



# Environmental Management Plan WSC South Bimini Mains Project



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## Environmental Management Plan

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## Executive Summary

The Water and Sewerage Corporation (WSC) of The Bahamas has received financing from the Inter-American Development Bank (IDB) to expand and improve the water supply and distribution systems in The Bahamas. The South Bimini mains project includes installation of new mains in two areas of the island:

1. Airport Road; and
2. Port Royal residential community.

There are currently no water mains in these two areas. The Airport Road mains will run for 1.76 miles along the Airport Road between the Bimini International Airport and the Buccaneer Point community. The Port Royal residential community was constructed prior to the Subdivision Act's requirement for the provision of water and sewerage systems. The mains will be installed for the Port Royal residential community, running for 1.89 miles.

Water will be provided through a connection to the existing 4-inch water mains starting outside of the Bimini Cove Resort and Marina. Water is produced on North Bimini at the Fluence water facility at Resorts World Bimini through a franchise agreement with WSC and piped along with seabed into South Bimini.

South Bimini is located in the northern Bahamas and is one of two islands comprising The Biminis with North Bimini being the other. The Biminis are west of Andros and southwest of Grand Bahama. South Bimini's topography is flat, and it is connected to North Bimini by ferry services. The population of The Biminis (North and South) is 2,361 (BNSI, 2024).

The Environmental Management Plan (EMP) seeks to address generalized environmental and social issues associated with similar projects and previous research done in South Bimini as environmental baseline field data collection was not required for the project by the Department of Environmental Planning and Protection (DEPP).

## 1.0 Introduction

The Water and Sewerage Corporation (WSC) of The Bahamas has received financing from the Inter-American Development Bank (IDB) to expand and improve the water supply and distribution systems in The Bahamas. The IDB activated the Conditional Credit Line for Investment Projects (CCLIP) and First Individual Operation for The Bahamas Water Supply and Sanitation Systems Upgrade Program for \$100 million to the Water and Sewerage Corporation. The loan contract was executed in February 2025, with \$50 million being the first loan operation to be implemented over a five-year period.

The specific objectives of the first loan operation are to:

- Improve coverage of potable water supply and wastewater services in New Providence and the Family Islands;
- Improve operational and financial performance by reducing Non-Revenue Water (NRW) in the Family Islands and increasing smart metering in New Providence; and
- Improve governance through institutional strengthening and supporting the modernization of the policy, legal and regulatory framework for WSC and the water and sanitation sector.

The objectives will be achieved through the following components:

- **Component 1: Non-Revenue Water Reduction and Establishing Advanced Metering Infrastructure** (US\$33,000,000). This component will finance an NRW Reduction Contract to address physical and commercial losses in the Family Islands.
- **Component 2: Institutional Strengthening** (US\$3,500,000). This component will finance institutional strengthening activities of the Utilities Regulation and Competition Authority (URCA) as proposed economic regulator of the water and sewerage sector and the Department of Environmental Planning and Protection (DEPP) as proposed environmental regulator of water and sanitation.
- **Component 3: Access to Potable Water Supply** (US\$8,000,000). This component will finance increased coverage to piped, potable water in New Providence and the Family Islands with due consideration to resilience to climate change and natural hazards.
- **Component 4: Wastewater Collection and Treatment** (US\$3,000,000). This component will finance urgent investments in the sewerage system in New Providence that will improve the quality of wastewater services.

The South Bimini mains project is a part of Component 3 of the Program and includes installation of new mains in two areas of the island (see Figure 1-1):

1. Airport Road; and
2. Port Royal residential community.

Main sources of water supply for dwellings in Bimini as of 2022 are (BNSI, 2025):

- Public piped into dwelling
- Public piped into yard
- Private piped into dwelling
- Public well or tank
- Rain water system

There are currently no water mains in the two project areas. The Airport Road mains will run for 1.76 miles between the Bimini International Airport and the Buccaneer Point community. The mains will be installed for the Port Royal residential community, running for 1.89 miles, starting at the Bimini Cove Resort (see Figure 1-2).

South Bimini is located in the northern Bahamas and is one of two islands comprising The Biminis with North Bimini being the other (see Figure 1-3). The Biminis are west of Andros and southwest of Grand Bahama. South Bimini's topography is flat, and it is connected to North Bimini by ferry services. The population of The Biminis (North and South) is 2,361 (BNSI, 2024).

The Environmental Management Plan (EMP) provides mitigation measures for implementation of the mains project. The EMP bases these measures on environmental and social impacts associated with similar projects and utilizes previous studies and research done in South Bimini as environmental baseline field data collection was not required for the project by the Department of Environmental Planning and Protection (DEPP). The EMP is also based on the Inter-American Development Bank (IDB) Environmental and Social Performance Standards as outlined in Section 1.1.

## **1.1 Alignment with IDB Environmental & Social Performance Standards**

For the Port Royal mains installation, the following Environmental and Social Performance Standards (ESPS) are being followed:

### **1. ESPS 1: Assessment and Management of Environmental and Social Risks and Impacts**

ESPS 1 is the basis of the EMP, requiring systematic identification, assessment, and management of potential risks throughout the project life cycle. In Port Royal, anticipated risks include construction-related dust, noise, localized water pooling during rain events, vegetation clearance along road verges, and short-term access disruptions for residents and property owners.

The Port Royal alignment passes through a canal-based residential subdivision with compacted rock and sand roadways, natural vegetation buffers, and a mix of elevated seasonal and permanent homes. While the area is not formally urbanized, it includes utility easements and well-defined property boundaries, which require careful coordination to avoid nuisance impacts and ensure right-of-way access is respected.

From a social perspective, the project addresses long-standing water security gaps in the South Bimini community. Many homes depend on private wells, rainwater catchment, or bottled supplies. Timely installation of the water mains will reduce household vulnerability, support public health, and enhance resilience for both permanent residents and seasonal visitors. The EMP embeds clear community engagement protocols, including grievance redress, to ensure residents remain informed and concerns are addressed throughout implementation.

## **2. ESPS 2: Labour and Working Conditions**

This standard ensures that all workers engaged in the project are treated fairly, operate under safe conditions, and have access to grievance redress mechanisms. For this project, ESPS 2 requires that the contractor provide proper Personal Protective Equipment (PPE), training on equipment and safety procedures, and fair terms of employment to both WSC staff and contracted workers. It prohibits child or forced labour and requires measures to prevent discrimination, harassment, or gender-based violence in the workplace. In the context of South Bimini, ESPS 2 also underscores the importance of hiring locally where possible, thus providing income opportunities while ensuring workers are safeguarded under a clear Labour Management Procedure (LMP).

## **3. ESPS 3: Resource Efficiency and Pollution Prevention**

ESPS 3 is applicable to the Port Royal water mains works due to the nature of construction activities involved namely, excavation, material handling, vehicle and equipment operation, and temporary storage of supplies, which inherently generate solid waste, noise, dust, and pose risks of fuel or lubricant spills. The applicability of this standard is based on the potential for environmental degradation linked to pollution and inefficient resource use.

While the project's physical footprint is narrow and localized along a roadside corridor, site conditions such as unpaved shoulders, sandy soils, and the lack of formal drainage infrastructure elevate the risk of erosion, sedimentation, and surface runoff during rainfall events. Without proper mitigation, these conditions could lead to particulate emissions, water quality degradation, and short-term disruption of nearby drainage channels.

To comply with ESPS 3, the Contractor will be required to implement resource efficiency and pollution prevention measures, with oversight from WSC and the supervising engineer. Additionally, all machinery must be regularly serviced to reduce emissions, and fuel or chemical storage must follow national environmental guidelines to prevent accidental releases. Given the scale and nature of the works, with appropriate mitigation, the residual environmental impacts are expected to be low, localized, and fully manageable.

## **4. ESPS 4: Community Health, Safety, and Security**

Port Royal is a low-traffic residential community where roadways are shared by pedestrians, vehicles, and seasonal property owners. ESPS 4 is triggered due to the need to protect community members from construction-related risks. This includes maintaining access to homes, controlling dust and noise, and ensuring that excavation zones are clearly marked and secured. Although heavy machinery use will be limited, safety signage, work zone barricades, and daily supervision will be implemented to safeguard residents and workers.

The community's proximity to the canal means that extra care must be taken to prevent construction debris or contaminants from reaching the waterway. While direct runoff is unlikely due to the positioning of homes and vegetation buffers between the road and canal, proper housekeeping will be essential. The project will also promote sanitation, and hygiene measures on site (workers will be required to access portable toilets at laydown yard).

By applying ESPS 4, the project ensures a proactive approach to minimizing disturbance, enhancing safety, and protecting the well-being of the Port Royal community during the construction phase.

## **5. ESPS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources**

The Port Royal works trigger ESPS 6 due to the presence of native roadside vegetation and proximity to canal-side ecological buffers. While the project's area of influence is not in protected areas, Key Biodiversity Areas (KBAs), or Important Bird Areas (IBAs), it contains vegetation typical of coastal shrublands, classified under the Caribbean Vegetation Classification System (Areces-Mallea et al., 1999) as "Coastal Scrub and Shrubland of Developed Areas."

Vegetation along the road shoulders includes salt-tolerant plants, shrubs, and other native plants that help stabilize the soil and provide habitat for fauna, such as birds, insects, and small reptiles. Tree removal is not expected, and no endangered species have been recorded during baseline surveys conducted by the WSC Project Management Unit.

To comply with ESPS 6, the Contractor must limit clearance to the minimum required footprint and apply restoration practices post-installation. All vegetation management will follow national environmental regulations, including those under the Forestry Act (2010), and be coordinated with the Department of Environmental Planning and Protection (DEPP) where relevant. With proper implementation, residual biodiversity impacts are expected to be negligible.

## **6. ESPS 9: Gender Equality**

ESPS 9 emphasizes equitable access to project benefits and opportunities for both men and women. In The Bahamas, men traditionally dominate construction-related employment, while women bear a disproportionate share of responsibility for household water management. By applying ESPS 9, the project can actively promote women's participation in employment opportunities and ensure that contract documents include equal pay and non-discrimination provisions.

## **7. ESPS 10: Stakeholder Engagement and Information Disclosure**

This standard requires transparent, inclusive, and continuous engagement with affected communities and stakeholders. For this project, ESPS 10 involves providing timely information about works, water service interruptions, and anticipated benefits; holding community meetings; distributing notices through accessible channels; and operating a functional Grievance Redress Mechanism (GRM). By implementing ESPS 10, the project ensures accountability, builds trust with communities, and creates space for local feedback to shape project delivery.

For the Airport Road mains installation, the following Environmental and Social Performance Standards (ESPS) are being followed:

### **1. ESPS 1: Assessment and Management of Environmental and Social Risks and Impacts**

ESPS 1 is the basis of the EMP, requiring systematic identification, assessment, and management of potential risks throughout the project life cycle. Under this component, site-specific risks such as dust emissions, noise, vegetation disturbance, localized erosion, and potential disruption to community

access have been identified. These impacts are addressed through tailored mitigation measures, contractor supervision protocols, and site-level monitoring plans. Roles and responsibilities are clearly delineated between the WSC and its Contractor, ensuring that the mitigation hierarchy is applied effectively, first avoiding impacts where possible, then minimizing, restoring, or offsetting residual effects.

The Airport Road corridor in South Bimini is a vital transportation link for residents, workers, and tourists. Not only is it the “main” road, but it is also the only road that leads directly from the airport to the ferry, with few side roads for residential communities. Its proximity to the airport, ferry terminal, and tourism-based businesses means even short-term disruptions may have notable effects.

Additionally, given the reliance on rain catchment potable water, delays in completing the mains extension risk prolonging water insecurity for the airport, residents and seasonal property owners. These social considerations elevate the urgency of timely execution, community engagement, and transparent communication, all of which are embedded in the stakeholder engagement and grievance redress provisions of this EMP.

Through this localized application of ESPS 1, the project aims to minimize residual environmental risks while maximizing long-term social and infrastructure benefits for Bimini’s residents and visitors.

## **2. ESPS 2: Labour and Working Conditions**

This standard ensures that all workers engaged in the project are treated fairly, operate under safe conditions, and have access to grievance redress mechanisms. For this project, ESPS 2 requires that the Contractor provide proper Personal Protective Equipment (PPE), training on equipment and safety procedures, and fair terms of employment to both WSC staff and contracted workers. It prohibits child or forced labour and requires measures to prevent discrimination, harassment, or gender-based violence in the workplace. In the context of South Bimini, ESPS 2 also underscores the importance of hiring locally where possible, thus providing income opportunities while ensuring workers are safeguarded under a clear Labour Management Procedure (LMP).

## **3. ESPS 3: Resource Efficiency and Pollution Prevention**

Although the works are relatively small in scale, ESPS 3 is applicable given the potential for local environmental disturbance during trenching and installation. The Airport Road is an inland, low-lying corridor with uneven, partially paved and rocky surfaces. These conditions lead to localized ponding during heavy rainfall, but there is no formal stormwater drainage system or significant surface runoff.

To align with ESPS 3, contractors will be required to implement resource-efficient practices and pollution prevention measures, with oversight from WSC and the supervising engineer. Additionally, all machinery must be regularly serviced to reduce emissions, and fuel or chemical storage must follow national environmental guidelines to prevent accidental releases. Given the scale and nature

of the works, with appropriate mitigation, the residual environmental impacts are expected to be low, localized, and fully manageable.

