.
- Any hose-bib connections, hose lines used for cleaning and kitchen pot wash spray hoses.
- Mechanical dishwashing machines.
- Recreational water facilities.
- Toilets and water fed urinals.
- Any water softener and mineralizer drains.

3. The HES manager will keep an updated list of all devices installed recording the dates of installation, inspections, testing, cleaning, disinfection and maintenance.

4. Testing and maintenance of the backflow preventers must be carried out at least once a year.

## **12. Manufactured and Supplied Ice**

Responsible: Food and Beverage Outlet General Manager

1. If any ice microbiological sample failures are identified, immediate action should be taken as outlined below and all corrective actions recorded:
  - The ice should be discarded and a new batch of ice (using production or shelf life codes) is to be microbiologically tested and negative results confirmed, before it is used again at the outlet.
  - The ice manufacturer should be identified and if possible, the ice production machine/operation checked by the manager, or by any hygiene experts/consultants employed by the food outlet.
  - An investigation should be carried out to determine as far as possible whether the failure was likely to have been caused by contamination at the outlet, sampling error, or was more likely to have been a supplier issue.
  - The storage and ice handling equipment used should be thoroughly cleaned and sanitized.
  - In an emergency situation where a ship call is imminent, the use of ice in drinks should be suspended for the call and only canned/bottled drinks served in the outlet.
  - The ice supply should be re-sampled as soon as possible to re-check its safety before any re-use.
2. If multiple ice microbiological sample failures are identified, then the following action should be taken and all corrective actions recorded:
  - A review of ice handling and storage practices should be carried out to identify any possible contamination risks.

- A review of the ice supplier should be carried out if possible, by the outlet manager or their hygiene experts/consultants to identify any hygiene issues or practices which may have led to the problem.
- Based on the results of the review and in consultation with their hygiene experts/consultants, a decision should be taken by the outlet management whether to continue to use the supplier, or to temporarily suspend use of this supplier pending any results or completion of any recommended actions. Any alternative ice supplier should be checked and samples taken and tested before they are used.

### **13. Ice Produced by Food Outlets at Grand Port**

Responsible: Food and Beverage Outlet General Manager

1. If any ice sample microbiological failures are identified, the ice machine or unit may be taken out of use temporarily and cleaned and sanitized (using a 200ppm chlorine solution not mixed with soap solution). The same cleaning and sanitation procedure should be carried out if the ice machine is drained for any other reason. In the case of microbiological failure, drinks or ice produced during this period should be disposed of as a precaution.
2. The ice machine water supply, carbon filters and UV treatment array should be checked to make sure these are working and that both the filters and UV bulbs are 'in date' and have been changed correctly.
3. Following a microbiological sample failure, once the ice machine has been cleaned and sanitized, it should be allowed to fill with ice and then this first ice discarded. The unit is then to be thoroughly cleaned and sanitized again and finally rinsed with potable water. It should then be allowed to refill once more and the ice produced microbiologically tested and negative results confirmed before it is re-used for ice production.
4. In an emergency situation, where a ship call is imminent, the use of ice in drinks should be suspended for the call and only canned/bottled drinks served in the outlet.
5. All test results and corrective actions should be recorded.

### **14. Irrigation Systems**

Responsible: The HES manager is responsible for achieving the recommended irrigation water standards.

1. Irrigation using treated wastewater will be only carried out in the exterior areas (away from guest areas). Irrigation water must maintain a free chlorine residual at the irrigation tanks and this is to be checked weekly and recorded.
2. The minimum value of free chlorine in the farthest point of the irrigation system should be 1.2 ppm to avoid the proliferation of fecal and total coliforms in the irrigation line.
3. At all guest areas, irrigation is to always be carried out using either potable water, or rainwater which is of a suitable quality for this purpose.

### **15. Food Safety and Hygiene**

Note: The implementation of these measures will be a direct responsibility of the food and beverage operators. Implementation will be based upon the contractual relations with each operator with a more specific set of procedures adapted to the characteristics of each facility's operation. This is also valid for purchased and manufactured ice, purchased bottled water and other aspects included in other sections of these procedures and applicable to operators. Site visits and ongoing communications should be systematically carried out with the operators to help in implementing the public health requirements.

Responsible: Food and Beverage Outlet General Manager/Owner

1. All served food is to be safe and free from any harmful contamination. Food and drinks served must not contain any levels of bacteria or other pathogens which may cause food borne illness.
2. If any significant failures in food safety (likely to cause illness, injury or complaint) are identified, then all affected food must be carefully disposed of and suitable action taken to prevent any recurrence. This would include any contamination of food with unsafe water/ice, undercooking, known problems with food sources or any vomiting/fecal incidents in food or bars outlets, which may have affected food or food surfaces.
3. An overall written food safety management system must be in place at each food outlet. This should be based on the preventative principles of 'Hazard Analysis and Critical Control Points' ('HACCP'). The food safety management system should identify all activities which are critical to food safety throughout the whole operation (from food supply through to final service) and set out the necessary control measures and monitoring procedures, including food safety records.
4. Food outlets are only to employ personnel who are medically fit and can demonstrate good personal hygiene, knowledge of hygienic practices and maintain high standards of cleanliness. Ideally, the food outlets should have a system of pre-employment medical screening or checking.
5. Food outlet employees suspected of or diagnosed with, any communicable diseases caused by Salmonella Typhi, Shigella, Escherichia Coli O157:H7, Hepatitis A virus, Norovirus or other communicable diseases that can be transmitted by food, must not work until they have been medically cleared. Food employees include all staff who works in any food or food related area or operation, or work with exposed food, ware washing, equipment, utensils, linens, single-service and single-use articles (such as napkins and tablecloths etc.).
6. Food employees who have conditions or symptoms of boils, open sores, infected wounds, diarrhoea, jaundice fever, vomiting, sore throat with fever, or discharges from the nose or mouth must report these to the food outlet manager and must not work until medically cleared.
7. If any food employees are taken ill during work hours with symptoms of diarrhea and/or vomiting, then the food outlet manager is to ensure that all food they have handled is discarded immediately. The areas they worked in should then be thoroughly cleaned and sanitized (using a 200 ppm chlorine solution) and ideally the unit closed until this can be completed. If any food handlers are found to have continued to work while symptomatic, then suitable action must be taken to prevent this to happen again.
8. If any passenger or food handler vomiting incidents take place in a restaurant, bar or food area, then suitable control measures should be introduced including the following:

- All nearby or exposed food/drink/ice should be disposed of.
- The unit should be closed for at least 2 hours (and overnight where possible), cleaned and sanitized using either 1000ppm chlorine, Virox, Tor HB, Oxivir or any similar product tested and known to be effective against Norovirus surrogate (and to be supplied from a ship).
- The area should then be effectively ventilated with fresh air for as long as possible before reuse.
- Any vomiting incidents in public or employee toilets should be similarly dealt with.

9. In the case of any potable water or ice microbiological sample failure, all food, drink mixes or ice which could have been affected must be disposed of and equipment cleaned and sanitized before re-use. The procedures set out in the relevant water and ice sections above should be followed by the food outlet managers.

10. Food outlets are only to use nominated and approved food suppliers, who should be required to have high standards of hygiene.

11. Checks on food deliveries, including that it is received at safe temperatures, and that all food is properly labelled, in date, free from contamination and free from pests. This should be carried out by all food outlets, keeping a log.

12. All food and beverage storage areas are to be kept clean and free from pests. Shelving should be constructed of easily cleanable and durable materials (e.g. plastic or stainless). Shelving must have at least a 6-inch (15 cm) clearance such that no food equipment or food items are stored on the floor. Walls need to be finished using a material that is easily cleanable, durable and non-absorbent.

13. Every food area including all kitchens, bars and any service area where open food is prepared, handled or served by food employees, must have at least one separate hand washing facility located in it. Every hand washing facility must have a supply of hot and cold or mixed water [supplying water at a temperature of at least 43°C (110°F)], anti-bacterial soap, a single-use towel dispenser and a waste bin for the towels. Any broken wash hand basin must be urgently repaired and no food handling may be carried out in that area, unless a facility is available nearby for staff to use.

14. Disposable gloves must be used at all times when actually handling and touching open 'ready to eat' foods during preparation and service.

15. All food preparation, dishwashing areas, and toilets must have sufficient working ventilation to keep them free of excessive heat, steam, condensation, obnoxious odours, smoke, and fumes. This is to include air extraction hoods for cooking facilities and provision of incoming chilled air to any kitchens where this is necessary to maintain safe food preparation and handling temperatures.

16. The final rinse temperature for mechanical dishwashing machines should reach a minimum of 160°F. Dishwashing machines through chemical disinfection in the final rinse should reach a minimum of 120°F and 50 ppm of chlorine.

17. For three-compartment sinks, these 5 steps must be followed for proper cleaning and sanitizing:

- a. Rinse, scrape, or soak all items before washing them.



- b. Clean items in the first sink. They must be washed in a detergent solution [at least 110°F (43°C)]. The water must be replaced when the suds are gone or the water is dirty.
- c. Rinse items in the second sink. Spray with water or dip them into it. Remove all traces of food and detergent. If dipping items, the water must be changed when dirty or full of suds.
- d. Sanitize items in the third sink fully immersed. Soak in hot water or a sanitizer solution.
  - i. If using hot water, items should be immersed during at least 30 seconds at a minimum temperature of 77°C (171°F).
  - ii. If using a sanitizer solution, time and temperature must be checked frequently and a test kit must be used to check concentrations. The sanitizing solutions should be as follows:
    - Chlorine Solution: at a minimum temperature of 24°C – 38°C (75°F – 100°F) and sanitize for 7-10 seconds in 50 – 99 ppm.
    - Iodine Solution: at 20°C (68°F) and sanitize for 5 seconds in 12.5-25 ppm or as per manufacturer's instructions.
    - Quaternary Ammonia (QUAT, QAC) compounds: at 24°C (75°F) and sanitize for 30 seconds and concentration as per manufacturer's instructions.
- e. All chemical solutions should be tested for effectiveness using a test kit strip. Use according to manufacturer's directions.
- f. Air dry all items. Items should be placed upside down so they will drain.

Sink compartments must be large enough to accommodate immersion of the largest equipment and utensils. If equipment or utensils are too large for the ware washing sink, alternative equipment, such as a three-bucket system, must be used.

18. A balanced air handling system should be provided to the main preparation kitchens to ensure safe ambient working temperatures. This will minimize any food safety risks from bacterial growth during food handling and help the refrigerators achieve safe food storage temperatures even when in constant use.

19. Storage fridges and walk in chillers must always keep potentially hazardous food products at an internal temperature of 5°C (41°F) or below. If any failures or breakdowns in food refrigeration take place, which mean that the temperature of food rises to greater than 5°C (41°F) for more than 4 hours, then the food must be discarded.

