

ENVIRONMENTAL AND SOCIAL ANALYSIS REPORT

CLIMATE-RESILIENT COASTAL MANAGEMENT AND INFRASTRUCTURE
PROGRAM, THE BAHAMAS

PREPARED FOR:
GOVERNMENT OF THE BAHAMAS

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NASSAU, THE BAHAMAS

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List of Acronyms

BEST	Bahamas Environment, Science, and Technology Commission
BPP&PBA	Bahamas Public Parks and Public Beaches Authority
BNGIS	Bahamas National Geographic Information System Centre
BNT	Bahamas National Trust
CCS	Climate Change Adaptation
CMIS	Coastal Management Information System
DMR	Department of Marine Resources
DPP	Department of Physical Planning
EBA	Ecosystem Based Adaptation
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIS	Environmental Impact Study
ES	Ecosystem Services
ft	Feet
GIS	Geographic Information System
GOBH	Government of The Bahamas
ICT	Information and Communication Technology
ICZM	Integrated Coastal Zone Management
IDB	Inter-American Development Bank
km	Kilometers
KPI	Key Performance Indicator
MCA	Multi-Criteria Analysis
MOEH	Ministry of Environment and Housing
MOWUD	Ministry of Works and Urban Development
NOAA	National Oceanic and Atmospheric Administration
OPM	Office of the Prime Minister
PEU	Project Execution Unit
SOP	Standard Operating Procedures
TAC	Technical Advisory Committee
TNC	The Nature Conservancy
TOR	Terms of Reference
WSC	Water and Sewerage Corporation

1 Executive Summary

This Environmental and Social Analysis Report (ESAR) pertains to the Climate-Resilient Coastal Management and Infrastructure Program (BH-L1043) for The Bahamas. In 2013, the Inter-American Development Bank (IDB) approved a technical cooperation for feasibility studies for a climate risk-resilient Integrated Coastal Zone Management (ICZM) Program in The Bahamas¹.

Adapting and implementing a strategy for integrated climate-resilience via a management program affords targeted risk mitigation. With approximately 80% of land below one meter above sea level, The Bahamas is subject to the influences of climate change. Sea level rise compounded by increased storm severity will place greater pressure on coastal resources, which contribute ecosystem services to The Bahamas. Critical infrastructure at risk to the impacts of climate change includes tourism properties, airports, ports, and road networks. The aforementioned feasibility studies establish a baseline for which the completed ICZM program will support improved organizational and technical capacity, priority site planning, data acquisition, and cost-effective finance allocation.

As a result, the proposed Climate-Resilient Coastal Management and Infrastructure Program, expected to be approved in 2017, includes three components and management costs for a total of US\$35 million: (1) Sustainable coastal protection infrastructure (US\$23.5 M) - diagnostics, design and construction of science-based engineering solutions for shoreline stabilization and coastal flooding control, coupled with reconstruction of adjacent critical public infrastructure at three priority sites (Nassau, New Providence; Central Long Island and East Grand Bahama). (2) Natural infrastructure for hazard resilience in Andros (US\$3 M) – a priority investment to demonstrate the effectiveness of natural infrastructure for shoreline stabilization and restoration which identifies opportunities for sustainable development for both people and nature and builds off an ecosystem-based, participatory planning process. (3) Institutional strengthening for coastal risk management (US\$3.5 M) - activities related to enhancements to governance and policy, data collection and information management and sustainable financing. In addition, there will be US\$5 M for management aspects.

The purpose of an ESA is to identify environmental and social aspects including risks, evaluate site-specific aspects, and provide recommendations for measures to mitigate identified impacts for proposed projects. The scope of this ESA includes the four project sites identified in components 1 and 2 above. Under the proposed program, a series of infrastructure projects have been identified on the four islands. This ESAR sets out to build off the findings of the environmental and social analysis of the feasibility studies and review the impacts and risks of the proposed infrastructure.

The ESAR contains data sourced from desktop analysis and site visits, including stakeholder consultations, an integral component for establishing the local environmental and social context. Together, the Environmental and Social Analysis and Environmental and Social Management Plan for proposed projects constitute the ESAR that includes an assessment of policies, regulations, institutional coordination

¹ [Feasibility Studies for an ICZM Program in The Bahamas \(ATN/OC-14521-BH; ATN/OC-14520-BH\).](#)

mechanisms and procedures in accordance to the IDB's Environmental and Social Safeguards Policy and the legislation and regulations of the Commonwealth of The Bahamas.

2 Purpose and Scope

The purpose of this ESAR is to identify environmental and social aspects including risks, evaluate those site-specific aspects, and provide recommendations for measures to mitigate identified impacts for proposed projects under the Climate-Resilient Coastal Management and Infrastructure Program (BH-L1043), expected to be approved in 2017. Additionally, the ESA process via stakeholder consultation, site reconnaissance, and desktop analysis will reveal data gaps and make recommendations for institutional capacity building within the context of a coastal zone management and climate change program.