#### **4. ESPS 4: Community Health and Safety**

ESPS 4 highlights the obligation to protect workers and surrounding communities from potential health and safety risks associated with construction and operations. In this project, that means ensuring traffic safety during pipe laying and equipment transport, minimizing dust and noise, and clearly communicating service disruptions. It also requires protocols for the safe handling and transportation of hazardous materials, measures to prevent the spread of communicable diseases (e.g., flu and respiratory illnesses), and plans for fire and life safety in worksites. The project will also promote sanitation, and hygiene measures on site (workers will be required to access portable toilets at laydown yard).

By applying ESPS 4, the project reduces community-level risks and enhances overall resilience to health and safety threats.

#### **5. ESPS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources**

The potable water mains installation along the South Bimini Airport Road corridor triggers ESPS 6 due to the presence of native roadside vegetation and potential incidental habitat for common fauna. Although the alignment does not traverse any formally designated protected areas, Key Biodiversity Areas (KBAs), or Important Bird Areas (IBAs), it is flanked by naturally vegetated buffers that provide ecological functions, including soil stabilization and wildlife movement for non-threatened species, such as lizards and birds.

Vegetation within the corridor consists primarily of low-lying coastal shrubbery and salt-tolerant groundcover typical of disturbed roadside environments. While no protected species have been identified within the project footprint by the WSC Project Management Unit, vegetation clearance or tree removal, if required, must comply with The Bahamas' national regulatory framework, including the Forestry Act (2010) and relevant DEPP permitting requirements.

The project's activities remain fully consistent with the objectives of ESPS 6, as the design limits vegetation disturbance to only what is necessary for trenching and access. No cumulative or long-term biodiversity impacts are anticipated, and all environmental safeguards support post-construction revegetation and ecological restoration in line with best practices and legal requirements.

#### **6. ESPS 9: Gender Equality**

ESPS 9 emphasizes equitable access to project benefits and opportunities for both men and women. In The Bahamas, men traditionally dominate construction-related employment, while women bear a disproportionate share of responsibility for household water management. By applying ESPS 9, the project can actively promote women's participation in employment opportunities and ensure that contract documents include equal pay and non-discrimination provisions.

## **7. ESPS 10: Stakeholder Engagement and Information Disclosure**

This standard requires transparent, inclusive, and continuous engagement with affected communities and stakeholders. For this project, ESPS 10 involves providing timely information about works, water service interruptions, and anticipated benefits; holding community meetings; distributing notices through accessible channels; and operating a functional Grievance Redress Mechanism (GRM). By implementing ESPS 10, the project ensures accountability, builds trust with communities, and creates space for local feedback to shape project delivery.

Figure 1-1: Locations of South Bimini Mains Installation



Figure 1-2: Port Royal mains location

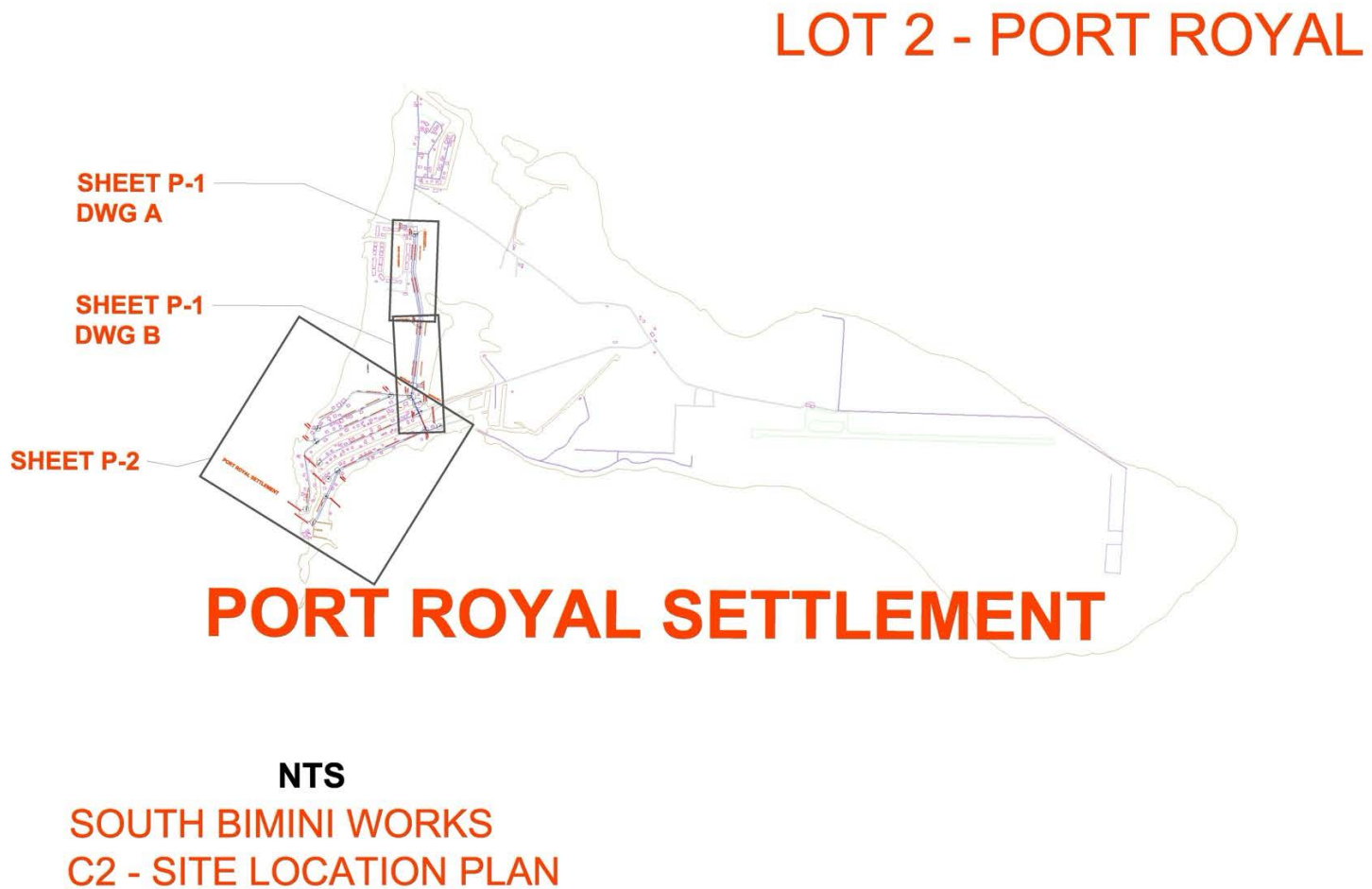


Figure 1-3: Map of South Bimini



Key demographic and social indicators for The Biminis (North and South) are provided below in Table 1-1. Bimini had an 18.8% increase in population since the 2010 Census (BNSI, 2024).

**Table 1-1: Key Indicators for The Biminis**

Indicators	2010	2022
<b>Population for The Biminis</b>		
Total	1,988	2,361
Male	1,063	1,332
Female	925	1,029
<b>Total and Percent Distribution of Population</b>		
Under 15 years No.	465	N/A
%	23.4	N/A
15-64 years No.	1,372	N/A
%	69.0	N/A
65+ years No.	145	N/A
%	7.3	N/A
Sex Ratio	114.92	129.45
Median Age	32.8	N/A
<b>Dependency Ratios</b>		
Young	33.89	N/A
Old	10.57	N/A
Total	44.46	N/A
<b>Population Density</b>		
Area (square miles)	11	11
Population density per square mile	180.7	214.6
<b>Households</b>		
Total number of households	751	1,130
Average household size	2.7	2.1

## 1.2 Objective of the EMP

The objective of the Environmental Management Plan (EMP) for the WSC South Bimini mains project is to detail the mitigation measures to minimize/eliminate any potential negative environmental and social impacts of the proposed project during construction and operation phases.

## 1.3 Scope & Implementation of the EMP

The EMP involves description of environmental and social mitigation measures including climate change resiliency measures that can be implemented during design, construction and operation/maintenance of the project.

Specific roles and responsibilities related to implementation of the EMP are outlined in Table 1-2. Names and cell phone numbers for these individuals will be provided to DEPP once the Contractor is engaged. WSC Project Management Unit will provide oversight of the Contractor. The WSC PMU includes Ms. Kendria Ferguson as the Environmental Monitoring and Evaluation Specialist. Her email address is [wckendferguson@wsc.com.bs](mailto:wckendferguson@wsc.com.bs).

**Table 1-2: EMP Roles and Responsibilities**

Name	Duties
Position:  <b>Project Manager</b> <b>– Pharez Darville</b> <b>801-9393</b>	<ul style="list-style-type: none"> <li>• Coordinates EMP implementation</li> <li>• Consults with outside advisers (e.g. Government, legal or medical)</li> <li>• Investigates incidents, injuries, accidents and spills</li> <li>• Completes incident, injury, accident and spill records (using appropriate forms)</li> <li>• Ensures injured employees are given planned rehabilitation</li> <li>• Maintains all reports and registries (including incident, injury, accident and spill records)</li> <li>• Chairs weekly staff meetings</li> <li>• Ensures all new employees are inducted and managed</li> <li>• Selects contractors</li> <li>• Ensures contractors are inducted and managed</li> </ul>
Position:  <b>Environmental Monitor –</b> <b>Kendria Ferguson</b> <b>822-8362</b>	<ul style="list-style-type: none"> <li>• Provides or sources specialist advice on EMP matters</li> <li>• Trains site superintendent on EMP matters</li> <li>• Trains employees in induction on EMP matters and safe work procedures</li> <li>• Reports serious injuries to relevant Government agency</li> <li>• Reports serious environmental incidences to relevant Government agency</li> <li>• Ensures that monthly inspections are carried out</li> <li>• Reviews incident, injury, accident and spill records (using appropriate forms)</li> </ul>
Position:  <b>Site Superintendent –</b> <b>TBD</b>	<ul style="list-style-type: none"> <li>• Supervises employees to ensure all EMP requirements are met and health, safety &amp; environmental hazards are managed</li> <li>• Ensures health and safety protocols are followed by staff on site.</li> <li>• Supervises staff and any subcontractors</li> <li>• Ensures staff and any subcontractors are issued with information about on-site safety and environmental management objectives and procedures</li> <li>• Ensures visitors have read information about visitor safety</li> <li>• Supervises visitors</li> </ul>

## 1.4 Project Description

There are currently no water mains in the two project areas in South Bimini. The Airport Road mains will run between the Bimini International Airport and the Buccaneer Point community. The planned activities include:

- Trenching and installation of PVC water mains;
- Installation of service lateral connections; and
- Backfilling, site restoration, and reinstatement of affected areas.

Trenching (16 inches) will occur along the southern shoulder of the roadway, which lies adjacent to naturally vegetated buffers. The corridor presents several environmental constraints, including no formal drainage system, sandy and loosely compacted soils, and a high incidence of water pooling during heavy rainfall, all of which influence the timing, logistics, and environmental sensitivity of construction activities.

The Port Royal residential community was constructed prior to the Subdivision Act's requirement for the provision of water and sewerage systems; the community is currently all on septic tanks. The mains will be installed for the Port Royal, running throughout the residential community. The mains project will benefit an estimated 100 lateral connections (roughly 300 persons) in the area. The road infrastructure is modest, with no formal sidewalks, limited commercial infrastructure, and many occupants relying on alternative water sources, including private wells and rainwater catchment.

The planned activities for Port Royal are the same as for the Airport Road. Trenching (16 inches) will be conducted along the edge of existing compacted sand and rock roadways, adjacent to residential properties and vegetated setbacks. While the area is not formally paved, the corridor features stable yet permeable road surfaces. Environmental sensitivities include the absence of engineered drainage infrastructure, localized terrain variation, and the potential for water pooling in depressions following heavy rainfall. These conditions will influence construction phasing, equipment mobility, and the need for active erosion and sediment control measures during implementation.

The mains will be installed on the opposite side of the road of the existing power lines along the Airport Road and within Port Royal.

Water will be provided through a connection on the Airport Road through a 4-inch connection. Water is produced on North Bimini at the Fluence water facility at Resorts World Bimini through a franchise agreement with WSC and piped along with seabed into South Bimini. The connection for Port Royal will start outside of the Bimini Cove Resort and Marina through a 4-inch connection.

The approximate lengths of water mains are provided below in Table 1-3.

**Table 1-3: South Bimini Scope of Works**

<b>Description</b>	<b>Quantity (in feet)</b>	<b>Quantity (in miles)</b>
Airport Road - 4" water main (PVC)	9,300	1.76
Port Royal - 4" water main (PVC)	10,000	1.89

From a social perspective, the project is expected to bring significant public health and equity benefits to households and businesses across South Bimini. Many residents currently rely on private wells, bottled water, or rainwater tanks, which are often expensive, unreliable, or vulnerable to contamination, especially during storms or system disruptions. By expanding piped water access, the Airport Road works will improve reliability, affordability, and safety of water services.

In addition to benefiting households, the upgraded mains will support critical infrastructure such as the airport, clinics, schools, churches, and small tourism enterprises, all of which depend on reliable water to maintain operations, hygiene, and resilience during emergencies. This will also help bolster economic confidence, reduce operational risks in hospitality and transport services, and enhance the island's ability to retain investment and manage long-term growth.

The new infrastructure also enables the interconnection of South Bimini's supply system with the broader island network, reducing reliance on isolated systems and supporting network redundancy and climate resiliency.

## 2.0 Baseline description

The Biminis are found on the Western Great Bahama Bank along with Andros. The Biminis receive an average of 112 cm of rainfall annually and are characterized by productive mangroves and seagrass habitats (Comier et al, 2025). Comier et al (2025) also note that:

*Bimini's mangroves and seagrass beds provide important nursery, foraging, and spawning habitat for at least 175 species of fishes and invertebrates, including the lemon shark (Negaprion brevirostris).*

Mangroves species found in The Biminis include Red Mangrove (*Rhizophora mangle*) and Black Mangrove (*Avicennia germinans*). Seagrass species found in the central lagoon bordering both islands are Turtle Grass (*Thalassia testudinum*), Shoal Grass (*Halodule wrightii*), and Manatee Grass (*Syringodium filiforme*) (Comier et al, 2025). All of these mangrove and seagrass species are protected under the 2021 Forestry Order.