20. Freezers and walk in freezers must operate at an air temperature of -18°C (0°F) or below, except those which are used for the short-term service of ice cream which may be higher. If any failures or breakdowns in freezers take place which mean that the temperature of food rises to more than 0°C (32°F) or food is found to have been defrosted, then it must either be used immediately [if it has not risen to more than 5°C (41°F) for more than 4 hours], or be discarded. A temperature log should be developed with initial unit temperature checks at opening and periodic checks throughout the day recorded, recording items discarded and reasons.

21. Ice cream should maintain a temperature between -16 and -18 °C through all the custody chain. Food outlet should keep a log with the ice cream refrigerator temperature. Ice cream mixes should be discarded after 4 hours if the temperature is not maintained at ≤5°C (41°F). When opened and held at the proper temperature, the containers should be labeled for discard within 7 days.

22. Foods are to be cooked (or reheated) to heat all parts of the food to a temperature and for a time that complies with the requirements listed below:

Food	Minimum Core Temperature	Minimum Time
Fruits and vegetables	63°C/145°F	15 seconds
Fish and shellfish		
Eggs (cooked for immediate service)		
Canned foods		
Poultry roasts & products (chicken and turkey)	74°C/165°F	15 Seconds
Pre-prepared eggs held before service		
Soups and stocks		
Meat products (e.g. ground meat, mince, pies, sausages & burgers)		
Stuffed or injected meats of any type		
Any stuffing, stuffed pasta or stuffed fish		
Ground fish, meat, poultry or game meat	74°C/165°F	15 Seconds Note; all food cooked in a microwave must be stood for at least 2 minutes before serving
Microwave cooking and reheating of foods		

23. POTENTIALLY HAZARDOUS FOOD must be thawed by one of the following methods:

- Under refrigeration that maintains the food temperature at 5°C (41°F) or less.
- Completely submerged under running water at a water temperature of 21°C (70°F) or below and for a period of time that does not allow thawed portions of READY-TO-EAT FOOD to rise above 5°C (41°F).
- Completely submerged under running water at a water temperature of 21°C (70°F) or below and for a period of time that does not allow thawed portions of a raw animal food requiring cooking to be above 5°C (41°F) for more than 4 hours, including:
  - The time the food is exposed to the running water and the time needed for preparation for cooking, OR
  - The time it takes under refrigeration to lower the food temperature to 5°C (41°F).
- As part of a cooking process if the frozen food is cooked or thawed in a microwave oven.
- Using any procedure if a portion of frozen READY-TO-EAT FOOD is thawed and prepared for immediate service in response to an individual CONSUMER'S order.

24. All food contact surfaces and materials used in the food outlets must be smooth, durable, easy to clean and non-toxic. Whenever possible, all food preparation tables, shelves and large pieces of equipment should

be made from stainless steel. Equipment should be free from rust, corrosion and cracks etc., be maintained in a good condition and disposed of when they are no longer easy to clean.

25. Adequate separate sinks and dishwashing facilities need to be available for proper cleaning and sanitising of food service equipment and utensils. Where a hot water sanitizing rinse is used, the surface of washed equipment and items must reach a temperature of 71°C (160°F) or above. Restaurant bathrooms should have hot water for employees' hand washing.

26. All food outlets must be kept clean and have effective cleaning management systems in place. Suitable provision of cleaning materials, equipment, cleaning products (detergents and sanitizers) and hot water must be maintained at all times.

27. All food and beverage outlets are to have effective IPM procedures in place including routine inspections and safe treatment ideally by a qualified and experienced outside pest contractor. Inspections and treatments should be recorded. Any significant pest infestations (in particular of rodents or cockroaches) must be reported to the Port General manager and Director of Ports Operations. The outlet must be treated and use suspended until the infestation has been safely removed.

28. Any other significant food safety or hygiene failures, complaints or allegations (including food contamination incidents) and the action taken to correct and prevent any recurrence should be carefully recorded and then reported to the Port General manager and Director of Ports Operations.

29. All food and beverage outlets are to comply with the following recommendations based on the BMPs regarding grease traps, maintenance and grease removal as well as for proper training of personnel.

- Instruct all restaurant personnel to “dry wipe” pots, pans, and dishware (scrape food and FOG into the trash and/or use paper towels to wipe away excess FOG). The person who removes plates from dining tables should be responsible for scraping all left-over food into a container for disposal as a solid waste. Both sides of each plate should be scrapped.  
Use debris screens in all floors and sink drains. Regularly empty screens into trash bins.
- Garbage grinders are not permitted – food waste should be deposited in the trash.
- Have grease traps cleaned on a regular basis – routine cleaning can be set up on a set time schedule (e.g., once a month) or based on when a certain percentage of the trap becomes full (e.g., grease trap must be pumped when 30% of it is full of grease and solids). Under sink grease interceptors must be cleaned according to manufacturers' recommendations (usually daily). All these cleaning activities should be recorded in a logbook. Also, maintenance logs detailing pump-outs, repairs and condition of interceptors should be kept.
- Have oil recycle container in a convenient location. Restaurant managers and personnel should be trained to dispose of cooking oil properly in recycling containers and not pour it down the drain as a short-cut. A specialized company should be contracted for collecting these recycling containers.

- Implement BMP training program for kitchen staff and keep a log of all the training programs.
30. All food and beverage outlets are to comply with proper management of solid waste.

## Appendix 1. Daily, Weekly and Monthly Sampling

### Daily pH and Free Chlorine Concentration Sampling

On a daily basis, HES operators will perform a sampling route, that includes the potable water tanks, secondary tanks (well and rainwater) and points in the potable water distribution system through the whole port facility. The following sampling points will be established for this matter (note: To be determined once the water distribution system is designed).

Testing should be carried out with a photometer using DPD and phenol red reagents. Palintest photometers will be used. Testing procedure is described in the Palintest user manual.

The pH level is to be maintained between 6.5 and 7.8. If the pH measured is out of range, then the cause should be identified and the appropriate corrective measures should be implemented to restore the balance and recorded.

Potable water throughout the distribution system must be maintained with a free chlorine residual at the furthest outlet higher than 0.5 mg/L (PPM). If the free chlorine residual is found to be outside this limit, then the cause should be identified and the appropriate corrective action shall be taken immediately and recorded.

A summary of these results will be monthly reported to the HES teams in the Monthly Water Quality Report.

### Weekly Microbiological Sampling

HES operators will carry out weekly microbiological sampling, following a schedule consisting of fixed and rotative sample points, as follows (note: To be determined once the water distribution system is designed).

A summary of these results will be reported monthly to the HES teams in the Monthly Water Quality Report.

In addition to these sample points, a water dispenser (drink water for employees) must be selected randomly and tested for total coliforms and *E. coli*.

The microbiological sampling will be carried out following this protocol:

1. Microbiological sampling will be conducted independently of the chemical testing of water.
2. All sample cocks and taps will be properly wiped with a cotton ball or gauze soaked with household alcohol before samples are taken. Sample cocks exposed to the exterior environment should ideally be metallic to allow flaming them in order to avoid false positive readings.
3. Before samples are taken the water lines will be thoroughly flushed for at least 2-3 minutes.
4. Sampling personnel will wash their hands before starting a sample run and then use hand sanitizer before taking each sample. They will also take care not to touch the sample cock, or the rim of the sample pot while taking the sample.
5. The sample is taken by filling a water sampling bag which contains a de-chlorinating agent.

6. All samples will be placed in a cooler with ice on collection and made ready for shipment to the approved independent laboratory or immediately placed in the incubator for a 24-hour period of incubation.
7. Ice samples should be taken using a clean and disinfected ice scoop or fresh disposable gloves. Care is needed not to contaminate the ice when placing it into a sample pot for testing and also to ensure it creates sufficient water when it melts to allow testing.
8. A proper chain of custody should be kept when samples are sent outside the premises.

For microbiological sample test results, if any are subsequently identified as positive for *E.coli*, the use of this unit is to be suspended and action taken as follows:

- The affected water system is to be checked for any potential contamination risks including back siphonage/backflow or leaks within the system.
- The system and all affected outlets and equipment are to be cleaned and sanitized using at least 50 MG/L (ppm) chlorine solution throughout the affected area and maintained at this concentration for at least 4 hours or using a 200 MG/L (ppm) throughout the affected area for at least 1 hour.
- The disinfected parts of the system must be flushed with potable water until the tested free residual chlorine level  $\leq 5.00$  MG/L (ppm).
- The location must be re- tested and a negative sample achieved before the system/outlet is then re-used.
- All actions taken and results must be recorded.

If a single positive total coliform test is identified, then the outlet potable water supply is to be checked (for any back siphonage, leaks or potential contamination risks), and then flushed for 3-4 minutes before it can be re-used. However, if the failure is within a water supply used for drinking, preparation of food/beverages, ice or food handler hand washing, then its use should be suspended, flushed for 3-4 minutes multiple times until a negative result has been achieved in by re-sampling. All actions and test results should be recorded.

If multiple, consecutive, positive total coliform test results are identified from one location, then the use of the outlet should be suspended and the possible source of the contamination investigated. The affected parts of the system should be cleaned and sanitized using at least 50 MG/L (ppm) chlorine solution throughout the affected area. The location must be re-tested and a negative sample achieved before the system/outlet is then re-used. All actions and test results should be recorded.

### **Monthly External Lab Analysis**

Samples will be scheduled to be sent monthly to an approved, certified, independent, laboratory for total coliform and *E. Coli* testing. The HES manager will guarantee that the samples reach within a window of 24 hours from the time they were taken. The HES manager will make sure that the samples are accompanied with a 'Chain of Custody'.

The following zones will be part of this sampling (Note: To be determined once the water distribution system and food and beverage outlets are designed).