Environmental and social analysis (ESA) is a planning tool that provides a review of a proposed project or strategy to facilitate an expected outcome in alignment with a program's overall objectives and goals. Importantly, an ESA considers the environmental and social aspects within a given spatial context to determine site-specific outcomes associated with a particular project. The ESA will be prepared in accordance with the Environmental and Social Safeguard policies established by the IDB.

This ESA pertains to the review of four (4) proposed sites for coastal infrastructure improvement across the Bahamian archipelago including:

- 1) Central Long Island: Gray's to Scrub Hill
- 2) East Grand Bahama
- 3) Central New Providence: Western Esplanade/Junkanoo Beach Nassau
- 4) Andros

The ESA will assess and document environmental and social impacts pertaining to each project's unique geographical and physical setting. Moreover, consideration will be given for environmental and social aspects incorporating local legislation being the laws and regulations of the Commonwealth of The Bahamas and relevant International Conventions to which The Bahamas is party. The ESA is limited to the proposed project areas and subsequently, each project's area of influence. The scope of the ESA also includes the proposed activities for enhanced capacity to manage coastal risks (also to be financed under the proposed IDB Program).

Overall, this ESAR will contribute to the design and policy decision making to achieve successful implementation of the proposed Program while also complying with the IDB's Environmental and Social Safeguard policies and procedures.

3 Methodology

The development of the ESA entails a desktop review of available resources in addition to data acquisition and ground-truthing via field visits to the proposed sites to provide site-specific project intervention verification. Desktop materials available for input include previously completed and pending technical cooperation reports under the Climate-Resilient Coastal Management and Infrastructure Program.

Preparation of the ESA will follow the methodology outlined below:

- 1) Background data collection and review. Background resources will be reviewed for data gaps.
 - a. Government reports
 - b. Statistical data and reports
 - c. Strategy reports
 - d. Preliminary reports
- 2) Coordination with other IDB contractuels for information exchange on technical inputs for project design.
- 3) Interviews with relevant Government agencies in The Bahamas including: Ministry of the Environment and Housing (MOEH)/ The Bahamas Environment, Science and Technology Commission (BEST), Ministry of Works and Urban Development (MOWUD)/ Department of Physical Planning (DPP), the Bahamas National Trust (BNT), and others as determined.
 - a. Legislation and regulations pertaining to coastal zone management and infrastructure
 - b. Environmental concerns for coastal infrastructure interventions
 - c. Knowledge of social aspects for the respective proposed sites
- 4) Site visits to the four (4) proposed sites to obtain additional information.
 - a. Land use information
 - b. Social aspects
 - c. Existing environmental conditions
- 5) Consultation with potentially affected stakeholder/interested parties, to both inform them of the program, and to seek their feedback on potential environmental and social impacts and risks.

A preliminary schedule of ESA deliverables is provided below:

- 1) Interim Report. A compilation of knowledge obtained during site visits and interviews with government and non-governmental organization officials.
- 2) Preliminary Report. The preliminary report will be an in-depth and expanded analysis of the background information contained in the interim report, and will be disclosed on the IDBs website. It will be accompanied by a power point presentation for use at public consultations and will be disclosed publicly in The Bahamas.
- 3) Final Report. The final report will incorporate comments and recommendations from the IDB and MOWUD project teams and will be disclosed on the IDBs website. The Final Report will be also be disclosed publicly in the Bahamas.