South Bimini is a thin ridge, backed by approximately a mile of extensive wetlands and by rockland (Sullivan-Sealey et al, 2002). South Bimini is also characterized by extensive coppice areas, unlike North Bimini which has been cleared of much of its vegetation. Terrestrial vegetation extent is approximately 691 hectares (1,707.5 acres) for South Bimini (Comier et al, 2025).

The wellfield for The Biminis is no longer operational due to saltwater intrusion (USACE, 2004). Water demand is met by reverse osmosis, private wells, rainwater harvesting and bottled water.

The Pacific Disaster Centre 2021 assessment ranked The Biminis as follows for environmental stress:

- *Bimini ranks 6<sup>th</sup> overall of seventeen Bahamian islands surveyed for environmental stress with 100% of reefs exposed to local threats and 100% exposed to thermal stress. Reefs already under stress may experience more dramatic decline due to the effects of climate change.*
- *Bimini ranks 4<sup>th</sup> highest for exposure to sea level rise.*

Conservation features of priority identified for Bimini in the 2014 Ecological Gap Analysis include:

- |   |                             |
|---|-----------------------------|
| • Deep water                            | • Medium mangroves          |
| • Scrub/Shrub land                      | • Mangrove connectivity     |
| • Coppice                               | • Benthic sand              |
| • Gorgonian slopes                      | • Sandy beaches             |
| • Seagrasses (sparse, medium and dense) | • Piping Plovers            |
| • Nursery habitat                       | • Seabirds of high priority |
| • Marine mammals                        | • Sharks                    |
|   | • Turtle foraging habitat   |

Bird species of significance found in South Bimini include the Piping Plover (*Charadrius melodus*) and White-crowned Pigeon (*Patagioenas leucocephala*). Bimini is also an important site for spawning aggregations of the Nassau Grouper (*Epinephelus striatus*) (Sullivan-Sealey et al, 2002). The deep reef areas of Bimini are important for Caribbean Spiny Lobster (*Panulirus argus*) reproduction and

lobster migrations are also observed, moving southwest from the bank to deeper fringe habitats (Sullivan-Sealey et al., 2002).

The only protected area gazetted for Bimini is the Cat Cay Wild Bird Reserve. The North Bimini Marine Reserve is another important area indicated for protection, but has not yet been gazetted. It represents 21,733 acres considered significant for bonefish flats, mangroves, sand/mud benthos, sandy beach, seagrasses, patch reefs, and tidal creeks. Threats to this proposed marine reserve include unsustainable development, sedimentation and climate change (BNT et al, 2018).

## **2.1 Airport Road Overview**

The following information is provided by the WSC Project Management Unit (PMU):

The Airport Road is a single partially paved carriageway connecting the South Bimini Airport to the ferry dock and adjacent communities. It functions as a critical access and logistics route that supports air-sea transport connectivity, tourism activity, and emergency response. The surrounding area is predominantly undeveloped, with a mix of natural vegetation, open clearings, and limited built infrastructure.

### **Geology**

The underlying geology of South Bimini, including the Airport Road corridor, is characterized by quaternary-age carbonate limestone, which forms the base of the island's geology. The surface layer consists of unconsolidated sandy soils with low organic content, typical of Bahamian coastal environments. These soils are light-colored, porous, and poorly cohesive, offering limited structural support and low compaction stability unless mechanically reinforced.

Observations from the July 2025 field visit by the WSC PMU confirmed that soils along the trench alignment are shallow and heterogeneous, with scattered rock fragments and loosely packed sand, particularly along the unpaved road shoulders (see Figure 2-1). Due to this composition, excavation activities must be carefully phased and promptly backfilled to minimize trench collapse or soil displacement. Because of the flat terrain and absence of defined runoff pathways, sediment transport is not expected to be a significant issue. However, persistent water retention after rain events could affect soil bearing capacity and slow construction timelines if mitigation is not in place.

**Figure 2-1: Airport Road**  
(unpaved road conditions)



The corridor is largely free of fill material or anthropogenic waste, and no evidence of soil contamination or buried debris was observed during the site walk. While the immediate works zone does not intersect ecologically sensitive sites, the presence of protected tree species in the adjacent road verge underscores the importance of careful equipment movement and vegetation avoidance during trenching.

### **Hydrology**

The hydrological regime of the Airport Road corridor in South Bimini is shaped by the island's flat topography, porous limestone geology, and shallow freshwater lens system. Field visits confirmed that the project area lacks formal surface drainage infrastructure. During moderate to heavy rainfall events, surface water accumulates in low-lying, unpaved sections of the roadway and adjacent verges. Due to the compacted soil and limited gradient, these depressions often retain water for prolonged periods, sometimes lasting several hours to days, contributing to localized flooding, waterlogging, and general nuisance for vehicular access and material staging.

According to national hydrogeological assessments, including The Bahamas' Third National Communication to the UNFCCC (2024), the archipelago lacks perennial rivers and instead depends entirely on direct rainfall infiltration as the sole means of freshwater recharge. The freshwater resources occur as thin, lens-shaped bodies that float above saline groundwater, typically situated 0.3 to 1.5 meters below the surface in inland areas like Airport Road. These lenses are highly

susceptible to salinization, particularly due to sea level rise, tidal movement, and surface contamination from anthropogenic activities.

The Airport Road does not intersect any visible watercourses, drainage canals, or mapped wetlands, nor does it fall within a designated stormwater catchment zone. However, its low elevation, averaging less than 2.5 meters above sea level, and underlying limestone substrate place it within the island's high water table zone.<sup>1</sup> Seasonal storm events, particularly during the Atlantic hurricane season (June–November), may temporarily elevate the water table to above-ground levels, turning portions of the corridor into ephemeral wetland areas. These conditions pose construction-phase challenges such as trench wall instability, compromised bearing capacity, and risks of backfill erosion or equipment access delays. While tidal flooding is not expected due to the inland location, persistent saturation demands a trench dewatering plan and adaptive construction schedule.

National climate change projections underscore the long-term fragility of The Bahamas' freshwater regime. With declining rainfall, increasing drought frequency, and elevated temperatures, groundwater recharge is expected to decrease. Meanwhile, the risk of saltwater intrusion and pollution from surface runoff is rising. These factors are compounded in smaller islands like Bimini, where freshwater lenses are thinner and more vulnerable to over-abstraction and contamination.

As summarized in the National Communication and previous water sector assessments, Bimini's freshwater lens is among the smallest in The Bahamas, covering only 395 acres and a lens area size of 0.06. This limitation reinforces the importance of climate-resilient water infrastructure, such as the Airport Road mains extension, to reduce dependency on vulnerable private wells and ensure potable water access through centralized, treated supply systems.

In response, this project incorporates environmental safeguards to manage hydrological exposure during construction. These include staged excavation, weather-responsive scheduling, protective backfill selection, and erosion-resistant materials. While no significant operational hydrological risks are anticipated post-installation, pre-emptive planning during construction is essential to avoid exposure-related setbacks or degradation of the surrounding environment.

## Vegetation

Vegetation along the Airport Road is characterized by low-lying, coastal scrub species and herbaceous cover typical of disturbed roadside corridors in limestone-based environments. Field observations from the July 2025 site visit by the WSC PMU identified the following dominant flora species:

- *Chrysobalanus icaco* (Cocoplum)
- *Serenoa repens* (Saw Palmetto)

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<sup>1</sup> Government of The Bahamas (2024). Third National Communication of The Commonwealth of The Bahamas to the United Nations Framework Convention on Climate Change (UNFCCC). Nassau, The Bahamas.

<https://unfccc.int/sites/default/files/resource/2024%20The%20Bahamas%20TNC%20to%20the%20UNFCCC.pdf>

- *Cynodon dactylon* (Bermuda grass)
- Various ruderal species and invasive grasses along the road edge

Other vegetation observed include native scrub thickets and *Casuarina equisetifolia* (Australian Pine), which is classified as invasive under the National Invasive Species Strategy (2013). No protected trees are expected to be impacted by trenching activities as none were observed within the construction footprint.

## 2.2 Port Royal Residential Community Overview

The following information is provided by the WSC Project Management Unit:

Port Royal, located in South Bimini, is a small, seasonally active, low-density residential community, comprising approximately 145 buildings and a single church, largely characterised by vacation homes rather than permanent, high-density settlements. It is characterized by unpaved but compacted sand and rock roads, naturally vegetated shoulders, and low-lying terrain. Water pooling often occurs in certain sections after rainfall due to the absence of formal drainage infrastructure. These baseline conditions require careful planning to prevent erosion, manage runoff, and avoid disturbance to natural landforms during trenching and pipe-laying operations.

Port Royal is a canal-based community, with homes surrounded by vegetated buffers and inland access roads. While the project area does not overlap with designated protected areas or ecologically sensitive zones, the community's layout near waterways calls for careful environmental management. Roadways and natural vegetation buffers reduce the risk of storm water runoff entering canals, but good housekeeping, material stockpile control, and storm-preparedness protocols are essential to maintain environmental integrity and climate resilience.

Unique to this community, the residential structures are elevated built on reinforced stilts or piers (see Figure 2-2). These homes are designed to reduce flood exposure by raising the living quarters above the ground level, which is especially useful in areas with variable terrain and localized water pooling. The ground level is typically left open or used for parking and storage. Located along the canal, these properties provide direct waterway access for boating and recreational use. Surrounding lots often include natural vegetation buffers, with driveways and roads composed of compacted sand and rock rather than formal paving.

**Figure 2-2: Port Royal residential community**



### **Geology**

The geology of Port Royal in South Bimini is primarily composed of Quaternary-aged carbonate limestone bedrock, typical of the Bahamian archipelago. Overlying this bedrock is a thin surface layer of unconsolidated sandy soils mixed with crushed coral, shell fragments, and occasional rocky substrate. The absence of engineered drainage systems contributes to localized pooling during rainfall events, with terrain variability affecting water retention in some areas. Although Port Royal has not experienced severe flood damage in recent history, Bimini as a whole sustained surge-related infrastructure impacts during Hurricane Irma (2017). These community vulnerabilities have been factored into the project's disaster risk planning, construction scheduling, and site management protocols.

Field observations from the July 2025 WSC PMU site visit confirmed that road shoulders and unpaved carriageways throughout the Port Royal community consist of white, fine-to-medium grain sand interspersed with exposed rock fragments and shell-based aggregate. These conditions are clearly visible in the site photos, where several road segments display shallow soil profiles, minimal vegetative ground cover, and visible material transitions between natural sand and compacted road base. Due to the fragile nature of this substrate, trenching must be carefully sequenced, with immediate backfilling and compaction to prevent trench wall slippage or collapse. The lack of engineered slopes and formal drainage infrastructure increases the risk of localized ponding after rainfall, which can soften soil bearing capacity and delay excavation or pipe-laying activities if not actively managed.

No signs of soil contamination, buried refuse, or anthropogenic fill material were observed within the project footprint. However, scattered natural and ornamental vegetation and tropical shrubs, line sections of the roadway and must be protected from unnecessary root disturbance during trenching.

The topography of the Port Royal corridor in South Bimini is moderately variable, with a mix of slightly elevated lots, gently sloping yards, and lower-lying compacted roadway areas. The roads are unpaved but well-maintained, comprised of compacted sand and shell aggregate that accommodates seasonal use by vehicles, golf carts, and pedestrians (see Figure 2-3). While the general elevation does not exceed 3 meters above sea level, some residential lots are built on raised pads or stilts, reducing direct exposure to surface water pooling.

The risk of erosion is considered low due to the absence of steep gradients and the coarse-textured soils, which minimize sediment displacement. However, localized waterlogging and soft ground may affect trenching timelines, especially during or shortly after rainfall. Construction schedules and backfilling methods should therefore remain adaptive to site conditions. No formal roadside swales or culverts exist, and mitigation measures must emphasize erosion control through good housekeeping, compacted backfill, and material stabilization.

**Figure 2-3: Port Royal roadways**



## **Hydrology**

The hydrological profile of Port Royal is defined by the area's coastal geology, porous sandy soils, and absence of engineered stormwater infrastructure. The community consists of unsealed limestone and sand-based roadways, with some sections slightly elevated or gently sloped. However, the general terrain is flat to mildly undulating, contributing to localized water pooling during and after moderate rainfall events.

Unlike other parts of the island, Port Royal does not intersect any mapped blue holes or wetland systems. However, the community lies adjacent to a canal-based waterfront system, which provides direct access to the sea, but is not hydrologically connected to the roadways due to the buffering effect of residential structures, landscaped yards, and perimeter vegetation. As such, stormwater runoff from the roadways does not flow directly into the canal but instead infiltrates slowly into the sandy and shell-based soil or is retained in low-lying depressions.

During site visits, surface water accumulation was observed in flatter segments and driveways where drainage is impeded by poor soil permeability, compacted surfaces, and a lack of natural swales or culverts. These conditions contribute to temporary waterlogging and may delay construction activities or equipment movement if unaddressed. Despite these challenges, widespread flooding is uncommon, and pooled water typically dissipates within 24–48 hours unless exacerbated by prolonged rainfall. Construction logistics must account for intermittent surface pooling, low soil infiltration rates, and the need for careful material staging to avoid compaction or disruption in saturated zones. No formal stormwater catchment areas or drainage features are present within the alignment footprint.