**Appendix 2. Summary of main daily operations of CULLIGAN automatic treatment system**

<b>CULLIGAN SYSTEM operations</b>	
1	Analyzer set point is established between 2.0 and 5ppm and pH is <7.8 (Not necessary to be checked Daily)
2	The circle chart recorder paper is changed daily at the same time (not allowed to overrun more than 24 hours), labeled with the name of the system, dated, reviewed and initialed by the responsible supervisor
3	The charts are kept for 12 months for possible review
4	The chart recorder is calibrated daily and the calibration noted in a log (or on the chart) *Not necessary to calibrate if hand-held meter and the probes agree within 0.2. IF CALIBRATION IS REQUIRED GO TO SECTION 6.6 OF ANALYZER MANUAL AND 7-9 AND 7-10 OF RECORDER MANUAL
5	Test kit should have accuracy within 0.2ppm and graduated in increments < 0.2ppm and (where available) have appropriate secondary standards to verify test kit
6	Check the chemical levels in each tank and add the necessary mixture of chemicals (if diluted) for normal operation.
7	The injection pumps should be vented of any accumulate air (only perform air venting when pumps are running)
8	Check the incoming water filter housing inlet and outlet pressures. Change the cartridge when the filter pressure drop is more than 15% of the operating pressure
9	Ensure a spare cartridge filter is available for the filter unit
10	Any maintenance actions, repairs or problems to the system should be recorded in the maintenance log
11	The machinery space should be kept in a clean and safe manner
12	The sample probes cartridge filter should be checked to ensure it is allowing sample flow through to the probes. If the probes do not have enough water flow, the flow indicator in the probe housing will be outside the sensor and the analyzer will go to "Pause"
13	Incoming water should initially be tested for chlorine and pH at the start of the flow and recorded in a log or on the chart
14	Incoming water treatment should be raised and controlled automatically to the necessary specifications within 30 minutes of starting the flow to storage
15	Any time the halogen or pH is out of specification, there should be a note as to the reason
16	Any machinery that is out of operation must be noted and repaired within 30 days of the date the failure occurred.
17	Any time the system is not in automatic, manual testing of the halogen should be performed with a hand-held tester and the results logged every 4 hours



### Appendix 3. Guidance on the Use of Total Coliforms, *E.coli*, *Enterococci* and *Pseudomonas* as Indicators

**Indicators** are parameters whose presence at a level outside of specified limits may reflect a problem in the treatment process or in the integrity of the distribution system.<sup>16</sup>

**Total coliforms** - Bacteria that are naturally present in the environment and which are generally not harmful to health. Total coliforms are used as an indicator that other, potentially harmful, bacteria may be present<sup>17</sup>. They are used being used in the port sampling program as an indicator of the effectiveness of water treatment and also to assess the cleanliness and integrity of distribution systems as well as the potential presence of biofilms or contamination through ingress of foreign material, including soil or plants.<sup>18</sup>

***E. coli*** - Fecal coliforms and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes and feces. Microbes in these wastes may cause short term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms.<sup>19</sup> The indicator organism of choice for identifying fecal pollution is *E. coli*,<sup>20</sup> which must not be detectable in any sample as detailed in the table 1 below and also as required by the EPA<sup>21</sup>

**Table 1. WHO Guideline Values for Verification of Microbial Quality<sup>22</sup>**

Organisms	Guideline value
<b>All water directly intended for drinking</b> <i>E. coli</i> bacteria	Must not be detectable in any 100-ml sample
<b>Treated water entering the distribution system</b> <i>E. coli</i> bacteria	Must not be detectable in any 100-ml sample
<b>Treated water in the distribution system</b> <i>E. coli</i> bacteria	Must not be detectable in any 100-ml sample

In many instances, drinking water quality monitoring programs only test for *E. Coli* once total coliforms have been detected<sup>23</sup>. However, since Colilert water testing is being used, total coliforms and *E. Coli* are both tested simultaneously. Consequently, the total coliform tests are not being used as an indicator of fecal pathogens (this role is played by *E.Coli*), but rather as an indicator of overall water quality.

**Enterococci** - The intestinal enterococci group can also be used as an index of fecal pollution, but as stated above, the indicator organism of choice for fecal pollution is *E. coli*. In addition, they have often been used to test water quality after repairs to distribution systems or after new mains have been laid. This parameter may be included in the water quality monitoring plan when significant changes are being carried out in the distribution system.

<sup>16</sup> <http://water.epa.gov/drink/contaminants/index.cfm#Microorganisms> (link in CDC's webpage)

<sup>17</sup> Idem

<sup>18</sup> [http://www.who.int/water\\_sanitation\\_health/dwq/guidelines/en/](http://www.who.int/water_sanitation_health/dwq/guidelines/en/)

<sup>19</sup> <http://water.epa.gov/drink/contaminants/index.cfm#Microorganisms>

<sup>20</sup> [http://www.who.int/water\\_sanitation\\_health/dwq/guidelines/en/](http://www.who.int/water_sanitation_health/dwq/guidelines/en/)

<sup>21</sup> <http://water.epa.gov/drink/contaminants/upload/mcl-2.pdf>

<sup>22</sup> [http://www.who.int/water\\_sanitation\\_health/dwq/guidelines/en/](http://www.who.int/water_sanitation_health/dwq/guidelines/en/). Adapted from Table 7.10 Guideline values for verification of microbiological quality.

<sup>23</sup> <http://water.epa.gov/drink/contaminants/index.cfm#Microorganisms>

***Pseudomonas*** - These can grow within untreated waters and in biofilms and is used as an indicator organism of bathing water quality. It can cause skin; ear and eye infections when present in large numbers and outbreaks of skin infections have been linked to swimming pools and spa pools.

That is why is so important to carry out routine, thorough cleaning of surrounding surfaces (trying to cover the bigger feasible area) especially after a cruise ship day. Where repeated samples identify its presence, the filtration and disinfection processes should be examined to determine whether there are areas within the pool circulation where the organism is able to multiply.

#### **Appendix 4. Accidental Release of Feces, Vomit and Blood into RWF<sup>24</sup>**

Accidental fecal releases may occur relatively frequently, although it is likely that most go undetected. Accidental fecal releases into the RWF can lead to outbreaks of infections associated with fecally-derived viruses, bacteria and pathogenic protozoa; vomit may have a similar effect. The RWF operator faced with an accidental fecal release or vomit must, therefore, act immediately.

##### Response in case of a fecal release:

1. For any fecal accidents, all bathers must evacuate the RWF and if the filtration system services more than one mass of water, all the affected pools must be closed. The pool must remain closed until the corrective measures are performed.
2. Remove manually (with a scoop or a net) all the fecal material that can be retrieved. If the emission is solid, remove it without breaking it. It is unlikely that any disease spreads to all the pool if this action is done quickly when the accident occurs. Vacuum is not recommended, but if is done vacuum to a drain.
3. Clean and disinfect the scoop or the net used.
4. Pools with cyanuric acid, might need higher levels of residual chlorine.
5. Keep a log with the accidents and corrective measures.

##### Solid feces release:

1. Raise the free chlorine to 2.0 ppm and make sure that the pH is at 7.5 or below, temperature must be 25 Celsius or higher. Maintain these levels at least 25 minutes before opening the pool.
2. Make sure that the filtration system is operating.

##### Diarrhea:

1. If the stool is runny (diarrhea), the situation is more likely to be hazardous, as the feces contain pathogens. Even though most disinfectants deal relatively well with many bacterial and viral agents in accidental fecal releases, the possibility exists that the diarrhea is from someone infected with one of the protozoan parasites, Cryptosporidium and Giardia. The infectious stages (oocysts/cysts) are resistant to chlorine disinfectants in the concentrations that is practical to use.
2. Raise the free chlorine to 20ppm make sure that the pH is at 7.5 or below, temperature must be 25 Celsius or higher. Maintain the concentration for 12 hours and 45 minutes.
3. Make sure that the filtration system is operating.
4. Backwash the filters or replace cartridges. Backwash water will be discharged to the deep injection well.
5. Restore the chlorine levels and open the RWF to the bathers.

See the following chart for different concentration and inactivation times of common bacteria, virus and parasites.

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<sup>24</sup> Adapted from [http://whqlibdoc.who.int/publications/2006/9241546808\\_eng.pdf](http://whqlibdoc.who.int/publications/2006/9241546808_eng.pdf). Volume 2. Swimming Pools and Similar Environments. Pages 92-93

Inactivation time of some bacteria, viruses and parasites in chlorinated water. (1 ppm free chlorine, pH 7.5 and 25 Celsius)		
Name	Type	Time
E. Coli	Bacterias	< 1 min
Hepatitis A	Virus	approx. 16 min
Giardia	Parasite	approx. 45 min
Cryptosporidium	Parasite	approx. 10.6 days
Inactivation time of Giardia		
Free chlorine	Disinfection time	
1.00	45 min.	
2.00	25 min	
3.00	19 min	
Inactivation time of Cryptosporidium		
Free chlorine	Disinfection time	
1.00	255 hours	
10.00	25.5 hours	
20.00	12.75 hours	

NOTE: If the pool has a cyanuric acid concentration of 50ppm a chlorine concentration of 40 ppm, 6.5 pH and 25 Celsius is needed for 30 hours, in order to eliminate the 99.99 % of Cryptosporidium.

If you want to use a different chlorine concentration (as the ones shown in the table) you can calculate a new inactivation time (T) with the following formula:

$T = \text{Cryptosporidium Inactivation time at 1ppm} / \text{Free Chlorine concentration to be used.}$  (Ex. You will use a 15 ppm free chlorine, you will need a  $T = 10.6 \text{ days} (15300 \text{ minutes} / 15 \text{ ppm, that will result in } 1020 \text{ minutes or } 17 \text{ hours of inactivation time})$ ).

#### Vomit and blood accidents:

- 1.If a bather vomits, follow the same procedure as solid feces release. Is more likely that Norovirus is present in vomit, chlorine concentration needed to kill norovirus is similar to the Giardia.
- 2.Viruses in blood like HIV or Hepatitis B are transmitted when the infected blood or certain body liquids enter the body or the circulatory system (by needle sharing or sexual contact, for example.). There is no evidence that supports the transmission of these diseases in pool water.

## Appendix 5. RWF Maintenance Plan

The purpose of this procedure is to ensure that RWF operators follow the necessary steps to maintain the structure and water of the pool hygienically and with good appearance: free of algae, byproducts of chlorination (such as chloramines), by products of bathers, among others.

This instruction includes only preventive activities. Corrective actions in case of the appearance of black algae, vomit or fecal accidents; they correspond to other procedures and require other additional actions.

### Daily maintenance:

The following are the daily activities that must be carried out to guarantee that the RWF is in optimum conditions of cleanliness:

- Brushing and vacuuming of the floor, prior to the opening of the RWF to customers. Brushing should be done with non-metallic bristle brushes, to protect the pool coat from aggressive brushing.

### RWF balance

Water that does not contain a dissolved material will be very aggressive, and there will be a natural attempt to "balance" this condition by causing the surfaces of the materials in contact with the water to become soluble. When water creates the mineral balance, it ceases to be aggressive.

Well-balanced RWF water creates an optimal medium for the disinfection process and also protects the components of the system against chemical corrosion.

The key parameters for the good balance of the RWF are the following:

- pH: Ideally it should be between 7.2 and 7.8. It is the most influential factor in the chemical balance of the pool. It goes hand in hand with total alkalinity, since it influences how much the pH changes over time or when adding chemicals to the pool.
- Total alkalinity: Ideally it should be between 80 and 120 ppm. A low total alkalinity implies peaks in the pH and a high total alkalinity implies that the pH will be very difficult to change.
- Calcium hardness: Ideally it should be between 200 and 400 ppm. A low calcium hardness means that the pool will be corrosive (it will cause surface wear) and a hardness means that the pool will have mineral deposits on the surface and components.
- Cyanuric acid: Works as a free chlorine stabilizer (protects the chlorine concentration from the effects of sunlight), it should range between 30-50 ppm. It should not exceed these values, because the

high concentration of cyanuric acid may protect some fecal bacteria like cryptosporidium from the effects of UV rays (refer to the NSPF Pool Operation Manual).