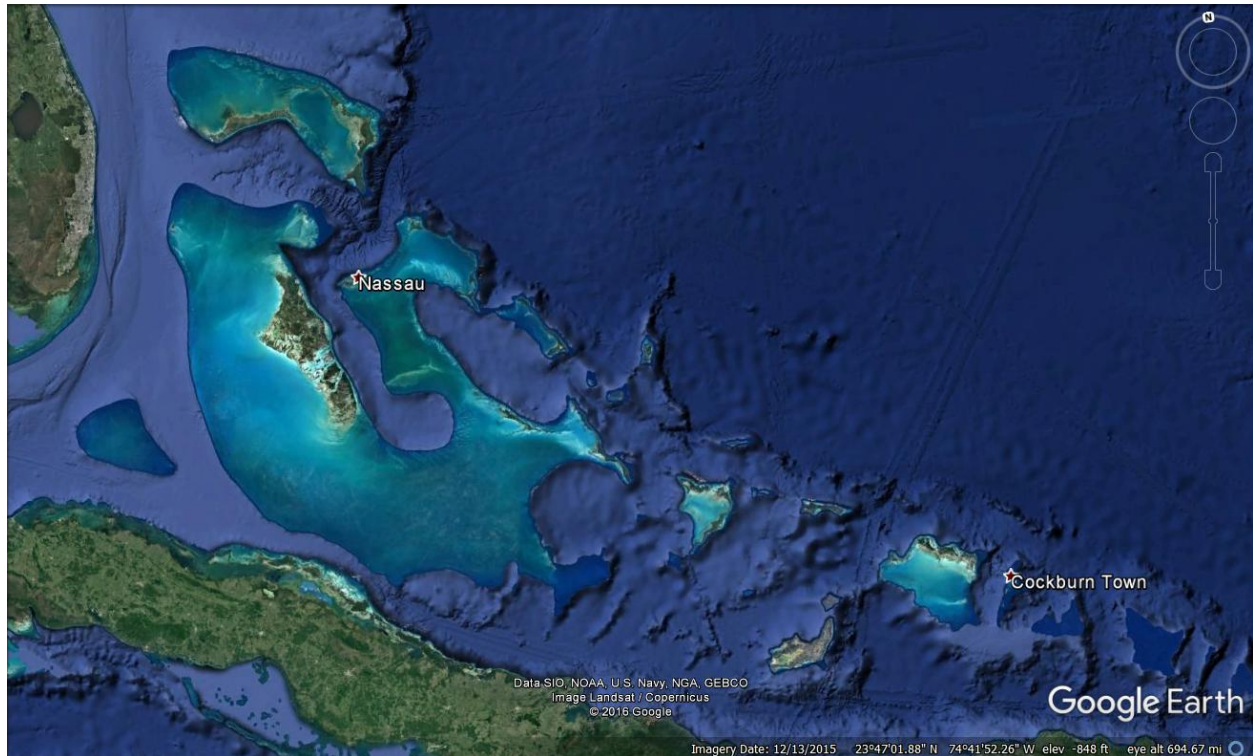
3.1 Work Plan Schedule and Major Milestones

Preliminary Report Submittal	January 15, 2017
Final Report Submittal	February 13, 2017
Site Visits	Grand Bahama, December 14, 2016 Nassau & Junkanoo Beach, December 21, 2016 Long Island January 5-6, 2017
Stakeholder Consultation	Andros, December 1 & 2, 2016 Grand Bahama, January 23, 2017 Nassau & Junkanoo Beach, January 25, 2017 Long Island, January 30, 2017

4 Geographic Setting

The archipelago of The Bahamas consists of over 700 islands that span 100,000 square miles of sea. With a total land mass of 5,833 square miles, the islands of The Bahamas extend along a northwest to southeast axis to the east of Florida and to the north of Cuba. Only 30 islands are populated with a majority of the population residing on New Providence. Under international law, The Bahamas' exclusive economic zone (EEZ) is estimated to be 245,000 square miles².

Figure 3.1-1: Map of The Bahamas³



² Bahamas Maritime Authority. Ministry of Transport and Aviation. (2015). *The Bahamas' National Maritime Policy - Draft*

³ Map of The Bahamas. Source: Google Earth. Accessed January 17, 2017.

5 Project Setting

The objective of the proposed Program is to build resilience to coastal risks including those associated with climate change through enhanced coastal protection infrastructure and integrated management of the coasts. Based on this objective, key coastal infrastructure improvement sites were identified as an output of the design and feasibility analysis of risk-resilient ICZM project. The Program is comprised of three components. (1) Sustainable coastal protection infrastructure for East Grand Bahama, Central Long Island and New Providence – Junkanoo Beach. (2) Natural infrastructure for hazard resilience in Andros. (3) Institutional strengthening for coastal risk management.

This Program takes place in the coastal zone, which was defined in the feasibility studies. This ESA will use this coastal zone definition to denote the area of influence of the project. The boundaries of the coastal zone are defined as⁴:

- Territorial Sea boundary of 12 nautical miles from the 1982 United Nations Convention on the Law of the Sea;
- Coastal resources derived from the 2014 Ecological Gap Analysis and the 2004 National Wetlands Policy;
- Inland boundary of 1 in 100-year coastal flood zone as a minimum, derived from the Sustainable Cities – Nassau project. The 1 in 100 coastal flood zone was chosen for use in disaster risk management and climate change adaptation to risks and vulnerabilities. To note, the coastal flood zone including the inland boundaries for the entirety of The Bahamas requires more detailed numeric modelling.

Proposed locations for sustainable coastal infrastructure:

1. East Grand Bahama – McClean’s Town
2. Central Long Island – Gray’s to Scrub Hill
3. New Providence - Junkanoo Beach
4. Andros – Sustainable Andros

⁴ CCS and SEV Consulting Group. (2016). *First Interim Report for Feasibility Studies for a Climate Risk-Resilient Coastal Zone Management Investment Program*.