### **Vegetation**

Vegetation along the roadway is discontinuous, consisting of patches of native shrubs, grasses, and maintained landscaping. Field observations from the WSC PMU July 2025 site visit identified the following common and/or dominant species within or near the project site:

- Sea Grape (*Coccoloba uvifera*): native, legally protected under the Protected Trees Order (2021)
- Coconut Palm (*Cocos nucifera*): widely planted ornamental species
- Australian Pine (*Casuarina equisetifolia*): invasive tree species per National Invasive Species Strategy (2013)
- Mango Tree (*Mangifera indica*): non-native fruit tree seen in some yards
- Florida Thatch Palm (*Thrinax radiata*): native, occasionally used in residential landscaping
- Bougainvillea spp. and other decorative shrubs, found throughout maintained parcels

Importantly, healthy mangrove vegetation is present along segments of the canal buffer zone, including Red Mangrove (*Rhizophora mangle*) and Black Mangrove (*Avicennia germinans*) shrubs. These mangroves are outside of the construction footprint but contribute to the ecological character and resilience of the Port Royal area. While not part of the trenching zone, their presence reinforces the importance of managing construction runoff and material storage to avoid indirect impacts on canal-side vegetation.

No vegetation clearance is anticipated beyond the narrow excavation path. The works are confined to previously disturbed margins, and no protected trees are expected to be removed. If incidental pruning or relocation becomes necessary, DEPP and the Forestry Unit will be consulted, and restoration measures, using native, salt-tolerant species, will follow backfilling and surface reinstatement in line with national regulations.

### 3.0 Proposed mitigation measures

Measures recommended to improve climate change resiliency specific to water mains include:

1. Install culverts to avoid flooding.
2. Storm surge protection guidance and requirements for pipelines, pumps, tanks, wells and treatment facilities.
3. Place water mains on opposite side of the road to the shoreline and deeper inland, where feasible.

Table 3-1 below summarizes the mitigation measures that are recommended to minimize or eliminate any negative environmental and social impacts from the project.

**Table 3-1: Summary of Environmental Mitigation Measures**

	<b>Mitigation Measures</b>
Materials	<p>Any toxic or hazardous chemicals to be utilized on project sites can be done so according to Material Safety Data Sheet (MSDS) guidance and safety protocols can be established by project management.</p> <p>Fuel trucks will dispense fuel on impervious surface with clean up and disposal equipment available in the event of a spill. All fuel trucks shall have spill/drip pans which shall be utilized during fueling exercises.</p>
Air quality and dust	<p>Impairment to air quality can be reduced when no illegal construction activities occur during this project.</p> <p>Construction equipment should be properly maintained to ensure they do not impair air quality.</p> <p>Construction methodologies and best practices can be employed to minimize generation of quantities of dust that can impair air quality including watering of the roads on a regular basis and only conducting trenching for small stretches of road at one time so these can be quickly reinstated.</p> <p>For dust suppression, areas can be lightly sprayed with water prior to trenching to prevent dust from being airborne, this can also be done to the lime rock roadways to reduce air pollution during transport of materials and heavy equipment.</p> <p>Transport of sand for pipe bedding should only be done by covered trucks to minimize dust generation. The sand source has been identified as a fill storage area near the South Bimini ferry dock.</p> <p>Dust generation is a high-risk environmental impact as neither the Airport Road nor Port Royal roads are paved.</p>

Waste management	<p>All waste can be properly disposed of according to regulations and standards of the Department of Environmental Health Services (DEHS) and the Water and Sewerage Corporation (WSC).</p> <p>Each construction site should have adequate portable toilets that are cleaned on a regular basis or access to flushing toilets during working hours.</p> <p>No garbage and debris are to be left on the construction sites. Garbage containers should be located at strategic locations along the construction sites and regularly emptied.</p>
Landscape and visual	<p>While there is no intent to clear any vegetation for the construction works, if any protected trees need to be removed, they should only be done so after a permit is issued for the project by the Forestry Unit. The Unit will provide guidance on ratio for replacement of the protected tree or plant species.</p> <p>Construction equipment should be inspected and cleaned prior to deployment to project sites to avoid introduction of invasive plants.</p>
Water resources	<p>Chemical and fuel management of the sites can ensure that any nearby groundwater resources are not negatively impacted. Spill response protocols will be established for effectively dealing with spills in the event of an accident to minimize any pollution of water resources.</p> <p>Potable or fresh water needed during construction should be provided by the Water and Sewerage Corporation so there will not be a need for extraction of groundwater resources by the Contractor.</p>
Ecology	<p>Efforts can be made to minimize negative impacts to coppice (also known as “bush”) habitats by preserving as much of it as possible during construction. This can be achieved through limiting clearing to the footprint of the mains.</p> <p>Some of the project works are also close to the marine environment (e.g. sand storage area, some of the mains installation). When working near the marine environment, care will be taken to avoid spilling of sediment/fill into the marine environment where it can harm patch reefs or seagrass beds.</p>
Biodiversity	<p>Protected bird species occur on South Bimini (see Appendix 1). These species must not be harmed in any way. If they are observed, they must be avoided. Following other mitigation measures should result in minimal disturbance to them from construction impacts, such as noise.</p>
Wetlands (e.g. mangroves)	<p>Project design can facilitate preservation of wetland areas by avoiding siting of project components in them. No wetlands</p>

	<p>are currently in the path of mains for the Airport Road or Port Royal.</p> <p>Handling of waste and excess fill should be done in such a manner as to avoid dumping near or in these important habitats.</p>
Coppice	<p>Land clearing should be limited to footprint of the mains and this is the intent. No protected trees or other vegetation should be removed during construction or operation.</p> <p>If any protected trees need to be removed, they should only be done so after a permit is issued for the project by the Forestry Unit. The Unit will provide guidance on ratio for replacement of the protected tree or plant species.</p>
Noise and vibration	<p>Construction activities should be for a limited time period to minimize disturbance to residents, birds and other animals near or at the project sites. If construction is limited to reasonable hours (e.g. 7 am to 7 pm), it should not disturb residents for extended periods. Once construction is completed in as short a timeframe as possible, the animals should return to habitats they normally utilize.</p>
Traffic and transport	<p>All workers utilizing vehicles and equipment should have adequate training and skills in their proper and safe handling. Equipment to be utilized for this project moving from other sites should be inspected and cleaned, as necessary, to ensure they do not introduce invasive plant material, such as seeds.</p> <p>Any vehicle or equipment with oil, hydrocarbon or chemical leaks shall undergo immediate repair before returning to service.</p>
Occupational health and safety	<p>Workers will be provided with appropriate protective personal equipment (PPE) for their assigned tasks by the Contractor. All workers will receive training in proper handling of equipment and materials as a part of their orientation before being admitted to the site during demolition and construction and before starting work on site. There will be regular reinforcement of occupational health and safety procedures during weekly meetings. Information on health and safety procedures (e.g. Material Safety Data Sheets) will be accessible to staff during working hours. At least one staff member will be assigned to ensuring health and safety procedures are being followed during demolition construction activities.</p> <p>Working near the marine environment poses a risk of drowning. All staff should be equipped with life vests appropriate for their tasks, so that if they do fall into the water, the vests will inflate to prevent drowning.</p>

Impacts on neighbouring communities and businesses	<p>Regular communication with neighbouring communities and businesses will occur so they are informed of any potential disruptions to traffic and can plan accordingly.</p> <p>Neighbouring communities and businesses will also be advised when noise levels may be elevated so they can choose to leave the area or wear appropriate protective equipment, such as noise-cancelling headphones.</p> <p>The site will be managed following best management practices to reduce or eliminate impacts related to noise, air pollution as well as land, marine and groundwater contamination, so there are no long-term negative impacts on human health.</p> <p>A mechanism for neighbouring communities and businesses to contact project management will be established to ensure communication is facilitated.</p>
Contaminated land	<p>Any toxic or hazardous chemicals to be utilized on site will be done so according to Material Safety Data Sheet guidance and safety protocols as established by the project's management. Staff should be trained in spill response measures to effectively handle such incidents.</p>
Airport fire service	<p>The new water mains are for solely for potable water supply. Any water needed for the Airport Authority's fire service at the Bimini International Airport should be via independent or stand-alone saltwater fire wells.</p>

Mitigation measures are additionally detailed in the following subsections.

### 3.1.1 Air quality

The main source of air pollution will be dust generated during construction. Dust can be problematic from a socio-economic perspective for a number of reasons including:

- Health - Exacerbation of respiratory problems (e.g. asthma) and allergies for residents near to construction as well as nose, throat and eye irritation.
- Safety – Reduced visibility on roads that can lead to accidents.
- Economic – Damage to property (e.g. home exteriors, gardens) and additional cleaning when dust gets inside homes and businesses. The health and safety issues also have an economic component when persons have to pay for doctor's visits and medication and to repair or replace vehicles.

Dust will be kept down at all times, including during non-working hours. Soils at the site, haul roads and other areas disturbed by construction and materials stockpiled for the project will be treated by water sprinkling or covered to control dust. The following measures will be taken to mitigate for any potential air pollution from dust during construction:

1. Excavation, earthmoving or grading – The working areas of any excavation, earthmoving or grading operation shall be sprayed with water immediately before, during and immediately

after the operation to keep the surface wet. These activities should be confined to small stretches of road that can be reinstituted in a short period of time (less than a week) to minimize dust generation. Where trenching activities occur, nearby road surfaces should also be wet on a daily basis.

2. Stockpile of dusty materials – Stockpiles of sand, rock and excavated material shall be covered entirely by impervious sheeting or sprayed with water to keep the surface wet.
3. Loading, unloading or transfer of dusty material – All dusty materials will be sprayed with water immediately prior to loading, unloading and transfer operation to prevent dust from becoming airborne. The exception is cases where the moisture content of dusty materials is a matter of concern.
4. Emission from construction plant driven by internal combustion engines – All construction plants shall undergo regular maintenance so that any emissions due to malfunctioning or inefficiencies are minimized.
5. General site tidiness – The site or active work areas shall be cleaned and moistened frequently to minimize fugitive dust emissions.

Once the mains construction is completed inclusive of vegetated verges, there should no longer be impairment of air quality.

### **3.1.2 Noise pollution**

Noise pollution sources at the site during construction will include heavy equipment being used during construction and operation as well as increased traffic to and from the sites. Any noise generated is expected to be intermittent and temporary. Noise generation is expected to be limited to day time hours (i.e. 7 am to 7 pm) to minimize disturbance to residents.

The following measures will be taken to mitigate for any potential noise pollution during construction:

1. Limit the amount of noise-generating equipment to be used.
2. Limit the amount of noise-generating equipment to be used simultaneously.
3. Use silenced or relative Quality Powered Mechanical Equipment (PME).
4. Position noise-generating equipment or activities away from sensitive receivers and at locations where existing structures on site can act as noise shields.
5. Switch off noise-generating equipment when not in use.
6. Ensure proper maintenance of noise-generating equipment.

### **3.1.3 Fuel, oil and chemical management**

Fueling on site can result in spills of gasoline, diesel, oil, and chemicals which are common sources of groundwater or marine pollution and are costly to clean up. Mitigation measures for prevention of fuel, oil and chemical leaks include:

1. Establishment of a designated fuel dispensation area on the site away from any known groundwater or marine resources.

2. Topping off practices when fueling should be discouraged. Tanks should not be filled beyond 95%. Impervious fireproof containment or drip trays/pans should be used when filling small cans to contain any possible spills. Easy to read signs should be posted at the fueling station to explain proper fueling procedures.
3. Secondary containment, such as drip pans, should always be used during fueling in the event of a fuel spill or leak.
4. The fueling system should be briefly inspected daily and thoroughly inspected once a week by fuel attendant(s) for leaks and overall soundness.
5. All spent fluids will be collected for either storage or recycling.
6. Absorbent materials, such as pads, should be readily available at the fueling station in clearly identified containers in the event of a spill. Used absorbent materials should be disposed of off-site by a licensed company.
7. A spill response plan for the project site needs to be developed for use in the event of a spill to provide proper petroleum containment. Components of the spill response plan include who to notify when a spill occurs, immediate spill response actions, a contact list for response communications, a response chain-of-command on the site, an inventory of spill response equipment and its location. This plan can be developed by the Site Superintendent in collaboration with the Health, Safety and Environment (HSE) Manager; a guidance template is attached at Appendix 2. Easy-to-read signs should be posted at the fueling station informing users what to do to contain fuel and oil in the event of a spill.
8. There should be a spill response container/kit with spill response equipment near the fuel delivery area. This container should house appropriate containment and control materials, such as absorbent pads and booms, fire extinguishers, a copy of the Spill Response Plan, and the emergency contact list. This container should be clearly marked and easily accessible in order to quickly react to any potential spills. An inventory of equipment will be taken monthly or after use and a list of items needing replacement will be submitted for purchasing immediately.
9. All appropriate staff should be trained in proper fueling, proper maintenance techniques, and the implementation of the spill response plan at least bi-annually.
10. When vehicles and equipment have oil or chemical leaks, operations should be immediately suspended and leaks repaired prior to operations reinstatement.
11. All oil and chemical leaks from vehicles and equipment shall be handled in accordance with the relevant MSDS and the Spill Response Plan.

#### **3.1.4 Sewage and wastewater management**

Sewage generated by portable toilets during construction should be pumped away and disposed of at a DEHS-approved facility by a specialist subcontractor. Alternatively, construction staff can be given access to flushing toilets during working hours. The Water and Sewerage Corporation (WSC) should outline methodologies for disposal of wastewater generated during construction. There will be no drainage of sewage or wastewater on land or in the marine environment comprising or near the project sites at any time. All activities related to sewage and wastewater management during construction will be subject to approval of respective Government agencies, including the Department of Environmental Services (DEHS).