- Total dissolved solids: Ideally it should not exceed 1500 ppm more than the amount when the pool was opened. This value refers to the weight of all dissolved matter in the water (salts, waste of bathers, algicides, chemicals, clarifiers, airborne debris, etc.).
- Temperature: It is the only factor that is not chemical in the water balance and only plays an important role when it comes to extreme conditions such as in spas with high temperatures (40 Celsius).

Note: The order of chemical balancing of the pool should be the following, from highest to lowest priority: alkalinity> pH> Calcium hardness. Actions for balancing the pool should be kept in a log book as well as the free chlorine, pH, total alkalinity, cyanuric acid, TDS and calcium hardness values.

Saturation index:

The saturation index is a method to determine if the water will deposit calcium carbonate or will keep it in solution. Ideally it should be between -0.3 and 0.3. This index is an indicator of pool balance and thus should be daily recorded.

It is calculated using the key parameters mentioned above and using the following formula:

**Saturation Index Factors**

Temperature			Calcium Hardness <small>expressed as CaCO<sub>3</sub></small>		Total Carbonate Alkalinity	
°F	°C	Tf	ppm (mg/L)	Cf	ppm (mg/L)	Af
32	0.0	0.0	25	1.0	25	1.4
37	2.8	0.1	50	1.3	50	1.7
46	7.8	0.2	75	1.5	75	1.9
53	11.7	0.3	100	1.6	100	2.0
60	15.6	0.4	125	1.7	125	2.1
66	18.9	0.5	150	1.8	150	2.2
76	24.4	0.6	200	1.9	200	2.3
84	28.9	0.7	250	2.0	250	2.4
94	34.4	0.8	300	2.1	300	2.5
105	40.6	0.9	400	2.2	400	2.6
			800	2.5	800	2.9

Total Dissolved Solids Factors	
Less than 1,000 ppm (mg/L)	1,000 ppm (mg/L) or greater
12.1	12.2

$$SI = pH + \text{Temperature Factor} + \text{Calcium Hardness Factor} + \text{Total Alkalinity Factor} - \text{TDS factor}.$$

**Weekly Maintenance**

The following are the activities that will be carried out weekly for the maintenance of the RWF. These activities must be done without bathers in the RWF. The purpose of this weekly maintenance is to ensure the oxidation of chloramines and other contaminants in the pool that accumulates after days of occupation.

1. Shock treatment and application of algaecide:
  - Shock treatment of the pool with granular chlorine at 10ppm of free chlorine. Add the amount of granular chlorine per gallon of water that is written in the spec sheet of the chemical.
  - The application of algaecide will be done in conjunction with the chlorine shock, to increase its effectiveness. Add the amount per gallon of water that is written in the spec sheet of the chemical. (note: The algaecide shouldn't be copper based due to its carcinogenic effect).
  - The shock treatment and algaecide will be carried out at the end of the day, to let work during the night. This does not apply in cases where there is no occupation at the port.
  - Close the valves to the Culligan sensors to prevent the probes from being damaged by the sudden chlorine increase.
  - In combination with the shock treatment, it is necessary to make a thorough brushing and vacuuming of the pool.
  - The concentrations of residual free chlorine after a shock treatment are not appropriate for bathers; therefore, these levels need to be returned to the acceptable ranges. For this, sodium thiosulfate will be used. (Note: This will be done at the most, 1 hour before the opening of the pool to bathers, and you should first check the concentration of chlorine, since the free chlorine could have been lost and it would not be necessary to make the addition of sodium thiosulfate).
  - It is necessary to backwash the sand filters, after a shock treatment; to eliminate the residues and other suspended solids that they collected. Backwash water will be discharged into the deep injection well.



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## Appendix 6. Cartridge Filter Cleaning Procedures

Cartridges should be cleaned in accordance with manufacturer's instructions where available and complete. In the absence of instructions, clean filters when the gauge pressure differential is 10 psi (68.9 KPa).

Cleaning EQUIPMENT should include a soaking container properly sized to immerse the filter elements, a rinsing area with proper drainage, and a drying area protected from CONTAMINATION (e.g., birds and insects).

New filters do not regain 100% of their capacity. Perhaps only about 80% of the capacity is recoverable, regardless of the treatment. If the recommended design flow rate exceeds 80% of the maximum flow allowed on the filter, the filter may be undersized.

Facilities with cartridge filters are recommended to have EQUIPMENT on-site to clean the cartridges. This includes a basin or tub large enough to immerse the entire cartridge. Water from the cleaning and soaking process must be discharged to the sanitary sewer. Proper cleaning is critical. Failure to clean the cartridge properly can lead to disease OUTBREAKS.

How to Clean Cartridge Filters:

1. Rinse Thoroughly: Rinse the cartridge of as much dirt and debris as possible by washing inside and out with a garden hose and spray nozzle.

DO NOT use a pressure washer. High flow/pressure can drive dirt into the interior and permanently damage the cartridge. It can also aerosolize pathogens in the filter.

2. Degrease: Cartridge filters need to be degreased each time they are cleaned. Body oil, suntan oil, cosmetics, hair products, and/or algae and biofilms can form a greasy coating on the filter pleats, which will clog the pores and reduce the filter capacity.

Soak the cartridge overnight in one of the following:

- Filter cleaner/degreaser OR
- A solution of water with 1 cup (236.6 g) of TSP (trisodium phosphate) OR
- One cup (236.6 g) of automatic dishwashing detergent per 5 gallons (3.8 L) of water.

Never use muriatic acid or products with acid in them before degreasing. Acid may permanently set the grease and ruin the cartridge. Rinse thoroughly.

3. Sanitize: To remove or prevent biofilms, algae, and bacteria growing on the cartridge, add 1 quart (0.95L) of household bleach per 5 gallons (19 L) of clean water and soak 1 hour before rinsing.
4. Rinse: Remove the clean cartridge from the SANITIZATION soak water and rinse thoroughly with a hose.

5. Dry: After the filter is cleaned and degreased, it should be allowed to dry completely. Some bacteria (for example, Legionella spp.) that survive the cleaning process can be killed by drying. Do not allow the filter to become contaminated with dirt or soil after it is cleaned. Put the cartridges in a clean plastic trash bag if they are to be transported and the original boxes are not available.

Acid Wash (Only if necessary): Excessive calcium or mineral deposits on the filter media can be cleaned with a 1:20 solution of clean water and muriatic acid. Put a few drops of muriatic acid on the filter. If it foams, it might need to be acid washed. Very few filters need to be acid washed.

**Appendix 7. Misting System Units**

- The misting unit should be routinely disinfected and flushed using a >10ppm free chlorine solution ideally held for at least an hour contact time. Misting nozzles should also be de-scaled and disinfected at least every 3 months.
- The misting system should also be flushed after use with compressed air in order to remove any remaining water and minimize any risk of Legionella growth in the system.
- The disinfection must be completed the day before the first cruise ship docking of the week. This activity is to be programmed on a weekly basis.
- A control log with the date and the operator in charge of the weekly disinfection must be updated regularly.
- The control log should also keep record of when the nozzles are to be de-scaled and disinfected. This activity is to be programmed every 3 months.

**Appendix 8. Cleaning and Disinfection of Hot Tubs**

Responsible: The HES manager is responsible for achieving the recommended water standards and reporting any issues and non-compliances. The Port General manager then has the overall responsibility for safe water management and compliance in the recreational facilities.

1. All hot tubs in the cabanas must be cleansed and disinfected thoroughly before filling. The cleaning must include scrubbing of the hot tub surfaces to remove any slime layer. The disinfection must be completed after the cleaning and it can be done with Clorox wipes (or similar) or a 200-ppm solution of chlorine.
2. The tubs must be filled up the day the ship arrives. Measurements of the pH and chlorine levels should be made once the tub is filled. Optimal levels expected are:
  - pH: 7.2-7.8
  - Chlorine: 2-3ppm
3. A control log must be kept with the recordings done for disinfection and measurements on operation as well as maintenance activities. Inspections should also be done to recirculation system components for a slime later and cleaned as needed.
4. The manufacturer's operation and maintenance instructions must be available to personnel that service the units.
5. Maintain filtration and recirculation systems according to manufacturer recommendations.
6. Fecal or vomit incidents must be recorded and kept on file as well as any measures taken to disinfect hot tub.
7. A sign with all the hot tub rules must be kept visible near the equipment.

**Appendix 9. Fish Therapy Controls and Procedures**

1. All potable water connections to the hoses used to clean customer's feet must have vacuum breakers installed at all times. The hoses must use garden water guns and when not in use, they must be placed in a pedestal with a hook that holds the hose upright.
2. Each fish tank must have functioning UV lamps in place and must have date of installation marked on the UV lamp as well as duration of the UV lamp.
3. Carbon filters must be used to remove the chlorine from the potable water provided to the Fish Therapy outlet. The carbon filter(s) must have date of installation and must be checked on every 6 months to confirm the filters are in good working conditions.
4. All filters and UV lamps must have dates of installation to keep control of dates of change. A control sheet must be kept by outlet with all changes done for any of these items and all control sheets must be available for any inspection completed by RCT.
5. After washing each customer's feet, the washing area should be disinfected with a solution of chlorine of 200 ppm. This solution should be sprayed on all of the tiles inside the washing basin focusing on the floor tiles so all bacteria and others can be eliminated.
6. A daily testing of all tanks should be carried out by the fish Spa designated staff to confirm chlorine levels with a precision test kit or strips.
7. The tanks should have a date of last change of water written on the glass or on a label.
8. A sign with the hygiene standards of the fish spa must be available and visible, for customer consultation.

## GROUNDWATER MONITORING

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

### 1. Purpose

The purpose of this procedure is to provide details for groundwater monitoring.

### 2. Description

There are currently five monitoring wells along and just north of the northern property line site: MW-9 (75 ft), MW-10 (67 ft), MW-11 (60 ft), MW-12 (65 ft) and MW-13 (75 ft). These wells are drilled 6-inch diameter with approximately 5 ft of 8-inch surface casing and open-hole completion. A layer of freshwater was found at each well location with the thickness varying between pre- and post-Hurricane Dorian conditions. These wells will be converted to permanent monitor wells by installing 2-inch diameter, #10 slotted PVC well screen with centralizers, back-filling the 2-inch annulus with sand using a tremie pipe to the top of the water table and cement grouting to the top of an 8-inch diameter, 3-foot "stick-up". Four 4- inch diameter, concrete filled sections of steel pipe shall be cement grouted in place to a depth of 4-feet with an above ground height of 4-feet (see diagram on following pages). A salinity profile should be conducted on each well prior to conversion to permanent status. Another salinity profile should be conducted after the wells have remained undisturbed for one (1)-month and monthly thereafter for first year. The frequency of future salinity profiles will be based on the data from the first two years.