5.1 East Grand Bahama

Coastal resilience in terms of infrastructure improvements for East Grand Bahama pertains to transportation linkages and restoration of tidal creek ecosystems. In the case of East Grand Bahama, improvements to critical coastal infrastructure will provide ecological benefits by restoring water flow to creeks that were historically impacted by the development of roads and causeways as access for the logging industry. These causeways appear to have been built without consideration for impacts on the local marine ecology and flood risk.

The primary driver for this site is to ‘maintain ecosystem services to pave the way for sustainable prosperity development,’ as identified in the feasibility studies. Hence, engineering designs will consider the ecological, economic, and social services provided by the creek systems to the people of East Grand Bahama in order to leverage healthy coastal ecosystems for climate resilience. Engineering designs will seek to encompass sustainable innovations with the aim to:

- Reduce whole life maintenance spend;
- Increase the resiliency of the structure;
- Have wider environmental benefits on the marine ecology; and
- Have wider flood risk benefits.

The approach to restoration efforts will use the Living Shorelines method for restoration which includes the goals of:

- Shoreline stabilization to reduce rates of shoreline erosion and storm damage;
- Providing ecosystem services; and
- Promoting terrestrial and marine ecosystem connectivity.

Specifically, the proposed project for East Grand Bahama includes baseline studies (tidal regime, mangrove condition), coastal flood reduction infrastructure and small-scale road rehabilitation along shoreline in East Grand Bahama in order to improve road access for vulnerable coastal communities and restore hydrological flows in mangroves. Infrastructure will primarily involve redesign, removal or installation of small culverts, associated road repair and native plant restoration. Causeways under consideration for culvert installation or removal are identified in Figure 5-1-1. Two of the sites are within the newly established East Grand Bahama National Park and all four sites have been identified by BNT as requiring modification to support restoration efforts.

Table 5.1-1: East Grand Bahama Proposed Infrastructure Descriptions

Site		Description/Project Specifics
West Gap Creek	Description	Gap Creek is approximately 3.5 kilometers (km) in length with the causeway located 1.6 km from the creek mouth on the northern coast of Grand Bahama. The West Gap Creek causeway is approximately 470 feet (ft) long and 35 ft wide. North of the causeway mangrove vegetation is considered dwarfed compared to larger fringing mangrove formations south. Water quality changes from saline to fresh moving north to south in the creek.
	Proposed Engineering Solution	1) Removal of the causeway to restore water flow and replanting with native species; OR 2) Installing large culverts (approximately 2 meter diameter or greater)
Ridge Creek	Description	Ridge Creek extends 6 km inland from its mouth at the north until it is blocked by the causeway. South of the causeway, the mangrove formation is isolated. The causeway is approximately 150 ft long and 40 ft wide.
	Proposed Engineering Solution	Removal or partial removal of the causeway.
Snapper Island Causeway & McClean's Town	Description	Located west of Snapper Island, August Creek is blocked 2.75 km inland of its northern mouth and again at McClean's Town where culverts allow restricted water flow. The causeways at Snapper Island and McClean's Town severely restrict water flow along August Creek. The Snapper Island Causeway is approximately 470 ft long and 35 ft wide. The McClean's Town Causeway is approximately 150 ft long and 40 ft wide.
	Proposed Engineering Solution	Snapper Island Causeway 1) Removal of a section at the west end of the causeway McClean's Town 1) Culvert flow connection should be at least 2 meter in width; OR 2) Consideration made for raising the road to alleviate flooding.

Figure 5.1-1: East Grand Bahamas Site Locations



Figure 5.1-2: East Grand Bahama Spatial Summary (Mott MacDonald, 2016 & ESRI Mapping, 2016)