Waste oil will be collected in a dedicated oil container and delivered offsite by a local waste management company for disposal and recycling.

All activities related to sewage and wastewater management during operation will be subject to approval of respective Government agencies, including the DEHS.

### **3.1.5 Solid waste management**

Covered trash receptacles will be positioned in locations that are convenient for users. As much as possible, these trash containers will be tied down to stationary fixtures. At these receptacles, signs should be posted listing or showing symbols of items that can be disposed of. Prohibited solid waste includes recyclables and hazardous waste materials, such as waste oil, and used absorbent materials. It is recommended that contents of all trash receptacles are disposed of at least once a day, or as frequently as possible. In order to maintain a clean work site, there should be morning and afternoon “walk-throughs” of the project areas by designated staff to pick up stray litter.

A licensed local waste management company will dispose of solid waste from the sites during construction and operation in accordance with DEHS standards and only with their approval. Disposal of solid waste from construction and operation will be done at a licensed facility in compliance with DEHS requirements.

### **3.1.6 Hazardous materials handling**

All hazardous materials brought on the sites should be accompanied by material safety data sheets (MSDS). These sheets detail proper handling, storage and disposal techniques for use of hazardous materials as well as proper treatment if persons are exposed to the materials. All MSDS should be accessible to staff who will be in contact with or using the hazardous materials so they understand how to safely use them.

Storage facilities at the sites for hazardous waste should have disposal containers that are covered, made of inflammable material, sealed to prevent leaking, and positioned on an impervious surface as far from any water as possible. Secondary containment for all disposal containers should be 110 per cent of the maximum volume of the container. Storage facilities should be inspected at least once a day by appropriate staff to check for leaky containers. Appropriate spill containment and clean-up equipment should be easily accessible near hazardous waste storage facilities.

Disposal of all hazardous waste generated by the project will occur offsite by a licensed contractor at a licensed facility as per DEHS requirements. A Hazardous Material Management Plan is provided at Appendix 3.

### **3.1.7 Disaster risk management**

The project faces disaster risks from hurricanes during construction and operation. Risks from hurricanes can be reduced mainly through project design. Mains and associated infrastructure should be designed to withstand a 100-year storm, i.e. the worst hurricane to occur within a 100-

year period. This would enable the project to withstand hurricanes of a variety of strengths on the Saffir-Simpson scale.

Reducing the risk of flooding from storm surge during hurricanes may involve raising specific locations on the project sites to minimal elevations that factor in sea level rise projections through 2100. The Contractor should refer to any criteria set by the WSC in its designs for more details. The design of the mains to enable stormwater runoff into vegetated swales or other green design features can also reduce flooding impacts.

The project can also result in groundwater salinization if methods for provision of potable water are not properly managed. Water trucks should not be filled from groundwater lenses as this can result in their salinization. Additional mitigation measures for addressing risks are also outlined in the sections of the EMP on stormwater management and the hurricane preparedness plan as well as the section on adaptation to climate change.

### **3.1.8 Stormwater management**

The project design should maximize pervious surfaces, such as vegetated areas, to reduce the quantity of stormwater runoff.

Project design will also need to factor in extreme events resulting during storms and hurricanes, such as storm surge and inland flooding. This can be achieved through establishing minimal elevations at specific locations on the project sites that factor in sea level rise projections through 2100. The Contractor should refer to any criteria set by the WSC in its designs for more details.

### **3.1.9 Traffic management**

Traffic management on the site will include:

1. Maintenance of low speeds for driving on site.
2. Traffic control on site with proper stop-and-go signage for traffic blockages and to prevent accidents with between heavy equipment, pedestrians and private vehicles.
3. Securing the sites (e.g. safety officer) to prevent pedestrians, particularly children, from traversing the sites.
4. Ensuring all workers wear high visibility vests so that drivers of heavy equipment can see them.
5. Training all workers in traffic hazards on sites in an effort to avoid injury and loss of life.

### **3.1.10 Hurricane preparedness plan**

The purpose of the Hurricane Preparedness and Response Plan is to identify the actions that will be taken to reduce or eliminate long-term risk to people and property, and respond to natural disasters in the form of tropical storms, hurricanes, and coastal flooding. Project management should ensure that all staff are knowledgeable and equipped to execute the Hurricane Preparedness and Response Plan when necessary. Employees should be informed well in advance of their responsibility during a storm.

Key preparation activities are outlined below.

1. **GENERATORS:** Check all generators for proper operation (change oil, test batteries, start and run, run under load, ensure plug-in receptacles in good working order).
2. **EMPLOYEE CONTACT:** Update Employee Contact List. Ensure all staff members have a copy and understand the procedures for calling in or reporting to work post-hurricane.
3. **SITE INSPECTION:** The designated Manager conducts complete inspection of sites no less than weekly to ensure sites are free from clutter. The designated Manager should initiate and direct the removal of all excess supplies and equipment from the sites.
4. **HURRICANE PLAN:** The plan should be printed and/or emailed to all staff. The designated Manager will ensure that all staff are familiar with the plan and its preparation and response procedures as well as the location of equipment and supplies necessary for preparation and response.
5. **SUPPLIES:** The designated Manager should ensure adequate supplies of tools and any equipment needed to deal with preparation and recovery are on-hand at the sites (batteries/radios, gas/diesel, rain gear, bottled water).
6. **VEHICLES:** All vehicles (including trucks and cars) should be in good working order and have fuel topped off and/or batteries charged. Staff should understand the procedures for relocating/securing any portable equipment to designated safe areas.

## **GENERAL**

### *A. Objective:*

To provide clear and concise procedures for staff to follow in the event of a hurricane or tropical storm. To manage, maintain security, and control the operation of sites during an announced emergency situation.

### *B. Background:*

The project sites may not be safe locations during a hurricane or tropical storm, depending on the direction and strength of the storm. It is highly recommended that vehicles and portable equipment and supplies be relocated well in advance to safer locations in order to protect them from damage of flying debris. The following procedures will enhance the project's ability to protect the lives and property of staff and safeguard facilities.

### *C. Preparation:*

Every designated manager should have an individual Hurricane Plan, designed specifically for their area of responsibility. This Plan should include the location of alternate storage for their vehicles and

equipment; a checklist of key procedures to be followed to prepare for a storm; and necessary gear and supplies to help secure their area of responsibility on short notice.

The management team should designate an Operating Post for the coordination of operations, communication, and emergency response. All staff shall be familiar with the emergency procedures.

## **HURRICANE ACTION PLAN**

### *D. Hurricane Watch*

- 1) All staff are required to know by definition the status of a weather emergency as differentiated between a Hurricane Advisory, Watch, Warning, etc.
- 2) All staff will be prepared to respond when called upon to report to work. Proper planning will ensure that personnel needs are met, while still meeting the need to respond to an emergency situation at any of the sites.
- 3) At designated staging areas, all emergency equipment and supplies (i.e. pumps, generators, vehicles, etc.) are to be at full operational capacity and ready to move. Batteries are fully charged; rain gear and other safety equipment stocked and in full working order.
- 4) At the Operating Post, the information cycle is started – the designated Manager shall contact the relevant local hurricane preparedness agencies (e.g. DRM Authority) and verify contact information. The Operating Post will communicate with staff – directly, by voice announcement, by posted notice, by phone, and/or by passing the word, the proposed order of an evacuation plan will be announced.
- 5) All trash and debris will be removed from containers to prepare those containers for receiving additional trash. The sites should be checked for removal of unnecessary equipment and materials.
- 6) Notification is made to other personnel/contractors if there is need to relocate any vehicles, equipment, or property. Employees are designated at the sites to handle the safeguarding, evacuation, or relocation of the above.
- 7) Commence securing vehicles, equipment and other property.
- 8) Staff should report essential information to the designated Manager and receive instruction as to communications, controls, phone numbers, radio channels, etc.
- 9) The designated Manager should rotate staff home to address personal needs. Some staff members will be required to report back to work, scheduled in selected groups at selected locations, for continuing emergency operations. It is imperative that staff report to work as instructed.

*E. Hurricane Warning*

- 1) All staff on duty shall alert the public of any Hurricane Advisory Update and Warning information.
- 2) All off-duty staff must respond immediately and report to work if requested to do so. Personal needs should now have been met and all available personnel will be meeting the need for necessary emergency work at the site.
- 3) Emergency equipment and supplies are positioned to be mobilized for fast use. Access roads are cleared of movable objects, garbage, and debris, inclusive of all open trenches being closed. Loose items that cannot be removed are secured, tied down, etc.
- 4) Keep vehicle and pedestrian traffic flowing in a smooth and orderly fashion.
- 5) Complete securing sites and facilities; finish safeguarding property from flood areas; secure areas once completed.

*F. Site Evacuation*

- 1) Upon local directive, sites and facilities are secured and evacuated. Off-duty staff are dismissed, with instruction to establish contact with the designated Manager as soon as possible after the storm for instruction. The sites and facilities will be shut down for the duration of the emergency. Begin planning for “after the storm” action.

**3.1.11 Emergency response plan**

This Plan is designed to address the most likely emergencies which will occur on site due to activities and material utilization and is detailed in Appendix 4.

**3.1.12 Worker health and safety**

As a part of the site-specific induction training, all staff and subcontractors should undergo safety training to ensure their safety on the respective sites. Safety training will include best practices for working:

- With hazardous materials
- At heights
- In confined spaces
- With heavy equipment
- With trench shoring methods

During staff orientation and regular training sessions, slideshows and PowerPoint presentations can be used to educate staff about health, safety, environmental and social issues. All new staff will participate in site-specific induction training delivered by the designated Manager. There should be refresher training for all staff every six months. The training should cover issues inclusive of

legislation, regulations, environmental management, staff duties and responsibilities, mitigation measures and the ESMP. Training will culminate in testing of staff's knowledge on health, safety, environmental and social management issues.

There should also be weekly staff talks regarding mitigation measures for any negative environmental and social impacts. All staff should be required to attend. Topics will include, but not be limited to:

- Air pollution control
- Waste reduction and management
- Noise control
- Good housekeeping practices
- Handling of hazardous materials
- Emergency preparedness

Workers should be required to wear appropriate personal protective equipment (PPE) and be trained in how to properly wear and/or use this equipment. Workers should also be trained in incident or accident response, including first aid.

The presence of chemicals and fuels can place a site at high risk for potential fire-related accidents. Such situations may require an immediate response, whereby waiting for emergency personnel can lead to dire circumstances. There should be adequate and visible signage posted about first aid and fire-fighting equipment at the various sites. Safety precautions and information must also be posted. The following first aid and fire safety guidelines should be followed:

- a) The fire-fighting equipment during construction and operation must at least include the presence of fire extinguishers, but could also include water hoses and fire carpets.
- b) The fire-fighting equipment must be easily identified and accessible 24 hours a day throughout both phases and indicated on site maps.
- c) Fire extinguishers must be present at the fueling stations, near hazardous waste storage facilities, on all heavy equipment and at locations where high temperature work is going on.
- d) First aid equipment must be present at the construction sites and at locations known to all staff.
- e) Public or emergency telephones at or very near the sites must also be available 24 hours a day, and clearly indicated on the site map.

### **3.1.13 Environmental and social monitoring**

The monitoring and reporting regime for the project during construction will include weekly site inspections which will be conducted by a designated staff member or subcontractor. These inspections will provide a means to enforce specific environmental and social management measures. Site inspection observations and results will be documented on site inspection forms, which will be submitted to the Project Manager and Construction Manager during construction. A possible template for the inspection form is provided in Appendix 5.

The monitoring and reporting regime during operation will include biennial inspections which will be conducted by a designated staff member or subcontractor. Site inspection observations and results will be documented on site inspection forms which will be submitted to the Manager responsible for mains and facilities maintenance.

If non-compliance is found during an inspection, appropriate action as per the ESMP will be implemented. The inspection will not be limited to the project sites, but also observations of environmental and social management issues in areas adjacent to the project sites, which are likely to be impacted, directly or indirectly, by site activities during construction and operation.

### **3.1 Additional social mitigation measures**

The following tasks are to be undertaken by WSC to ensure that any negative social impacts during the construction works for the project are minimised or eliminated and positive impacts enhanced. Reporting documents are to be submitted on a bi-weekly basis to facilitate the monitoring process. A Stakeholder Engagement Plan for the project is also provided in Chapter 4.0.

#### **3.1.1 Public Communication**

WSC will take every opportunity to inform the public of the works programme and schedule.

##### ***Public Service Announcements***

WSC will inform residents of the works programme and schedule ahead of the commencement of work. This should take the form of a Public Service Announcement (PSA) about the project as well as regular updates about the specific weekly/daily schedule. The PSA should be delivered via the most effective media for the specific location. This can include:

- Announcements on local radio and television
- Social media (e.g. WhatsApp)
- Flyers
- Information on the contractor's website
- Information on the Water and Sewerage Corporation's website

In addition, WSC will announce road closures and diversions no less than 48 hours in advance, preferably seven days prior to the closure or diversion.

##### ***Precautionary signage***

The Contractor should erect clearly visible precautionary signs throughout the project sites. These signs would indicate safety procedures for pedestrians and road users and will include, but not be limited to:

- Road diversions
- Road closures
- Caution - Open trenches
- Construction Site – Do Not Enter

Use of barricades to prevent site access to non-construction personnel is highly recommended. Examples of signage are provided in Appendix 9.