An additional monitoring well will be installed adjacent to the deep disposal well and will also be of the same design as above with the depth and location dependent on the details of the deep well location and construction. This well will be sampled semi-annually for the first year subsequent to the opening of the port.

### 3. Procedure:

- Salinity profiles shall be conducted on MW's 9 - 13 using a YSI Model 30 salinity, conductivity, temperature meter. Readings should be made at one (1)-foot intervals throughout the water column and recorded. Static water level as measured from the designated measuring point should be recorded.
- Groundwater samples from the monitor well associated with the deep disposal well are to be collected for the following parameters: BOD, TSS and salinity.
- Field sampling log sheets are to be recorded for each well indicating field parameters for sampling, samples collected, well depths, depth to water, and observations.
- Samples to be shipped via express courier under chain-of-custody procedures at 4C° to certified environmental laboratory (Test America, Tampa, FL).
- Final report drafted and submitted to GBPA Environmental Department.

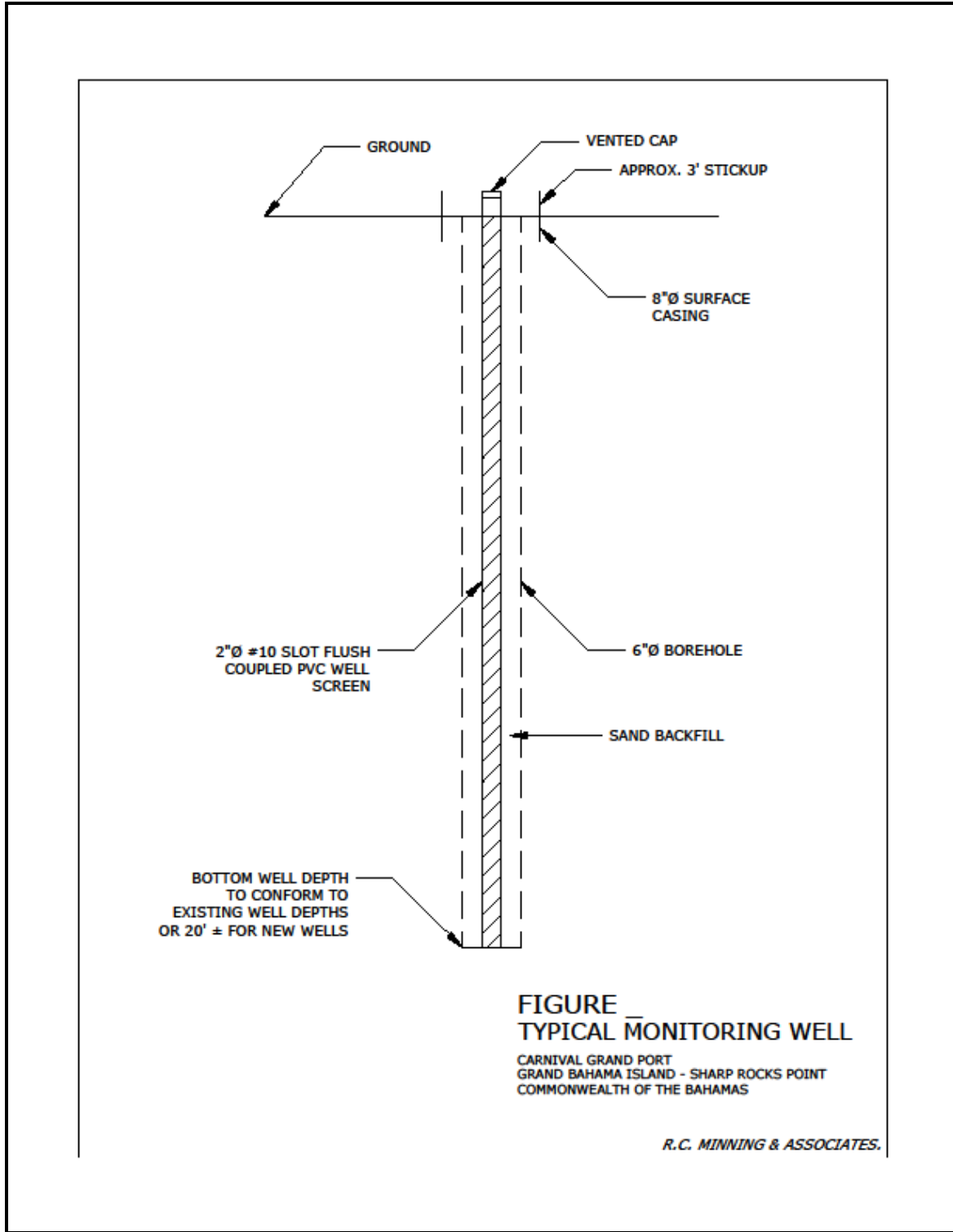
6. If any petroleum hydrocarbon free product is observed in this monitor well during sampling the situation should be reported immediately to the HES Manager

#### **4. Requirements**

A salinity profile should be conducted on MW's 9-13 prior to conversion to permanent status. Another salinity profile should be conducted after the wells have remained undisturbed for one (1)-month and monthly for the first year. The frequency of future salinity profiles will be based on the data from the first two years.

Sampling and testing of groundwater samples from the monitor well associated with the deep disposal well are to be conducted semi-annually for the first two years. The frequency of future salinity profiles will be based on the data from the first two years.





## SURFACE WATER SAMPLING

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

### 1. Purpose

The purpose of this procedure is to provide details for surface water samples from the sea, waterway, and mangrove wetland at Grand Port.

### 2. Description

Surface water samples will be collected from the sea, waterway and mangrove wetland to check water quality. Several sampling points will be located in the beach as well as in the interior beach areas (waterway) once the design of these facilities is concluded. All these sampling points will be located in the areas where the highest concentration of bathers is expected. The waterway sample locations will be identified in the revised EMP before the facility is opened once more information is obtained regarding flushing.

Additionally, samples will be collected from the mangrove wetlands and stormwater collection chambers of the drainage wells (EPA Class V drainage well).

### 3. Procedure:

The sampling of the waterway and beach area will be conducted twice a month. Sample bottles for bacteria analysis must be sterile so as not to compromise the results. Sampler will wear disposable nitrile or latex gloves when sampling.

Several sampling points will be located in the beach as well as in the interior beach areas (in the canal) once the design of these facilities is concluded, according to Blue Flag standards which require at least one sampling point, which must be located where the concentration of bathers is highest. However, considering the extension of the beach and the canal it is anticipated that the beach will have approximately three sampling points and the canal approximately two sampling points. All these sampling points will be located in the areas where the highest concentration of bathers is expected. The sampling points will be identified upon final design (including the management plan of the coastal environment) and consideration of industry standards. These areas of highest concentration of bathers are highly dependent upon the final design and especially upon the coastal environment management plan which will define carrying capacities and zoning for different uses. The EMP will be updated upon final design and the coastal environment management plan to identify the specific sampling locations.

The beach areas must comply with the Blue Flag requirements (<https://www.blueflag.global/criteria>) for microbiological and chemical parameters (Statistical Threshold Value) as follows:

*Escherichia coli* < 250 cfu/100 ml

Intestinal Enterococci < 100 cfu/100 ml

pH 6 to 9

In order to verify the proper flushing of the waterway the following water quality parameters will be tested twice a year:

DO

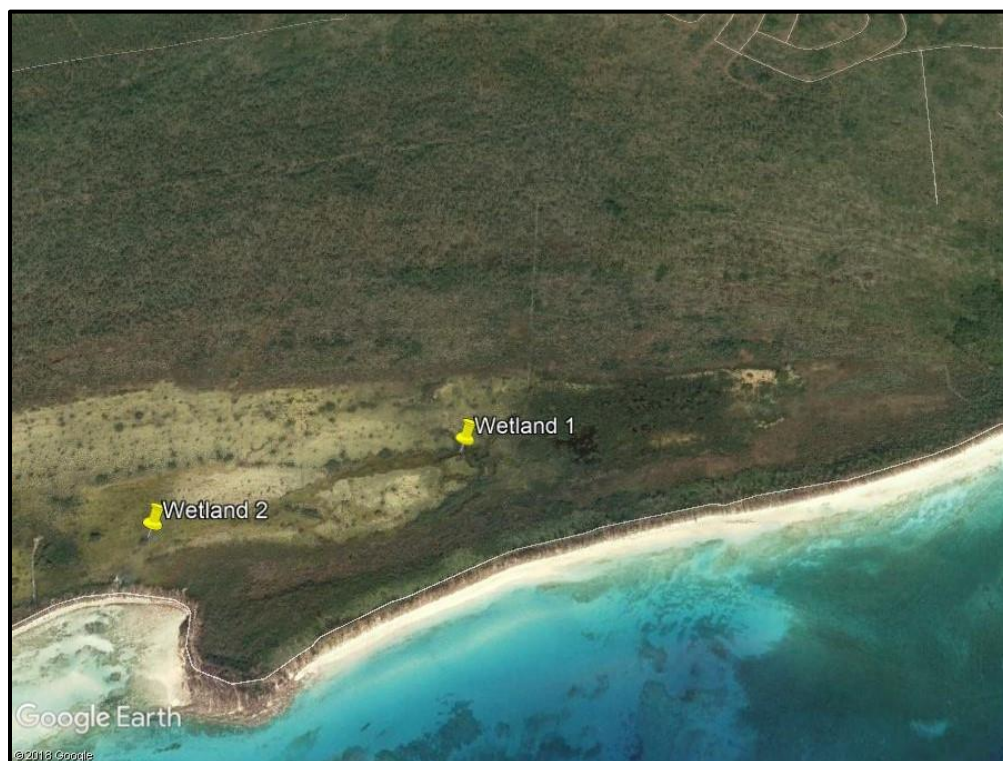
BOD<sub>5</sub>

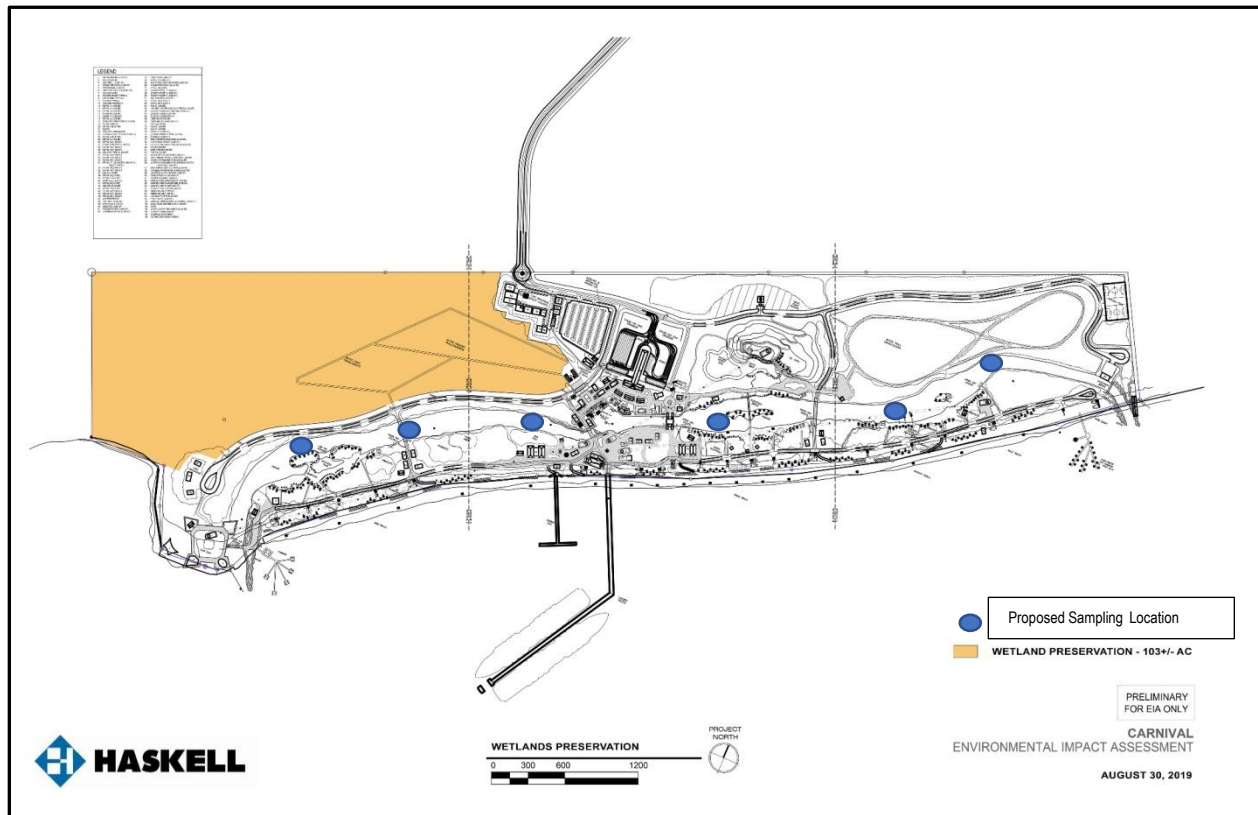
Turbidity

In the case of the stormwater collection chambers the main parameters to be tested will be Oil & Grease and TSS. Based upon U.S.EPA's Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (2008) specifically for asphalt paving the benchmark monitoring concentration of TSS should be 100 mg/L. Oil & Grease will be monitored as a reference because paved areas in the facility are not expected to receive oil spills and if accidentally happened those spills will be cleaned preventing underground disposal. These parameters will be monitored annually.

Sample Collection for the wetland area will be conducted on monthly basis. Samples will be collected and analyzed for the following parameters: BOD, Temperature, TDS, TSS, Dissolved Oxygen, Turbidity, TSS and Fecal Coliform.

Below are proposed sampling locations for the Wetlands:





Canal Surface Water Sampling Locations

Sample bottles for the sampling are to be ordered from the laboratories. Two laboratories that are proposed for use:

Eurofins/Test America – Tampa, Florida

Adam's Analytical – Freeport, Bahamas

Adam's Analytical will be used for all bacteria testing to make hold times are met for analysis and will provide the sterile bottles for sampling and other parameters if possible.

Appropriate sample bottles will be ordered from the laboratories with preservatives if required.

Sampling will be conducted on a date that minimizes holding samples for FedEx shipment schedule. It is noted that since Hurricane Dorian FedEx shipping has not been consistent which may result in longer delivery times. Currently, FedEx ships 3 days per week; Monday, Wednesday and Friday. Samples have to be at FedEx before 10:00am. FedEx shipping schedule should be checked before sample collection to make sure they have not reverted to a 2-day per week schedule.

Sample log sheets will be completed in the field during sampling noting, date, time, field conditions, location, source of sample bottles and preservatives and parameters sampled. Field data collected will be documented along with, appearance, color, and odor notes. Log sheets shall be completed for each sample location.

Samples will be collected using appropriate sampling device. Where a bailer is used it should be a new disposable Teflon bailer using a Teflon coated stainless steel wire. Disposable bailers will only be used once to prevent cross contamination between samples. Should a peristaltic pump be used, it should be fitted with new silicon and polyethylene tubing for each sample location.

Samples will be collected and placed on ice.

A chain-of-custody form will be completed for each event and returned with samples.

Samples to be shipped with ice to maintain hold temperatures until they arrive at the laboratory.

The laboratory is responsible for ensuring all hold times are met for the analysis of samples.

Detailed laboratory report will be reviewed for results and issues identified in the case narrative of the report.

An example sample collection log sheet to be completed is provided on the next page.

Sample Location		Initials	
GPS Coordinates		Weather	
Project Name		Street Address	
Sample purpose		City/ Country	
Site contact		Sampler (s)	
Site conditions		Vehicle	
<b>Sample Container Description</b>			
Sample Analysis			
Container Description			
Container Supplier			
Preservative			
<b>Purging Information</b>			
<b>Casing Diameter (inches):</b>	<b>2</b>	<b>3</b>	<b>4</b>
	<b>5</b>	<b>6</b>	<b>8</b>
	<b>12</b>		
<b>Gallons/foot of Casing:</b>	<b>0.163</b>	<b>0.367</b>	<b>0.653</b>
	<b>1.02</b>	<b>1.469</b>	<b>2.611</b>
	<b>5.875</b>		
Aquifer, Surficial, Lucayan		Condition of Well	
Top of Casing Elevation		3 X Gallons in Well	
Casing Stickup above/below Ground Surface (feet)		5 x gallons in Well	
Purging Equipment		Decontamination Method	
Pump Plumbing Construction		Fuel Powered Units	
Drill Method		Date	
Well Casing Construction		Time Start	
Diameter of casing (inches)		Time Stop	
Gallons per foot		Gallon Pumped	
Depth of Well (measured from TOC)		Purge Time (minutes)	
Depth of Water (measured from TOC)		Purge Rate (gallons/minute)	
Water height in Well (feet)		Well Pumped Dry	
Gallons in well		End Water Level	
<b>Field Data</b>			
Time/Depth			
pH			
Conductivity			
Temperature			
Salinity			
TDS			
<b>SAMPLING INFORMATION</b>			
Sequence #		Color	
Sampling Equipment		Appearance	
Date		Odor	
Time Start		Decon Method	
Time Stop			

#### **4. Requirements**

Results for all sampling events should be maintained and recorded on a excel spreadsheet. Should results be out of criteria, the HES manager shall be notified immediately, and a determination made as to the cause of the elevated levels and if more frequent sampling is required. The pH meter should be calibrated before the analysis.

Samples shall be acquired using appropriate sampling device. Where a bailer is used it shall utilize a two-point calibration. Salinity and Conductivity instrument should be a new disposable Teflon bailer calibrated using a Teflon coated stainless steel wire. Disposable bailers will only be used once to prevent cross contamination between samples. Should a peristaltic pump be used, it shall be calibrated using a known calibration (NIST traceable) standard before use.



## CANAL/WATERWAY MANAGEMENT

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

### 1. Purpose

To prevent pollution of the canal/waterway during construction and operation of the canal/ waterway.

### 2. Description

Grand Bahama Port Authority Town and Planning Regulations.

### 3. Requirements

The below are requirements from the GBPA Town Planning and Development Regulations.

- No combustion engines should be used in the waterway.
- No littering is permitted in the waterways. All debris generated during construction or occupancy activities should be removed (i.e. floatables, litter, etc.) at once. All illegal dumping should be reported to the developer, and then to GBPA.
- All containers, materials, derelict vehicles or other possible refuse items should be properly secured and covered to avoid entry into the waterway or seepage into the groundwater resources.
- Special care should be given to the proper storage and disposal (removal) of pesticides, fertilizers, cleaners, paints, fuel, and other potentially hazardous materials to avoid seepage into the groundwater resources and entry into the waterway. Under no circumstances should these products be stored in an area susceptible to transport during storm events.
- If a spill occurs in the waterway, GPBA as well as the developer should be contacted immediately, to determine the extent of remedial actions to be taken.

### 4. Water Quality

Regarding water quality the canal/water way will be considered a beach. Consequently, several sampling points will be located in the canal once its design is concluded. Blue Flag standards require at least one sampling point, which must be located where the concentration of bathers is highest. However, considering the extension of the canal it is anticipated that the canal will have approximately two to three sampling points. All these sampling points will be located in the areas where the highest concentration of bathers is expected. The sampling points will be identified upon final design and consideration of industry standards. These areas of highest concentration of bathers are highly dependent upon the final design and especially upon the coastal environment management plan (including the canal) which will define carrying capacities and zoning for different uses. The EMP will be updated upon final design and the coastal environment management plan to identify the specific sampling locations.

The sampling frequency will be twice a month.

The canal must comply with the Blue Flag requirements (<https://www.blueflag.global/criteria>) for microbiological and chemical parameters (Statistical Threshold Value) as follows:

*Escherichia coli* < 250 cfu/100 ml

Intestinal Enterococci < 100 cfu/100 ml

pH 6 to 9

The waterway pumping system will include intake screens to prevent entrainment of debris and marine species.

## FUEL BUNKERING

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

Fuel bunkering is an activity that is not part of the services that are offered by Grand Port. However, based on the cruise ship needs, it is a service that may occur at some point in time. This service is an agreement between the cruise ship brand and the fuel provider. Two types of fuel bunkering operations will occur at the Port: 1) marine oil fuel and 2) LNG.

As part of the EMP, Grand Port has contacted the potential parties that may provide marine fuel oil and LNG. The provider for the marine fuel oil bunkering at the Freeport Harbour may likely be the same provider at Grand Port. This will be determined in the future. However, Carnival does have a responsibility to make sure that the procedures in place to meet international standards and that the parties involved in the fuel bunkering operations have spill prevention and counter measure plans in the event of an accidental release. While procedures are captured in this EMP, there is an obligation to review and verify the procedures prior to the first fuel bunkering operation and to work with the parties concerned to make sure that the bunkering operations are conducted in a safe and environmentally responsible manner.