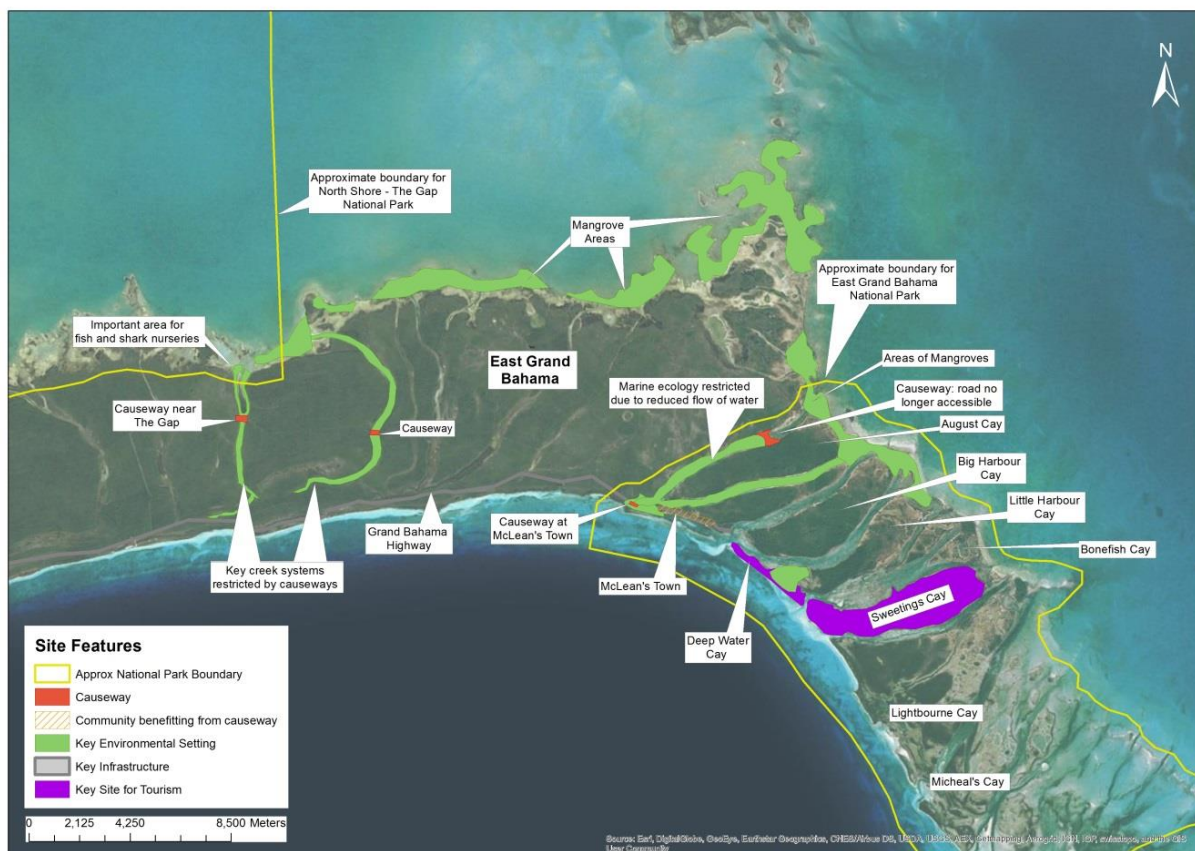




Figure 5.1-3: West Gap Causeway



Figure 5.1-4: North Culvert at McClean's Town



Figure 5.1-5: McClean's Town Causeway - Facing East

5.2 Long Island

In Long Island opportunities to improve community resilience to storm surge and flooding include reducing flood risk vulnerability of a public road providing the only access to communities impacted by Hurricane Joaquin. The Queen's Highway is a critical transport link connecting north and south Long Island, which is presently at risk for flooding. Currently, the MOWUD is constructing a seawall within the project area to protect the road and Long Islanders have been building their own infrastructure to mitigate flooding, including trenches, drainage pond, culverts and bypass road.

The immediate objectives include:

- Undertake studies to identify the key flood risk areas; and
- Provide infrastructure (grey, e.g. drainage wells, and green, e.g. mangrove restoration, for increased resilience to high risk areas from flooding – overtopping, storm surges, hurricanes, sea level rise.

These objectives will be achieved by infrastructure improvements that provide increased resilience following an assessment of hydrodynamics and climate change adaptation techniques.

Specifically, the proposed project for Long Island includes a flood hazard risk assessment and coastal flood reduction infrastructure (drainage improvements, road improvements and ecosystem restoration). This specific project sites are dispersed within an area of approximately eleven (11) km of shoreline from Gray's Settlement to Scrub Hill Settlement in Central Long Island (see Figure 5-2.1). Infrastructure will primarily involve the installation of drainage wells (locations along the Queen's Highway and at Deadman's Cay Airport), small retaining flood walls, embankments, possible road raising and natural restoration through plantings to improve climate resilience. Additional information on the environmental and social setting is available in Section 7 and 8.