***Bi-weekly reporting requirement***

WSC will submit copies of the PSA text as well as copies of the receipts from the placements of the PSA in the local media as proof that these PSAs were transmitted. Photos of the precautionary signage should be submitted.

**3.1.2 Complaints**

The Contractor will provide cards on the site that included contact information for WSC where complaints by the public or stakeholders can be submitted via email or telephone. The email and phone number for the grievance redress mechanism (GRM) will be publicised in the Public Service Announcements. Walk-in complaints to the Contractor's office or the Water and Sewerage Corporation should also be referred to one of the options for the GRM.

The complaints form in Appendix 6 or a similar version will be used by WSC to record the complaints. All complaints should be recorded– including date of complaint; complainant; nature of problem including location; time; number, gender and age of people impacted; cost of problem if possible (e.g. cost of doctor's visit and medication; cost of repair to vehicle or third party property, etc.)

***Bi-weekly reporting requirement***

WSC will retain copies of all complaint forms and a brief summary report indicating the status of the complaint(s) resolution.

**3.1.3 Property Restoration Plans**

The Contractor is required to provide the following prior to commencement of works:

- A property restoration plan for all instances where property will be damaged during construction.
- A construction schedule that WSC can share during their stakeholder engagement activities.

Once construction is completed, the Contractor will provide a report indicating completion of any restoration works if there were properties damaged during construction.

***Bi-weekly reporting requirement***

The Contractor is required to submit copies of property restoration plans for instances of property damage during the biweekly period and copies of any reports indicating completion of restoration works on properties damaged during construction.

The Employer's Requirements should incorporate specifications for road restoration that will ensure that the quality of the roads and other associated infrastructure affected by the construction in the adjacent communities is restored after the construction.

### **3.1.4 Mitigation of Noise, Dust and Vibration Impacts**

The Contractor is required to adhere to the plan for mitigation of noise, dust and vibration impacts as provided in the environmental mitigation measures.

#### ***Noise management***

Construction vehicles traversing the adjacent areas should strictly observe the speed limit, and horns should be minimally used only as necessary. The equipment that will be used on the construction site should be equipped with mufflers and appropriate sound attenuation devices. Work onsite should also be conducted during specifically set times.

#### ***Dust management***

Dust associated with the construction site can be controlled by the implementation measures such as:

- Ensuring that all trucks hauling material have tarps to cover the load
- Cleaning spillages on roadways and property accesses promptly to minimize spread of sediment and dust
- Where necessary, water roads and work areas to manage dust. Road surfaces shall be left free of construction debris on a daily basis.

#### ***Vibrations***

With respect to vibrations, it is expected that the contractor would have the required insurance policies to cover any legitimate claims made as a result of any damage that may occur during the construction phase.

#### ***Bi-weekly reporting requirement***

The contractor is required to submit copies of the property restoration plans, reports of meetings with property owners, and reports of the completion of restoration of property.

### **3.1.5 Site Safety**

Work sites should have clear precautionary signage. Workers will be required by the Contractor to use personal protective equipment to guard against on-the-job injuries. Ergonomic devices should be available, e.g. for lifting and carrying. Only trained and or certified persons should use specialized equipment. There should be appropriate supervision to ensure that workers do not cause harm to themselves or others on the site. There should be adequate security to prevent curious onlookers from wandering into the construction zones.

Following Health and Safety requirements all incidents on site must be recorded. An example of an incident report form is included in Appendix 10.

#### ***Bi-weekly reporting requirement***

A health and safety report must be submitted to indicate: No incident or incident with details. An example of a health and safety incident report form has been included in Appendix 10.

### **3.1.6 Provisions for Utility Outages**

The Contractor is required to establish communications with the electricity company, the Water and Sewerage Corporation, the Cable Utility and the Telecommunications Utility.

Where possible, public service announcements should be made regarding any electricity, water, cable and telecommunications outage ahead of time if possible, indicating the length of time of outage and time for service resumption.

In the event of unplanned outages, a PSA should be made as soon as possible, giving the likely time for resumption of service.

#### ***Bi-weekly reporting requirement***

The Contractor is required to provide records of utility outages as well as a report of the time within which the service was resumed.

### **3.1.7 Evidence of Employment of Locals**

One of the potential positive social benefits of the project is the immediate employment opportunities provided by the construction to local residents. The Contractor is required to provide a list of locals who are employed during construction, as well as the nature and duration of the employment. A full list of employees should be provided to demonstrate the ratio of local employment to non-local employment. The list should indicate gender and age group.

In addition, any evidence of spin off employment should be provided, e.g.:

- Use of bed and breakfast or other local accommodation for workers
- Purchases of food or other goods and services at local establishments.

#### ***Bi-weekly reporting requirement***

Provision of a list of employees as well as indications of purchases of local resources. A template for the listing of employees is provided in Appendix 11.

## **3.2 Adaptation and resilience measures**

Over the past two decades, Bimini has been impacted by several notable hurricanes, each highlighting different aspects of the island's vulnerability. In 2005, Hurricane Wilma (Category 3) caused severe beach erosion and infrastructure damage.<sup>2</sup> Most significantly, Hurricane Irma (Category 5) in 2017 delivered widespread coastal flooding, storm surge, and damage to coastal roadways. Irma also prompted the evacuation of 365 persons from Bimini specifically, along with other islands in the southern Bahamas.<sup>3</sup> Although Bimini was spared the direct impact of Hurricane Dorian in 2019, the event catalyzed national-level reassessments of climate and disaster risk across all islands, reinforcing the urgency of resilience-building efforts even in areas not traditionally considered high-risk. According to Think Hazard, there is a greater than 20% chance that Bimini will experience

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<sup>2</sup> Neely, W. (2019). The greatest and deadliest hurricanes to impact The Bahamas. URLink Print & Media, LLC.USA.

<sup>3</sup> The Tribune. (2017, September 8). PM warns: Stay indoors and heed all warnings. The Tribune 242.  
<https://www.tribune242.com/news/2017/sep/08/pm-warns-stay-indoors-and-heed-all-warnings/>

damaging cyclone-force winds within the next decade, underscoring the importance of integrating disaster-resilient design even for inland infrastructure like water mains.<sup>4</sup>

The project faces risks from hurricanes and inland flooding during construction and operation. Risks from hurricanes can be reduced mainly through project design. The new mains and any associated infrastructure should be designed to withstand a 100-year storm, i.e. the worst hurricane to occur within a 100-year period. This would enable the project to withstand hurricanes of a variety of strengths on the Saffir-Simpson scale.

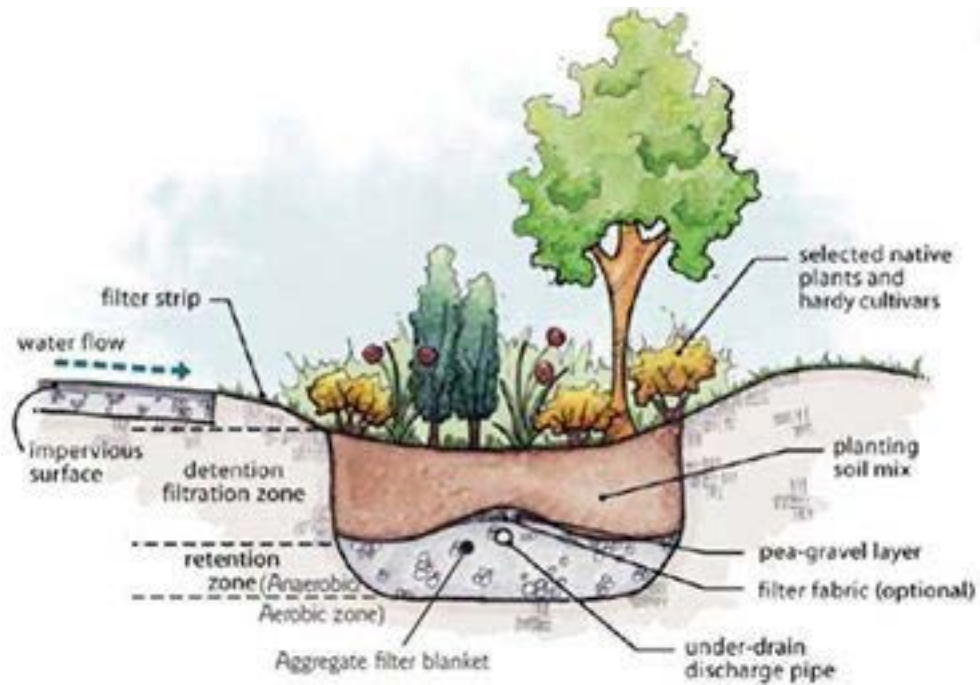
Reducing the risk of flooding from storm surge during hurricanes would involve raising the elevation of specific high-risk locations to minimal elevations that factor in sea level rise projections through 2100. The Contractor should refer to any criteria set by the WSC in its designs for more details. The design of the roads to enable stormwater runoff into vegetated swales or other green design features can also reduce flooding impacts.

Green design with areas bordering the roads can include development of bioswales. Bioswales are vegetated channels that drain stormwater to natural channels without the need for pipes and concrete. The swales can be grassed or vegetated and steeper swales may have small rock check dams installed to slow water flow (Randolph, 2012). Examples of a bioswale are provided in Figure 3-1 below.

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<sup>4</sup> Think Hazard (n.d.). *Bahamas-Natural hazard risk overview*. Global Facility for Disaster Reduction and Recovery (GFDRR). [Think Hazard - The Bahamas](#)

Figure 3-1: Examples of a Bioswale



Natural shoreline protection should be maintained or restored in areas where it has been removed. Natural shoreline protection is offered by mangroves as well as vegetated dunes in addition to offshore coral reefs and seagrass beds. Natural, green or soft coastal risk reduction measures that can be utilized include sills as shown below in Figure 3-2. These are constructed parallel to existing or vegetated shorelines and help to reduce wave energy and prevent erosion (SAGE et al, 2015). Sills

can slow inland water transfer and increase natural stormwater infiltration and toe protection can help prevent wetland edge loss. Sills are best-suited for low-energy shorelines. These types of green measures can also be more cost effective than gray or hard measures (e.g. seawalls). While seawalls work better in high-energy wave conditions, they can have several disadvantages including:

- Erosion of seaward seabed;
- Disruption of sediment transport leading to beach erosion;
- They can be damaged/destroyed by over-topping oceanfront storm waves.

Retreat is another adaptation response that should be pursued. Installing infrastructure, such as water and sewerage infrastructure, further away from the shoreline, particularly in low-lying areas is recommended in an effort to reach minimal elevations for adapting to sea level rise that may result from climate change.

Engineers will have to confirm which adaptation interventions are best suited at particular sites on Bimini. No single intervention may be suitable for every area. Wherever possible, natural, green or soft engineering options should be utilized based on environmental and economic benefits.

The project can also result in increased groundwater salinization if methods for provision of potable water during construction are not properly managed. Every effort should be made to minimize or avoid withdrawing water from any groundwater sources in the vicinity of the project sites. Additional mitigation measures for addressing risks are also outlined in the sections of the EMP on stormwater management and the hurricane preparedness plan.

Figure 3-2: Example of a sill



Wetland functions should also be maintained, not only from a shoreline protection perspective, but also through provision of habitat, food and inland flood control. These functions can be disrupted and these habitats even destroyed by mains construction along roadways. They can also be negatively impacted if they are filled in during construction.

Methodologies for minimizing impact of roads and other infrastructure on wetlands include construction of features that not only allow continued flow within the wetland, but also movement of wildlife across the wetland. While bridges are ideal for maintaining passage of water and wildlife,

their construction and maintenance costs may be prohibitive. Alternatives to traditional circular culverts that seldom function well for extended periods would include arches or bottomless culverts (see Figure 3-3). It may also be necessary to include a series of culverts versus just a single one to increase flow. Other potential designs to explore may include aggregate mattresses as well as subsurface structures (e.g. French drains).

**Figure 3-3: Examples of arch or bottomless culverts**





The 2014 Second National Communication on Climate Change recommends several adaptation measures for specific areas as outlined in Table 3-2 below.

**Table 3-2: Adaptation Measures**

<b>Area</b>	<b>Measures</b>
Water resources	Prevention of further development in low-lying areas prone to flooding; Non-excavation of canals, waterways and areas below the water table; Control of rock and sand mining activities that are restricted to approved locations only; Protection of beach ridge and coastal dune formations; Protection of mangroves and similar coastal features; and Adoption of appropriate physical planning policies that will protect infrastructure from storm surges and rising water tables.
Forests	Review and evaluate existing forest management plans for the sustainable management of all types of forests on Crown Lands.
Tourism	Development of a hurricane preparedness and evacuation plan that will permit the tourism sector to respond and recover from any hurricane or extreme weather events in cooperation and collaboration with its public and private partners; Assist communities to develop funding mechanisms and technical expertise in protecting their beaches and shorelines in conjunction with the Coastal Awareness Committee;

Area	Measures
	<p>Educate the general public on the role wetlands play in the protection of the coast from storm surges and as an important habitat for fisheries and wildlife; and</p> <p>Establish an Integrated Coastal Zone Management Unit to manage country's coastal assets.</p>
Capacity-building	<p>Train additional Department of Meteorology technicians in the use of SLOSH modeling to forecast hurricane landfall; and</p> <p>Provide equipment to assist in mapping coastal areas vulnerable to sea level rise.</p>

## 4.0 Stakeholder Engagement Plan

The Bahamas Water Supply and Sanitation Systems Upgrade Program is funded by an IDB loan for \$100 million. The loan was executed in February 2025 with the first phase for \$50 million to be implemented over a five-year period. The South Bimini mains project is a part of Component 3 of the Program on access to potable water.