The SPCC plan for the bunkering operations that may take place at the facility is the responsibility for the fuel supplier. The “Grand Port” will review the SPCC to ensure it meets all international and local standard. The SPCC plan will be reviewed and integrated into an overall plan for the facility. The EMP will be revised and copies forwarded to the DEPP and the GBPA.

Grand Port staff will assist with LNG risk management if necessary, such as:

1. Hazard Identification Studies (HazID)
2. Hazard Operability Studies (HazOP)
3. Failure Mode and Effect Analysis (FMEA)
4. Qualitative Risk Assessment (QRA) for the quantification and establishment of safety distances, if applicable.

Port staff will be responsible for documenting the bunkering operations, including but not limited to documenting the ship name, date, time, and type fuel and duration of fueling operation at a minimum.

## MARINE FUEL OIL

The bunkering of marine fuel oil procedures should be no different than those currently in practice at Freeport Harbour where bunkering operations currently occur. Industry Standards to be followed for marine fuel include OCIMF – Guide to Purchasing, Manufacturing and Testing of Loading and Discharge Hoses for Mooring. Additionally, ISGOTT - International Safety Guide for Oil Tankers and Terminals. Information regarding marine fuel oil bunkering and Shipboard Oil Pollution Emergency Plan is presented in **Appendix 10**.

## LNG BUNKERING

- This section is written primarily to disseminate information to port management and staff on the future arrivals of LNG powered ships and bunkering operations. The fuel bunkering of the ships at Grand Port is strictly an arrangement between Carnival-branded ships, other ship brands and the fuel service provider. The LNG will be transported by an LNG carrier from the east coast of the United States. **This is not a service provided by at Grand Port. However, Grand Port will assist wherever possible to make sure the bunkering operations are conducted in a safe manner.**
- Carnival is in the process of expanding the existing fleet with the construction of a new class of ships named the “Excellence Class” also known as the “XL Class.” The XL Class ships are 180,000 gross tons (GT) cruise ships that are 1,130-feet-long (345 meters) with a 6,500-passenger capacity. This class ship is the largest in the Carnival fleet. The XL Class ship or Mardi Gras, named after the first Carnival cruise ship of the series, was completed and delivered in 2020 and is currently homeporting from Port Canaveral, Florida. The new class ship will be the first North American-based cruise ship to be powered by (LNG), part of Carnival’s “green cruising” design platform. An artist rendering of the new XL Class ship is presented in the next figure.



**Artist Rendering of Carnival XL Class Ship (Source: Carnival)**

- Carnival made history with the first ever cruise ships to use LNG, when they took delivery in 2018 of the first cruise ship able to be completely powered by LNG, the AIDAnova. They have an additional ten next-generation cruise ships on order that will also be powered by LNG (both in port and on the open sea) - an innovation that reduces carbon emissions to help protect the environment.
- Carnival is in the forefront of advancing LNG as a fuel source for the cruise industry. One of the keys to establishing LNG as a standard for powering cruise ships is building extensive, safe and reliable infrastructure across the globe for this clean burning fossil fuel. Carnival is working closely with fuel

providers as they help to bring LNG to North America in what will be the first step in building a strong foundation for the future of LNG fuel supply for cruise ships in the region.

- Presented in **Appendix 11** is Carnival Corporation's LNG Bunkering Management and Procedures used in Europe. Additionally, the Bahamas Port Authority Ship to Ship Transfer Code of Practice is included. While an LNG provider has not been contracted at this time, an example of the industry standards for providing LNG bunkering is attached in the Shell LNG Bunkering Synopsis. Additionally, attached in the Shell Bunkering Synopsis in **Appendix 11**, page 30, is the Regulatory Framework including Industry Standards. An LNG Safety Data Sheet is attached.

## HURRICANE PLAN

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

A detailed site-specific hurricane plan will be prepared prior to the opening of the facility and submitted with the revised EMP. The plan will be similar to those written for other Carnival ports operating in the Caribbean. Below is an example from Mahogany Bay Cruise Center in Roatan, Honduras. This Hurricane Plan will be updated prior to port commissioning to address specific issues associated with the Grand Port Cruise Center and will be provided to the GBPA for review and comment prior to implementation. The updated plan will address both construction and operational project phases.

In addition to the GPCC hurricane plan, each construction contractor and vendor will be required to develop a hurricane plan for review and approval by GPCC.

### Introduction

1. Hurricanes represent the most probable natural threat to the Grand Port Cruise Center (GPCC) and surrounding areas. During the tropical storm season (June through November) we must be well prepared to meet the potential threat of hurricanes.

2. It is incumbent upon each employee of the Cruise Center to be prepared in advance for both man-made and natural disasters such as hurricanes and earthquakes.

3. Destructive winds and hurricane categories are rated on the Saffir-Simpson Hurricane Scale as shown below:

- **Tropical Depression – Sustained winds of up to 38 mph.**
- **Tropical Storm – Winds from 39-73 mph**
- **Category 1 Hurricane – Winds from 74 – 95 mph**
- **Category 2 Hurricane – Winds from 96 – 110 mph**
- **Category 3 Hurricane – Winds from 111 – 130 mph**
- **Category 4 Hurricane – Winds from 131 – 155 mph**
- **Category 5 Hurricane – Winds of 156 mph and above**

4. For purposes of this manual, sustained winds in excess of 50 mph will be considered “destructive winds”.

5. Specific plans will be developed by each vender for review and concurrence with the overall GPCC Hurricane Plan.

### Preparation:

1. Prior to the onset of hurricane season, the GPCC shall meet with the GBPA to discuss any update to response protocol.

2. GM shall schedule a meeting with Department Heads to discuss the GPCC Hurricane Plan and any update/revisions that may be needed.

3. GPCC's internal Emergency Disaster Response Team membership (EDRT) is updated by the GPCCSO and a meeting held to begin preparations for the upcoming tropical storm season.

4. The EDRT will be made up of the following personnel:

- a. General Manager
- b. Head of Maintenance
- c. GPCCSO
- d. Beach Manager
- e. Head of Accounting
- f. Administrative Assistant g. Health & Sanitation Supervisor
- g. Chairlift Supervisor
- h. IT
- i. Storage Manager
- j. Maintenance Personnel (Minimum of six maintenance personnel)
- k. Security Personnel (minimum of six security officers)
- l. Beach Personnel (minimum of four beach personnel)

5. The Head of Maintenance will take an inventory of the previous season's emergency supplies prior to the onset of Hurricane Season to ensure the following items are both in stock and in good working order:

- a. 3 megaphones
- b. 400 gallons of bottled water (100 gallons must be in storage always and the other 300 will be added in the event of a hurricane approaching)
- c. 50 sheets 5/8" plywood
- d. Main back-up generator & Beach back-up generator and fuel for two week's operation.
- e. 12kw portable gasoline generators (2) – (with fuel for two week's operation)
- f. Chainsaws (2)
- g. 20 flashlights with a two week supply of batteries
- h. 20 sets of rain gear
- i. 14 blankets and mattresses
- j. One week's supply of food rations and plastic utensils for 80 employees – Being supplied by CCO
- k. Electric stove

- l. Electric Jumbo rice cooker
  - m. Minimum of 1000 garbage bags
  - n. 500ft of 1/2" polypropylene rope, 300ft of 3/4" polypropylene rope
  - o. Vinyl tarps: 7' x 9' (21), 9'x11' (12), 20'x30' (3), 10' x 12' (8), 8' x10' (4)
  - p. Ratchet straps: 2" x 14" (6), 2" x 27" (17)
  - q. 2" x 40", straps (15)
  - r. Ratchet with no straps (22)
  - s. Leather gloves (50 pair)
6. The GPCCSO will ensure that the following items are in stock and good working order:
- a. Two portable AM/FM battery operated radios
  - b. Satellite phone
  - c. Four emergency first aid kits
  - d. Coordinate through IT cleaning of all tree branches that may cause any damage to all CENCOM cameras.
7. The General Manager will ensure a complete photo inventory of entire facility is up to date and multiple copies stored in safe locations. IT will be involved in providing photographic evidence.

### **HURRICANE ALERT – 72 HOURS PRIOR TO FORECAST OF SUSTAINED 50 MPH DESTRUCTIVE WINDS**

Upon receiving an alert of a forecast storm with destructive winds of 50 mph or more in the area, the following actions shall be taken:

- a. **General Manager.** will advise scheduled cruise lines that the Cruise Center will be closed when sustained winds reach 30 mph.
- b. Ships will not be allowed to remain at the pier when sustained winds reach 30 mph
- c. The EDRT will convene to discuss situation followed by full staff briefings by department heads to ensure expectations are understood by each person
- d. **Head of Accounting and Administrative Assistant** will notify each vendor of their obligation to protect their store and goods. Also, all cart owners must be advised that all inventories within the carts must be removed and stored outside the premises.
- e. **Head of Accounting** will increase PETTY CASH to \$10,000.00, distribute as follows;
  - i. Administration \$5,000.00
  - ii. Maintenance \$2,500.00



## iii. Beach \$2,500.00

f. **Maintenance Manager** will be in charge of the following duties:

1. Inform employees of possible threats of the hurricane alert.
2. General checkup of all equipment.
3. Functional check of emergency/backup generators, verifying that they are fueled up and operating.
4. Install storm shutters and plywood on windows at the top of each building.
5. Fill all vehicles, gas containers and ensure generator tanks are full as well as any other needed equipment.
6. Verify with Gardening team that all trees that can be prone to falling have the correct support around barks.

g. **Health and Sanitation Supervisor** will be in charge of the following duties:

1. Coordinate strap-down of the WWTP at the Cay entirely and will strap-down the lids for the WWTP at the Plaza
2. Confirm all lids of the lift stations at the Cay are secure
3. Coordinate cleanup of the downspout filters and all inlets.

h. **Beach Manager** will begin completing the following tasks:

1. Place all water sport equipment at the highest location at the Cay which would be the Hurricane Hole restaurant after obtaining permission from Carnavaleto to use their facilities.
2. Place beach chairs in piles and tie them on poles in Hurricane Hole facilities.
3. With the help of IT, all computers, printers, cash registers and all electronics such as televisions and refrigerators from Cabanas are to be moved to the main warehouse.
4. All snorkeling equipment is to be moved to the Employee Break.
5. All floats are to be moved to Employee Break, office and bathrooms at cay.
6. All water clams are to be chained up to the tree areas in the back of Hurricane Hole restaurant. Blue Lagoon beds will be tied down within the same area using ratchet straps.
7. All cabana beds are to be chained up to the tree areas in the back of the Hurricane Hole restaurant.
8. Blue Lagoon mattresses and cushions are to be placed in the office and/or bathroom at the Cay.
9. Remove football field goal posts and place them in the tree areas in the back of Hurricane Hole and they are to be secured with ropes to poles or trees.
10. All meshes and accessories are to be placed in the Cay office.
11. Secure water sport, kayak booth, storage room and beach rental roofs with ropes.