Table 5.2-1: Long Island Proposed Infrastructure Description

Site		Description/Project Specifics
Scrub Hill	Description	Scrub Hill is located on a low-lying land nestled between the eastern windward hills and White Pond to its west. Flooding of the Queen's Highway is a regular occurrence with severe weather, heavy rain or hurricanes, severely restricting vehicle flow. After Hurricane Joaquin, the water level in Scrub Hill was reported to be 2 meters above the center line of the road and lasted for over 3 weeks. The specific impact area for the proposed by-pass road is considered undeveloped with dry broad leaf evergreen/upland coppice.
	Proposed Engineering Solution	The preferred solution is completion of a by-pass road. At present, secondary roadways perpendicular to the Queen's Highway exist to the north and south of the area of flooding. Approximately 220 meters of parallel roadway exists from the northern side road. In order to connect the two secondary roadways, it will be necessary to purchase land, clear, and pave a 900 meter length of by-pass road. At this point, it is anticipated that the area of impact includes land owned by one individual.
Buckley's Seawall	Description	Coastal road damage was evident in Buckley's where a 700 ft concrete seawall is currently being constructed.
	Proposed Engineering Solution	It is recommended that additional studies ascertain whether mangrove restoration is feasible in coordination with a revetment on west face of the seawall to mitigate refracting wave energy.
Deadman's Cay Airport	Description	<p>The Deadman's Cay Airport is situated within a drainage basin. Flood water from the airport drains into the ocean via culverts under the Queen's Highway between Lower Deadman's Cay and Old Gray's. The culverts provide inadequate drainage relief as the area floods prior to the airport.</p> <p>Three (3) drainage well exist at the Deadman's Cay Airport; however, these no longer function as intended. In 2015, a drainage well was installed at the airport which is functional. Another drainage well was installed in Lower Deadman's Cay to the immediate east of the Queen's Highway.</p>
	Proposed Engineering Solution	To alleviate flooding at the airport it is recommended that a flood gate be installed in the area of the culverts as well as mangrove restoration for the area. Other works to address flooding include additional drainage wells, improved drainage channel to the sea, improved crossfall of runway and installation of swales.
Main Road, Gray's, and Old Gray's	Description	<p>The Queen's Highway floods in two (2) areas of Gray's.</p> <p>Gray's (North) experiences flooding after a heavy rain for approximately 730 meters. Of note, for vehicles travelling north a corner obscures the flooding setting up a dangerous situation for high speed and water.</p> <p>Gray's (South) the Queen's Highway floods for approximately 200 meters.</p>
	Proposed Engineering Solution	<p>1) Gray's (North). Solutions include raising the road or the addition of drainage well to alleviate flood water.</p> <p>2) Gray's (South). Installation of a drainage well is recommended.</p>

Figure 5.2-1: Central Long Island Site Location⁵



⁵ Mott MacDonald. (2016). *Design and feasibility analysis of risk-resilient ICZM in The Bahamas*. Inter-American Development Bank.

Figure 5.2-2: Culvert at Lower Deadman's Cay



Figure 5.2-3: Drainage Well Lower Deadman's Cay



Figure 5.2-4: Scrub Hill Home in Close Proximity to White Pond



5.3 Western Esplanade to Junkanoo Beach (New Providence)

Junkanoo Beach is a popular tourist destination and adjacent to major transport corridor, West Bay Street. Coastal interventions will result in reducing overtopping and flood risk, while providing regeneration and economic benefits. The initial scope of the proposed program for Nassau extended from Potter's Cay to Arawak Cay. This scope has since been modified to a nearly one km stretch of shoreline extending from the western boundary of the Pointe development to Arawak Cay, inclusive of Junkanoo Beach, the Western Esplanade, and the Nassau Harbour breakwaters. For simplicity purposes, references to Junkanoo Beach also include the area of the Western Esplanade.

The primary objective for Junkanoo Beach is to develop a strategic, climate risk-resilient, sustainable shoreline management program that integrates soft and hard engineering techniques. The scheme of proposed works for Junkanoo Beach aims to enhance coastal protection, reduce overtopping and beach erosion, and provide economic benefits. Importantly, the project site falls within the context of the Emerging and Sustainable Cities Initiative and any proposed improvements and management directives should align with both this Initiative and the National Development Plan⁶.

Specifically, the proposed project for New Providence will focus on shoreline and beach enhancements including, beach and dune stabilization measures and associated oceanographic studies along the one (1) km Junkanoo Beach and adjacent nearshore waters to reduce the rates of shoreline and dune retreat and help model the impacts of nearby developments. The shoreline dynamics of this area are influenced by the urban setting, deep harbor, recent development projects and existing hard coastal protection infrastructure (seawalls and groynes). Additional information on the environmental and social setting is available in Section 7 and 8.

The present coastal issues at Junkanoo Beach include:

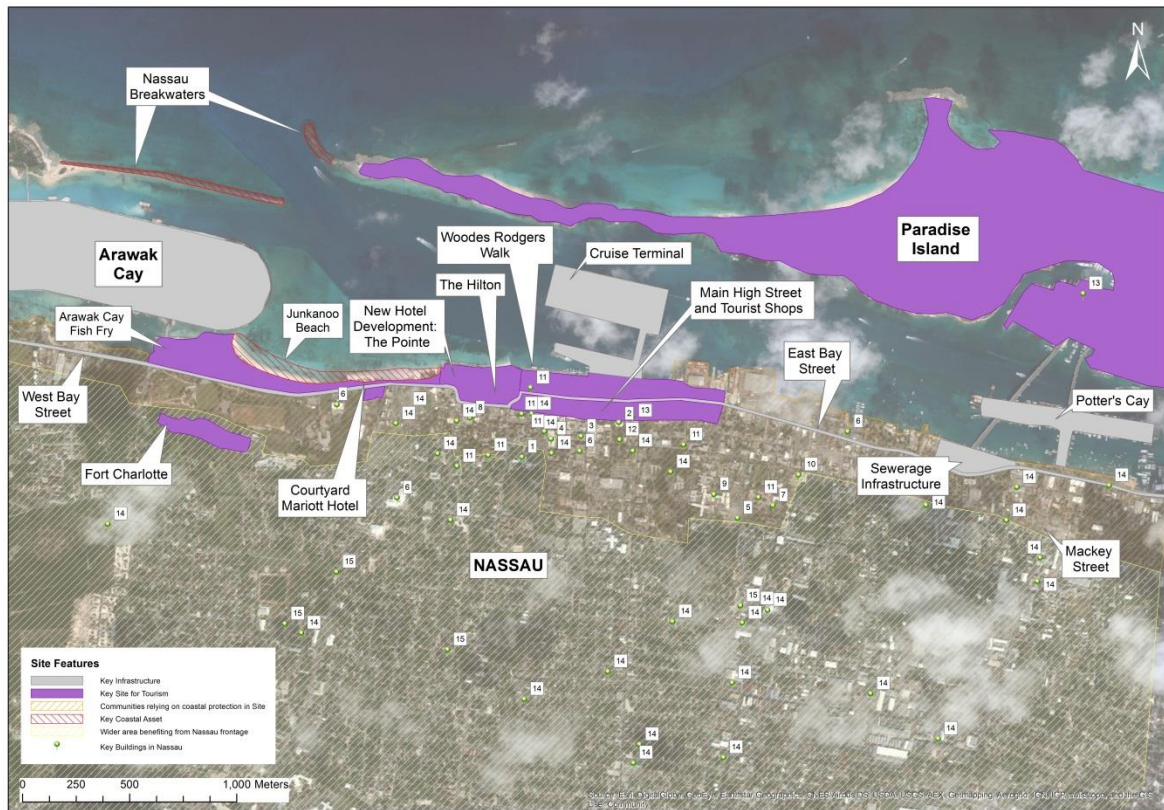
- Loss of sandy beach limiting the value of the beach asset and exposing seawalls to erosion
- Damaged seawalls and sidewalk
- Flooding on West Bay Street (main road) and distribution/working status of drainage outfalls
- Sand deposits to impervious surfaces immediately adjacent to beach

⁶ [The Bahamas National Development Plan: Vision 2040](#) is to be a comprehensive framework to guide decision-making over the next 25 years.

Table 5.3-1: New Providence Location and Proposed Engineering Solutions

Site		Description/Project Specifics
Junkanoo Beach	Description	Junkanoo Beach is defined as the 950 meter shoreline extending from the Pointe Development westward to Arawak Cay encompassing the area also known as the Western Esplanade.
	Proposed Engineering Solution	1) Beach management through groyne structures 2) Repaired/upgraded drainage at West Bay Street
Breakwater	Description	The Nassau Harbour Breakwaters entail an eastern groyne and western groyne. Assessing the current and wave conditions around the Nassau Harbour is a critical aspect for understanding coastal vulnerability. The abutment section of the East breakwater is severely damaged with an open breach of approximately 100 meters.
	Proposed Engineering Solution	The damaged breakwaters can either be repaired or a new build depending on overall cost and preference based on detailed designs.

Figure 5.3-1: Nassau - Potter's Cay to Arawak Cay⁷



Reference for Key Buildings labelled:

- | | |
|---------------------------------------------|-------------------------------|
| 1. Government House | 8. US Embassy |
| 2. The Supreme Court | 9. Princess Margaret Hospital |
| 3. Court of Appeal and Commonwealth | 10. Doctor's Hospital |
| 4. Central Bank of The Bahamas | 11. Museums |
| 5. CIBI First Caribbean International Banks | 12. Nassau Public Library |
| 6. Government Building | 13. Police Stations |
| 7. Bahamas National Council of Disability | 14. Places of Worship |
| | 15. Schools |

Source: Mott MacDonald, 2016 and ESRI mapping, 2016

⁷ Map of Western Esplanade to Junkanoo Beach. Google Earth. Accessed: January 17, 2017

Source: Mott MacDonald, 2016 and ESRI mapping, 2016. Altered Blue Engineering 2016.