The Program aims to improve potable water and sewer services in order to protect public health, safeguard the environment, and support long-term national development. Through targeted investments in infrastructure upgrades, system modernization, and improved operational practices, the Program seeks to deliver more reliable, efficient, and resilient water and sanitation services for households, businesses, and public institutions. These improvements are designed to strengthen climate resilience, reduce environmental risks, and ensure sustainable access to essential services for current and future generations.

The Program is being implemented transparently and in accordance with national policies and international development partner standards, with clear governance, oversight, and reporting mechanisms in place. Strong collaboration among government agencies, development partners, and implementing institutions is central to achieving results, while regular communication and public engagement help ensure accountability and build trust. Communities, stakeholders, and institutions are encouraged to stay informed, participate in outreach activities, and share feedback to help improve Program outcomes.

To ensure stakeholders are effectively engaged with the aims of the Program, the communications function will play a central coordinating and facilitative role. The communications lead will develop clear, consistent, and audience-appropriate messaging; select and manage suitable communication channels; and plan outreach activities that promote understanding, participation, and dialogue. This includes organizing public and stakeholder events, producing accessible digital and print materials, coordinating media engagement, and working closely with implementing agencies to ensure message alignment. The communications team will also gather and document stakeholder feedback, monitor engagement effectiveness, and adjust approaches as needed to strengthen awareness, buy-in, and sustained support for the Program's objectives. Proposed messaging for identified stakeholders is outlined in Table 4-1.

**Table 4-1: Proposed Messaging for Stakeholders**

<b>Stakeholder Group</b>	<b>Messaging</b>
Local communities	Raise awareness of the benefits of improved potable water and sewer services and promote behavioral change regarding water use.
Investors	Showcase the WSC's strategic vision to attract investment in the water and sanitation sectors.
Private sector contractors & service providers	Promote awareness of upcoming procurement opportunities for works, goods, and services.
Senior officials from beneficiary agencies	Ensure awareness and buy-in for the implementation of potable water and sewer upgrades and innovations.

Government agency staff	Promote broad support for water efficiency, conservation, and environmental sustainability principles.
Construction contractor	Reinforce adherence to building codes and regulations relevant to the execution of program components.
Educational institutions	Foster youth engagement and encourage school participation in the broader goals of the Program.
Other stakeholders (NGOs, universities & financial institutions)	Maintain transparency and generate interest in The Program's implementation and expected results.
General public	Increase awareness of the WSC's efforts to improve water and sanitation infrastructure.

## 4.1 Methodology

The Stakeholder Engagement Plan provides a structured yet flexible approach for identifying, informing, consulting, and engaging stakeholders throughout the lifecycle of the Program. Its purpose is to promote transparency, accountability, and inclusive participation while complementing the Communication and Dissemination Plan by emphasizing two-way engagement rather than one-way information sharing. The Plan is guided by principles of inclusiveness, transparency, proportionality, cultural appropriateness, responsiveness, and coordination, ensuring that engagement activities are accessible, relevant, and aligned with institutional and donor requirements.

Stakeholders include individuals, communities, institutions, and organizations that are affected by the Program, have an interest in its outcomes, or play a role in influencing or implementing activities. These stakeholders broadly encompass affected communities and end users, government and public sector institutions, private sector entities and service providers, investors and development partners, civil society organizations, educational institutions, media, and the general public. Stakeholder identification and prioritization will be reviewed and refined as the Program progresses to reflect evolving needs and implementation realities.

Stakeholder engagement will take place throughout all phases of the Program and will be scaled according to the level of stakeholder interest, influence, and potential impact. Stakeholders will be informed through a combination of methods, including town hall meetings, public announcements, print and digital communication materials, social media content, websites, and media outreach (local media outlets). These tools will be used to provide timely, clear, and consistent information on Program objectives, activities, progress, and results.

In addition to information sharing, consultation and dialogue will be encouraged through structured engagement activities such as public or hybrid meetings, community outreach sessions, stakeholder briefings, workshops, surveys, and targeted discussions. These methods are intended to provide stakeholders with opportunities to ask questions, share feedback, and contribute perspectives that may help improve Program implementation. Engagement approaches will be adapted to local contexts, logistical considerations, and public health guidelines, ensuring that participation remains inclusive and feasible.

Coordination and collaboration will be supported through regular interaction with key institutions, implementing partners, and relevant agencies to ensure consistent messaging and aligned engagement efforts. Feedback gathered through engagement activities will be documented, reviewed, and used to inform communication strategies and, where appropriate, Program decision-making. Stakeholder engagement activities will be monitored using practical indicators such as participation levels, reach of communication efforts, and qualitative feedback, with findings summarized in periodic updates and final reporting. The Stakeholder Engagement Plan will remain a living framework, allowing methods and approaches to be adjusted over time based on lessons learned, stakeholder feedback, and Program needs.

## 4.2 Timeline

Stakeholder engagement activities will be phased broadly to align with the overall lifecycle of the Program and associated works. Before the commencement of works, engagement will focus on early awareness and preparedness. During this phase, stakeholders will be informed about the Program's objectives, planned activities, and expected benefits through town hall meetings, community outreach sessions, and stakeholder briefings. Printed materials such as flyers and brochures will be distributed in affected areas, and notices and feature articles will be published in newspapers and other widely accessible media to ensure broad public awareness. These early activities are intended to build understanding, manage expectations, and provide opportunities for questions and feedback prior to implementation.

During construction and implementation, stakeholder engagement will emphasize ongoing information sharing and transparency. Stakeholders will be kept informed of progress, timelines, and any relevant updates through regular social media posts, public announcements, media releases, and updates on digital platforms. Visual content, such as photos and short videos, will be used to illustrate progress and highlight key milestones. Where appropriate, targeted briefings and community updates will be conducted to address concerns, share changes, and reinforce key messages related to safety, access, and environmental considerations.

Following the completion of major works and during ongoing Program implementation, engagement will focus on sharing results, outcomes, and lessons learned. Stakeholders will be informed about completed activities, achieved benefits, and next steps through media coverage, digital content, community updates, and stakeholder reports. This phase will also provide opportunities to reinforce messages around responsible water use, sustainability, and long-term benefits, while maintaining open channels for feedback and continued dialogue.

## 5.0 Conclusions

Employment of appropriate design and planning methodologies can result in construction and operation of the water infrastructure in a sustainable manner. Utilizing the recommended mitigation measures can eliminate or minimize any negative environmental and social impacts that may occur during construction and operation phases.

Using green design in stormwater management as well as shoreline protection is another way to mitigate for any negative environmental impacts.

The EMP should be utilized to guide design, construction and operation of the project.

The WSC has expressed its commitment to implementing the recommended mitigation measures and executing the project in a manner that respects the natural resources of the site and is environmentally sustainable and respectful of adjacent communities.

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## Appendix 1: Species Identification

Photos of species that are considered important, endangered or threatened are included here so that staff can identify them and avoid interacting with them or inflicting any harm on them.

**Photo A-1: White-crowned Pigeon**



Source: Zanka M. [commons.wikimedia.org](https://commons.wikimedia.org)

**Photo A-2: Piping Plover**



Source: Roger Eriksson. [audubon.org](https://audubon.org)

**Photo A-3: Bahama Woodstar**



Source: David Dean, SEV Consulting Group

## Appendix 2: Template for Spill Response Plan

The spill response plan should provide contact information for:

### Emergency Agencies

Fire Department **911**

First Aid Responder **919**

Police Department **911, 347-3424 (South Bimini)** or **347-3144 (North Bimini)**

### Administrative Agencies

Department of Environmental Planning and Protection **322-4546**

Department of Environmental Health Services **347-2287 (Bimini)** or **322-8037 (Nassau)**

Incident Commander, **Alphonzo Rigby, 823-0895**

The spill response team should be comprised of the following staff with their names and cell phone numbers provided.

- Incident Commander (IC): **Alphonzo Rigby, 823-0895**
- First Alternate IC: **Pharez Darville, 801-9393**
- Second Alternate IC: **Kendria Ferguson, 822-8362**

### **SPILL CONTROL PRACTICES**

Important spill control practices to be included in the plan are outlined below.

In addition to the good housekeeping and material management practices discussed in the previous sections of this EMP, the following practices will be followed for spill prevention and cleanup:

- Manufacturer's recommended methods for spill cleanup will be clearly posted and staff will be made aware of the procedures and the location of the information and clean-up supplies.
- Materials and equipment necessary for spill cleanup will be kept in the designated storage area onsite.
- All spills will be cleaned up immediately after discovery.
- Staff will wear appropriate protective gear to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the Incident Commander and relevant Government agencies, regardless of the size.
- The spill prevention plan will be adjusted to include measures to prevent spills from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included. This information is usually documented in a spill incident report form. An example of one is provided below.

- The designated Manager should be the Incident Commander and responsible for spill prevention and cleanup coordination. He/she will designate at least two other staff members who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible staff members should be posted at the project site or main building's administrative offices.
- A stockpile of spill cleanup materials will be stored where it will be readily accessible.

### Example of Spill Report Form

Reporting Party's Name:			
Address/City/State:			
Phone:			
Responsible Party's Name (if known):			
Address/City/State:			
Phone:			
Date of Spill:		Time:	
Location:		Product spilled:	
Estimated quantity:		Discharge stopped or contained?	
Source or cause of spill (if known):			
Actions taken:			
Injuries/fatalities/evacuations?			
Environmental damage:			
List of equipment used:			
Disposal site/facility for used absorbents:			
<b>Oil Spill Notifications</b>			
<b>Organization</b>	<b>Phone</b>	<b>Time Contacted</b>	<b>Case Number</b>
Fire Department			
Incident Commander			
Spill response contractor			

## **Appendix 3: Hazardous Material Management Plan**

This plan outlines best management practices for hazardous materials that may be found or generated on site.

### **Good Housekeeping**

- An effort will be made to store only enough product required to do the job.
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product will be used before disposing of the container.
- Manufacturers' recommendations for proper use and disposal will be followed.
- The Site Superintendent will inspect the site daily to ensure proper use and disposal of materials onsite.

### **Hazardous Products**

If hazardous materials are required, then the guidelines below will be followed:

- Products will be kept in original containers unless they are not resealable.
- Original labels and material safety data sheets will be retained for important product information.
- If surplus product must be disposed of, the manufacturer or local recommended methods for proper disposal will be followed.

### **Petroleum Products**

All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chances of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.

### **Paints**

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system, the sea, the ground or any natural water body, but will be properly disposed of according to manufacturer's instructions or local regulations.

### **Concrete Trucks**

Concrete trucks will be required to wash out or discharge surplus concrete or drum wash water into a wash out pit with construction of the pit overseen by the Site Superintendent. The wash out pit will be designated in an area that does not receive significant runoff and does not drain directly into a storm network. Upon the completion of the project, this area will be cleared of the concrete and the site restored.

## **PREVENTION OF POLLUTION OF WATER SOURCES**

To ensure that all efforts are undertaken so that the water sources (ground or marine) are not impacted during construction the following actions will be taken:

- All diesels, fuel and other toxic materials shall be securely bounded in welded steel trays whose capacity is at least 110% of the maximum stored volume of the fuel. Bunds shall be inspected and cleaned out at regular intervals.
- Any bulk tank with an integral delivery hose and nozzle shall have a means of securing and padlocking at the nozzle above the maximum fill level and the nozzle shall be locked in this position when not in use.
- A fueling area shall be designated adjacent to the storage tanks and this shall be comprised of a concrete apron laid to falls, draining into the steel tray or leak proof sump.
- Generator and other static plants shall be of a type supplied with integral bunds or shall be located within a welded steel tray of appropriate volume.
- All mobile plants such as vehicles, pumps and excavators used on site shall be in good condition and free from engine, lubrication and hydraulic oil leaks and shall have steel dip trays placed beneath them when not in use.
- All containers for chemicals and lubricants used on site shall be stored in trays of steel or other approved materials of appropriate volume.

If there is a major Spill, call the following agencies:

Fire Department (should fire be possible) **911** or Police at **911, 347-3424 (South Bimini)** or **347-3144 (North Bimini)**

Department of Environmental Health Services **347-2287 (Bimini)** or **322-8037 (Nassau)**

## Appendix 4: Emergency Response Plan

### 1.0 Purpose and Applicability

1.1 The purpose of this Plan is to coordinate the response of the workers to a situation that may jeopardize the safety or wellbeing of the workers, the general public, the community and the environment. Types of disasters include: fires, bomb, threats, chemical releases, loss of utilities, and natural disasters (floods, wind, etc.). It should be noted that where applicable any national Emergency Response Plan will supersede this plan.

### 2.0 Roles and Responsibilities

2.1 **Command Center** will be the general office location of the Contractor or the area identified by the Designated Manager if this is not acceptable.

2.2 **Disaster Team** will respond to all emergency, contingency and disaster situations. This will comprise the Project Manager, Designated Manager, and, where applicable due to the extent of the emergency, relevant Government agencies' representatives.

2.3 **Incident Commander** or highest-level administrator who is present at an incident will report to the Command Center as soon as possible. The Incident Commander is authorized to declare an evacuated area safe for re-occupancy. In the event of an emergency requiring the assistance of Government agencies, the Government representatives will assume the responsibility of the Incident Commander. For localized situations which do not require Government agency involvement, the Incident Commander will be the Contractor's representative for the project.

2.4 **Managers/ Supervisors** shall maintain a current list of workers including their home phone numbers, pager numbers, and mobile phone numbers, if applicable. Managers are also responsible for evacuating staff of affected areas as necessary and as instructed and to account for all staff.