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**HURRICANE WATCH – 48 HOURS PRIOR TO FORECAST OF SUSTAINED 50 MPH DESTRUCTIVE WINDS****a. Beach Manager** will be in charge of the following duties:

1. Secure trash bins, beach loungers, chairs, benches, umbrellas, clamshell umbrellas, ash trays and all loose objects that could become a hazard.
2. Remove the swim lines and swim zone marker buoys and store in a safe location.
3. Stack all Beach Loungers and secure all loose items that cannot be stored indoors.
4. Remove all garbage from the site.

**b. Maintenance Manager** will be in charge of the following duties:

1. Initiate use of generators for all areas.
2. Remove outdoor lighting fixtures, hanging signage and outdoor ceiling fans where possible.
3. Remove carts from the Plaza area to the Building 8.
4. Lash down mobile items inside plaza that cannot be stored (all trash cans to be placed in bathroom 7 and all chairs from Plaza to be secured in Craft Market).
5. In coordination with Head of Accounting and Storage Manager, ensure company material, supplies and equipment are stored in a satisfactory manner.
6. Secure barge and pilot boat.

**c. GPCCSO** will be in charge of the following duties:

1. Remove all unauthorized vehicles from the property.
2. Limit facility access to tenants, their employees and Cruise Center staff.
3. Secure all security gates.
4. Ensure that all MBCC building and tenant properties units are secured and locked.

**d. Health & Sanitation Supervisor** will be in charge of the following tasks:

1. Install chlorine canisters in all potable water cisterns and start measurement of levels manually.
2. Coordinate removal of all trash from the facility.
3. Remove all pumps used for misting systems set throughout the premises.

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**HURRICANE WARNING – 24 HOURS PRIOR TO FORECAST OF SUSTAINED 50 MPH DESTRUCTIVE WINDS**

- a. **General Mgr.** will be in charge that after all other tasks are completed; remaining staff that is not part of the EDRT is released as soon as possible.
- b. **Maintenance Manager** will be in charge of the following duties:
  1. Ensure that Cruise Center vehicles are fueled and parked at Building 8.
  2. Dispatch all employees 6 hours prior to arrival of storm once everything has been checked and secured.
  3. Install pump inside containment of Fuel Room.
- c. **GPCCSO** will be in charge of the following duties: 1. Restrict Cruise Center access to authorized persons only.
- d. **Health & Sanitation Supervisor** will be in charge of the following tasks:
  1. Water Systems will be shut down. The chlorine and muriatic acid tanks at the Cay's pump room will be removed and placed in the chemical warehouse as well as pumps and pressure tanks.
  2. Chlorine feeders and Sym/tec filters of both Waste Water Treatment Plants will be removed from canisters and placed in the Pump Room at the Plaza.
  3. The Waste Water Treatment Plants at the Plaza and Cay will be manually forced to discharge to their lowest level.
  4. Bolt down lids for Pre-Equalization tanks.
- e. **Head Accounting**, in coordination with IT, will be in charge of the following tasks:
  1. Unplug all computers and electrical appliances and place in a safe/elevated position. Cover all electronic equipment with plastic or garbage bags.

**Hurricane Duration**

1. All personnel not remaining in the RCT office building will be offered the opportunity to depart for their homes or shelters no later than 6 hours prior to the onset of a forecasted hurricane landfall.
2. Four contracted armed security officers will remain in the facilities during the storm.
3. Other employees may seek safe haven in the facilities if it is felt that their houses may not withstand a hurricane.

**Post Hurricane Recovery**

1. Rapid recovery from hurricane damage and return to full operations shall be the number one priority.
2. All members of EDRT should report for duty immediately after storm passing (or as soon as it is safe to do so) to prevent looting and assist with damage assessment. Rally Points for staff who are not able to make their way to Cruise Center will be SUN Station (Bojangles) in Coxen Hole, Bojangles in French Harbor, Oakridge area (main entrance next to the Texaco station), Los Fuertes (in front of Almendros) and Sandy Bay (main entrance of Balfate community).
3. The General Mgr. will establish communication with Carnival Corporate Office (CCO) management to give status report and list of any urgently needed supplies.
4. Where possible, employees are expected to report for duty within 12 hours after destructive winds are no longer present.
5. Goal is to return to operation within 48 hours of the storm's passing.
6. GM will keep CCO management and Port Agent updated on status of expected return to normal operations so scheduled vessels can be notified.
7. All Managers will check their areas and confirm via email to GM status of their areas. If damages exist, these will have to be detailed and photographic evidence should be provided. If no damages occurred, this will also be advised in email.
8. A new inventory will be completed by PFSO of all Hurricane Emergency supplies. If inventory is utilized for any of the before mentioned activities, they must be restocked as quickly as possible. PFSO will coordinate purchasing with Maintenance Manager.
9. All computers and electrical appliances will be plugged in and tested for proper functioning.

**Post Hurricane Inspection of Tenant Property**

1. GPCCSO will do an inspection of stores to identify damages of tenant properties. A list will be provided to GM to confirm status of operation. This information will include an approximate amount of days for reopening of store if damages occur.
2. GM will send report to CCO and send frequent updates as to confirm full reopening of all stores.

**Potable Water Start-Up Procedure**

1. Head of Maintenance and Health & Sanitation Supervisor and person in charge of water supply will verify that main tank (Jerry Hynds tank) is undamaged and that water is being supplied without any problems to MBCC. If main tank is damaged, immediate repairs will be requested to owner.
2. Verification that all plumbing lines are working properly. If any leakages are found, those will be repaired immediately.
3. Verification of pump rooms stability, including pressure tanks and pumps.

4. Verification that cisterns are all sound and stable as well as lids for the cisterns and Pre-equalization tanks. If any damages are done to the structure, immediate repairs will be scheduled by Maintenance.
5. All water points will be checked to confirm its chlorine levels and pH are complying with allowed levels. If all is confirmed stable, and energy is stabilized, Culligan System will be reinitiated. Chlorine and Muriatic Acid tanks will be reinstalled in the pump rooms. After a 1 day of operation is analyzed through the discs and calibration sheet, and if all parameters are met, the canisters will be removed from all four cisterns and the system will be run only by Culligan System.
6. Verification that all rain water filters and screens are stable and cleaned up if required.
7. For the following 7 days, chlorine levels will be checked two times each day, with immediate response if any levels are off the allowed parameters.
8. For the following 7 days, water analysis for *E. coli* and Total Coliforms will be done on site in MBCC's laboratory to confirm the microbiological analysis comply with requirements of the Public Health Procedures.

### **WWTP Start-Up Procedure**

1. Confirm the stability of the structure of the Cromaglass tanks and the preequalization tanks in both Plaza and Cay. The following equipment need to be checked:
  - a. Pre-filters located in outlet of main tank (Jerry Hynds tank)
  - b. All plumbing that leads the influent to the Pre-equalization tank and into the Cromaglass
  - c. Pipe that connects both Cromaglass tanks
  - d. All plumbing that leads the effluent to the drain fields.
  - e. All lids of the Pre-equalization tanks and Cromaglass Plants
  - f. Pumps, venturis and electric panels
  - g. Lift stations at the Cay If there are any of the parts that have been affected, Maintenance will work immediately to do the necessary repairs.
2. Checkup of the drain fields. Confirm all PVC pipes are stable and there are no leakages. If the drain field is flooded at the Cay, the sand filter will be enabled. If the drain field is flooded at the Plaza, a pump truck will be hired to suction accordingly.
3. Reinstall Sym/Tech filter and chlorinators.
4. If all components are confirmed to be stable, immediate samples will be taken on a daily basis of settleometer, DO and pH.
5. Maintenance Manager and Health & Sanitation Supervisor will perform a test cycle for immediate checkup of the panels and the timers, confirming that the cycles have not been affected. If so, proper modifications will be done.

6. Immediate laboratory samples will be taken to Agroindustriales Laboratory (certified laboratory located in San Pedro Sula) for analysis of both influent and effluent.

## FIRE PLAN

Prepared/ Reviewed by		Document No:		Date Released on:	
Approved by:		Revision No:	0.00	Next review date:	

A detailed fire plan will be developed once the design of the facility has been finalized and prior to the facility opening. The revised EMP will include the site-specific fire plan which will be submitted to the Department of Environmental Planning and Protection and the Grand Bahama Port Authority. Given the distance from Grand Port to downtown Freeport, Grand Port cannot rely solely on the Royal Bahamas Police Fire Branch. Grand Port will have a firefighting system installed with water storage tank and fire hydrants. Additionally, other firefighting equipment will be present at the facility, which include portable cart mounted pumps with hoses for extracting water from the waterway and various fire extinguishers.

- Provide a site tour to Royal Bahamas Police Fire Branch and discuss port fire plan.
- The plan will include the identification of muster stations for guest and staff and evacuation plan in the event of an emergency.
- Understand Evacuation and Emergency Response Plan
- Fire Drills
- Fire Prevention and Risk Management
- Internal Emergency Plan Activation
- Incidence Command Center
- Incident Commander and hierarchy of command
- Communication Internally and with Royal Bahamas Police Fire Branch
- Training of Staff on Equipment
- Training of Staff on Personal Protection Clothing, Gloves, and Boots
- Training of staff on Self Contained Breathing Apparatus
- Training of staff for firefighting with hoses
- Training of staff in the types and usage of fire extinguishers
- List and Location Map of Flammable materials including SDS's included in SDS book
- Procedures for storing Flammable Liquids and the use of Flammable Storage Liquid Cabinets
- Storing of Flammable liquids in appropriate fuel containers
- Location map of Class and Type Fire Extinguishers, Fire Fighting Equipment, Hydrants and Hoses, and other Firefighting Equipment
- Weekly checks of Fire Extinguishers and Annual Inspections

Grand Port staff will consult with experts as well as from the corporate staff in developing the plan and provide the necessary equipment and personal protective clothing to emergency response staff. The EMP will be revised once the details of the plans are finalized.

**Appendix 12 includes FIRE PROTECTION DESIGN CRITERIA.**

See **Appendix 16** for an example of a Fire Emergency Plan and the Grand Turk Cruise Center Internal Fire Procedures Plan. This will be adapted to the “Grand Port” facility in freeport and included in the revised EMP before opening.

Potential List of Flammable Materials that may be present at the Grand Port. This list will have to be revised based on actual inventory present and locations stored.

Flammable substances include, but are not limited to:

- Gasoline
- Isopropyl alcohol
- Acetone
- Cleaning Agents
- Liquid Propane Gas
- Aerosol Cans
- Paint Thinner
- Paint Stripper
- Turpentine



## Appendices

*Please note that these appendices are templates. This version of the EMP will be revised prior to the opening of the Port. As more information becomes available, specific procedures will be incorporated into the revised document.*