2.5 **Security** will respond under the direction of the Security Supervisor. Security personnel will take immediate steps to prevent the entrance of all non-essential traffic at the incident. The Highest Ranking Officer on duty will be responsible for traffic control. Security personnel will ask employees not authorized to be at the incident scene to leave the area.

### 3.0 Disaster Declaration Procedures

3.1 A **Phase A (Alert) Disaster** is the initial response to the report of a potential disaster or an actual disaster when the impact on the construction site is uncertain. For example, a Phase A disaster might involve an equipment system failure that may extend for a few hours. Limited on-site personnel can handle a Phase A disaster. Advancement to a Phase B is unnecessary unless the incident cannot be handled by those already involved or the nearby residents must be notified.

3.2 A **Phase B Disaster** will be declared in response to an actual event that stresses on site operations, but can be managed by on-duty personnel or requires outside assistance. The purpose of Phase B is to quickly mobilize on-duty personnel and resources in support of event management. For

example, a Phase B disaster might involve extended or widespread power failures due to downed lines, a significant fire, or a significant hazardous material release on site. Notification for a Phase B disaster will be accomplished by mega-phone and other available PA systems. Each supervisor with specific roles in a disaster is responsible for notifying their own staff. Upon notification of a Phase B disaster, personnel will remain on duty, report immediately to their assigned areas, and proceed as directed. In the event of upgrade or termination of Phase B, all personnel who have been contacted will be informed by supervisors.

3.3 A **Phase C Disaster** is the site response to a major disaster in which on-site personnel cannot effectively manage the event. The purpose of a Phase C is to quickly mobilize necessary Public Emergency Responders. A Phase C disaster involves the evacuation of staff from the site. Notification for a Phase C disaster will be accomplished via mega-phone and other available PA systems, and each supervisor with specific roles in a disaster is responsible for notifying their own staff. A Phase C may be terminated at the discretion of the Incident Commander. Upon notification of a Phase C disaster, personnel will remain on duty and report immediately to supervisor for direction.

#### **4.0 Disaster Procedures**

4.1 Each department shall maintain a current list of personnel including their home phone numbers, pager numbers and mobile phone numbers, if applicable. This list will be made available to the Incident Commander upon request.

4.2 The following terms and corresponding emergency contact numbers must be used to report or declare an internal disaster.

#### **Emergency Agencies**

Fire Department **911**

Ambulance Department **919**

Police Department **911, 347-3424 (South Bimini)** or **347-3144 (North Bimini)**

#### **Administrative Agencies**

Bahamas Power and Light **347-3018 (Bimini)** or **302-1000 (Nassau)**

Department of Environmental Planning and Protection **322-4546**

Department of Environmental Health Services **347-2287 (Bimini)** or **322-8037 (Nassau)**

Department of Meteorology **356-3734 or 356-3736**

Hurricane Forecast Section **377-7178 or 377-7040**

Royal Bahamas Police Force **911, 347-3424 (South Bimini)** or **347-3144 (North Bimini)**

Water and Sewerage Corporation **347-3454 (Bimini)** or **302-5599**

Ministry of Works Chief Civil Engineer **322-4830**

4.3 The **Disaster Team** will be comprised of the following staff

- Incident Commander (IC): **Alphonzo Rigby, 823-0895**
- Alternate IC: **Pharez Darville, 801-9393**
- Alternate IC: **Kendria Ferguson, 822-8362**

4.4 Contractor's Project Manager will perform the initial investigation of a potential disaster. As the investigation progresses, the Command Center will be updated. If a significant threat exists, the Command Center will notify the Incident Commander. It is the responsibility of the Incident Commander to assess the situation and issue the announcement specifying the level of the disaster and the location of the Command Center.

### **Hurricanes**

Please follow the Hurricane Preparedness and Response Plan in section 3.1.11 starting on page 18.

### **Fuel Spills**

Spills and leaks that occur during vehicle and equipment fueling can contribute hydrocarbons, oil and grease, as well as heavy metals to stormwater runoff. The following management practices will be implemented to help prevent fuel spills and leaks. A reduction in the potential for pollutant discharge will be done through source control pollution prevention and best management practices (BMP) implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

### **SPILL CONTROL PRACTICES**

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Employees will be educated about spill prevention measures.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to brooms, dustpans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery. Spills are not cleaned up until all materials used in the clean up are picked up and properly disposed of.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the Environmental Manager and appropriate Government agency, regardless of the size.
- The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A description of the

spill, what caused it, and the cleanup measures employed will also be included in the spill incident report.

- The Site Superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite.
- A stockpile of spill cleanup materials (spill kits) will be stored where it will be readily accessible.

### **FIRE CONTROL MEASURES**

There will be no burning on the construction sites and fire extinguishers will be kept at the fueling location and in the managers' trailer. Signs will be posted identifying the location of all extinguishers.

All employees will immediately report any fires occurring in or near the sites. A phone will be available to all employees for emergencies which might occur on site. All emergency numbers will be posted in the office and near the fueling areas or other hazardous areas.

### **MUNICIPAL ELECTRICAL POWER LOSS OR DAMAGE**

All issues relating to loss or damage to power lines, poles or junction boxes whether in the ground or overhead must be deferred to BPL. The Project Manager will ensure that all staff is removed from the area and that the area is secured. BPL will be notified and the site will await the arrival of the BPL Technicians - Telephone **347-3018 (Bimini)**, **302-1000 (Nassau)** or **329-2314 (Emergency)**.

### **MUNICIPAL WATER LINES DAMAGE**

All issues relating to loss or damage to water lines or junction boxes will be the responsibility of the Contractor. The Project Manager will ensure that all staff is removed from the area, that the area is secured and that the Water and Sewerage Corporation is notified - Telephone **347-3454 (Bimini)** or **302-5599 (Nassau)**.

### **ACCIDENTS INVOLVING THE PUBLIC**

In the event of an accident involving members of the public, whether by vehicle or pedestrian, the Police, and/or Clinic will be notified as required. The Project Manager will ensure, as much as is possible, that the area is secured and that the accident site poses no additional safety risk to the public or staff. Once the Government agents have arrived on the scene, these agents will assume responsibility of the site of the accident.

## Appendix 5: Template for Inspection Form

**Contractor:** \_\_\_\_\_

**Observers:** \_\_\_\_\_

**Tide:** high/low

**Weather:** sunny/partly cloudy/mostly cloudy/rain

**Date/Time:** \_\_\_\_\_

**Air Temp (°F)** \_\_\_\_\_

**Rain in last 24 hrs:** Yes/No

### Types of Construction Activities

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Excavation            | <input type="checkbox"/> Erosion and Sediment Control | <input type="checkbox"/> Air Pollution/Dust control  |
| <input type="checkbox"/> Fill Import           | <input type="checkbox"/> Waste /Hazardous Material    | <input type="checkbox"/> Water/Drains/Wetland issues |
| <input type="checkbox"/> Land clearing/Grading | <input type="checkbox"/> Noise Pollution              | <input type="checkbox"/> Other                       |
| <input type="checkbox"/> Fueling               | <input type="checkbox"/> Building construction        |  |

### Excavation Operations

<i>Components</i>	<i>Compliance w/ ESMP</i>	<i>Maintenance required</i>	<i>Comments/Recommendations</i>
Control of dewatering discharge and runoff.	<input type="checkbox"/>	<input type="checkbox"/>	
Contamination/oil spills identified	<input type="checkbox"/>	<input type="checkbox"/>	
Hazardous/contaminated material disposal and containment.	<input type="checkbox"/>	<input type="checkbox"/>	
Proper disposal of spoils	<input type="checkbox"/>	<input type="checkbox"/>	

### Erosion and Sedimentation Control

<i>Components</i>	<i>Compliance w/ ESMP</i>	<i>Maintenance required</i>	<i>Comments/Recommendations</i>
Proper stabilization of slopes and exposed areas on construction site and at stockpile site	<input type="checkbox"/>	<input type="checkbox"/>	
Adequate installation and maintenance of perimeter controls.	<input type="checkbox"/>	<input type="checkbox"/>	
Use of diversion swales and basins.	<input type="checkbox"/>	<input type="checkbox"/>	
Proper sorting of spoils at stockpile management site	<input type="checkbox"/>	<input type="checkbox"/>	

### Groundwater Management

<i>Components</i>	<i>Compliance w/ ESMP</i>	<i>Maintenance required</i>	<i>Comments/Recommendations</i>
Measures to control vehicle/equipment oil or chemical leaks or spillage (e.g. fuel containment sump, drip trays)	<input type="checkbox"/>	<input type="checkbox"/>	
Accessibility of spill kits/absorbents and spill response equipment	<input type="checkbox"/>	<input type="checkbox"/>	
Adequate secondary containment for fuel and oil tanks.	<input type="checkbox"/>	<input type="checkbox"/>	

### Air Quality Management

<i>Components</i>	<i>Compliance w/ ESMP</i>	<i>Maintenance required</i>	<i>Comments/Recommendations</i>
Watering of construction sites to minimize dust generated.	<input type="checkbox"/>	<input type="checkbox"/>	
Equipment properly maintained to reduce emissions.	<input type="checkbox"/>	<input type="checkbox"/>	

### Waste Management

<i>Components</i>	<i>Compliance w/ ESMP</i>	<i>Maintenance required</i>	<i>Comments/Recommendations</i>
Good housekeeping practices on site.	<input type="checkbox"/>	<input type="checkbox"/>	
Adequate on-site sanitary facilities.	<input type="checkbox"/>	<input type="checkbox"/>	
Sewage being properly disposed of.	<input type="checkbox"/>	<input type="checkbox"/>	
Proper collection and disposal of construction and hazardous wastes (licensed collectors, manifests)	<input type="checkbox"/>	<input type="checkbox"/>	
Maintenance of concrete washout area	<input type="checkbox"/>	<input type="checkbox"/>	
Vehicle wash down / Contractors Yard	<input type="checkbox"/>	<input type="checkbox"/>	

**Landscape Management**

<i>Components</i>	<i>Compliance w/ ESMP</i>	<i>Maintenance required</i>	<i>Comments/Recommendations</i>
Minimization of disturbance to terrestrial vegetation (e.g. plants to be preserved).	<input type="checkbox"/>	<input type="checkbox"/>	

**Other**

<i>Components</i>	<i>Compliance w/ ESMP</i>	<i>Maintenance/Action required</i>	<i>Comments/Recommendations</i>
Proper maintenance and availability of fire extinguishers at the construction site and on all heavy equipment	<input type="checkbox"/>	<input type="checkbox"/>	
Coppice mitigation measures in place	<input type="checkbox"/>	<input type="checkbox"/>	

**Other Corrective Actions Needed:**

**Inspector(s):** \_\_\_\_\_

## Appendix 6: Complaint Form

Date of complaint:	
Time of complaint:	
Name of person recording complaint:	
Name of person making complaint:	
Telephone number:	
Address:	
Nature of complaint:	
Results of investigation:	
Action taken:	
Date complainant contacted with results of the investigation and action taken:	
Name and signature of person investigating the complaint:	

## Appendix 7: Report of a meeting convened with the property owners re the construction schedule and the proposal for property restoration

<b>Date:</b>	
<b>Contractor representative:</b>	
<b>Property representatives:</b> <i>(please confirm whether the representative is the owner)</i>	
<b>Summary of main points shared by Contractor's representatives:</b> <i>(This should include but not be limited to:- likely start date of construction; areas of potential damage; plans for restoration; date of completion of restoration)</i>	
<b>Summary of questions or concerns raised by property representatives:</b>	
<b>Detailing of ongoing plans for communication with property representatives:</b>	

## Appendix 8: Report of completion of the restoration works on properties damaged during construction

<b>Date:</b>	
<b>Report repaired by:</b>	Signature ..... PRINT NAME.....
<b>Confirmed by property representative:</b>	Signature ..... PRINT NAME.....
<b>Start date of construction</b>	
<b>Works undertaken</b>	
<b>Damage incurred</b>	
<b>Restoration undertaken:</b>	
<b>Restoration completed:</b>	

## Appendix 9: Examples of precautionary signage



## Appendix 10: Health and safety incident report form

Incident	
Reported by:	
Contact details: Company: Email: Phone:	
Date of occurrence:	
Time of occurrence:	
Type of incident:	<input type="checkbox"/> Accident <input type="checkbox"/> Incident <input type="checkbox"/> Near miss <input type="checkbox"/> Violence <input type="checkbox"/> Ill health <input type="checkbox"/> Safety <input type="checkbox"/> Other
Description of incident:	<i>(Include details that may have contributed to the incident (e.g. poor lighting, absence of signage))</i>
Description of the outcome:	<i>(Harm/health effects/damage)</i>
Description of the corrective measures taken to address immediate hazards related to the incident:	
<b>The affected person:</b>	
Description:	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Worker <input type="checkbox"/> Visitor <input type="checkbox"/> Contractor <input type="checkbox"/> Other
Name:	
Address:	
Date of birth:	
Telephone:	
Email:	

Witness details	
Name	
Address:	
Telephone:	
Email:	
First aid	
First aid provided:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
Time of attendance:	
By whom:	Name: Address: Telephone: Email:
Details of provision:	
Post incident:	
Where did the person involved in the incident go next?	<input type="checkbox"/> Hospital <input type="checkbox"/> Clinic <input type="checkbox"/> Private doctor <input type="checkbox"/> Home <input type="checkbox"/> Returned to work <input type="checkbox"/> Other
Was the health and safety officer notified of the incident?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Additional information:	

**Appendix 11: List of employees' template:**

<b>Employee</b>	<b>Gender</b> (Insert M of F)	<b>Bimini Resident</b> (Please check if yes)	<b>Resident of other island</b> (Please indicate the location)	<b>Nature of employment</b>	<b>Duration of employment</b>