Figure 5.3-3: Western Esplanade Beach Outfall



Figure 5.3-4: Western Esplanade Sidewalk on Dune - Facing West



Figure 5.3-5: Groyne with No Sand on Western Side - Facing East



Figure 5.3-6: Junkanoo Beach - Facing East

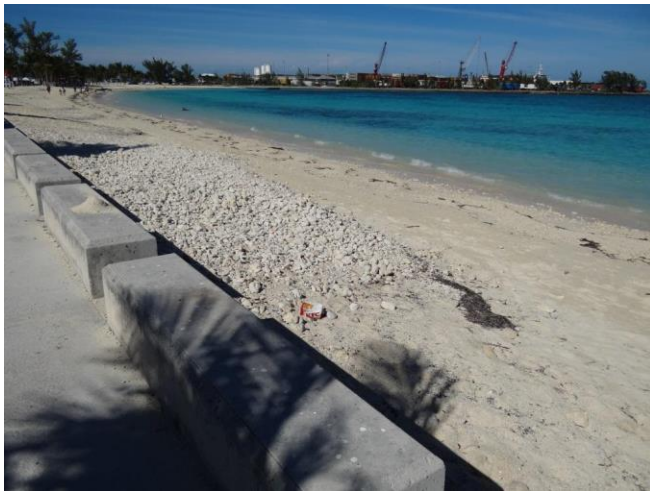


Figure 5.3-7: Accumulation of Rocky Rubble and Recent Sea Wall Repairs along Western Esplanade - Facing West

5.4 Sustainable Andros

Given Andros' rich biodiversity, the objective of interventions at this site is to demonstrate the effectiveness of natural infrastructure for shoreline stabilization and protection through restoration of coastal natural habitats (mangroves, reefs). Recently, an IDB-funded project developed the Andros Sustainable Master Plan using an ecosystem-based approach that involved community participation and modeling using INVEST software. This Program will build off that approach through community engagement in restoration and management activities, with a view to promoting local participation and engagement to achieve sustainable impact.

Proposed interventions will be on the East coast (see Figure 5-4) since it is home to the majority of people, settlements and infrastructure on the island. One site will be included from each district and site selection will be validated during execution, due to the need to ensure that environmental conditions are suitable for restoration activities. Specifically, the Program will finance baseline inventories and diagnostics, conservation and restoration of coastal ecosystems through mangrove and seagrass replanting, invasive casuarina eradication and other approaches for the purposes of erosion and flood control and associated benefits such as fisheries production and recreation. Additional information on the environmental and social setting is available in Sections 7 and 8.

Figure 5.4-1: Location of Potential Infrastructure Interventions on Andros



Figure 5.4-2: Lowe Sound Seawall, North Andros (Blue Engineering)



Figure 5.4-3: South Mastic Point Seawall, New Town, North Andros, looking south (Blue Engineering)



Figure 5.4-4: Deep Creek Seawall Looking South, South Andros (Blue Engineering Ltd.)



6 Institutional Legal, Policy, and Administrative Framework

Presented herein are the relevant existing laws, regulations, and responsible regulatory agencies, which pertain to the conservation, protection, and management of the natural environment of The Bahamas.

6.1 Inter-American Development Bank Policies

In order for the Program to be considered for financing by the IDB, it must demonstrate that it has been prepared and will be executed in compliance with IDB's environmental and social safeguard policies. To that end this Program has been classified as a Category 'B' operation according to IDB's Environment and Safeguards Compliance Policy (OP-703). The Program is expected to comply with the Environment and Safeguards Compliance Policy, including Directive B.2 for compliance with in-country regulations and the Environmental Assessment requirements of Directive B.5. Due to designation of Long Island as an Important Bird Area, as well as interventions on East grand Bahamas taking place in the newly designated National Park, the Program will incorporate environmental management to safeguard against significant conversion or degradation of critical natural habitat or damage critical cultural sites as in accordance with the requirements of Directive B.9. Given the Program's focus on ecosystem restoration, it is likely that the impact of the Program will be positive for the vulnerable bird species present on Long Island. Appropriate pollution prevention and abatement measures, including good waste management practices during construction, will be incorporated in the ESMP, in accordance with Directive B.11. Also, the Program has intrinsically incorporated the IDB's Disaster Risk Management Policy (OP-704) and its directives into its strategy, design and implementation, having a component aimed at strengthening resiliency and reducing vulnerabilities to natural disasters, climate change, and environmental management, including collection of data related to disaster risk management. Finally, to comply with the Bank's Gender Equality in Development Policy (OP-761), this Program will build off best practice and lessons learned from the Andros Sustainable Master Plan process, in order to make sure that women and youth are involved in relevant stakeholder meetings. In addition, some of the proposed activities identified under Component 2, for instance possible mangrove restoration projects, will be designed to facilitate women's involvement.

The Program will also comply with IDB requirements for consultation with affected parties (Directive B.6, OP-703): *For Category 'B' operations, affected parties must be consulted at least once, preferably during the preparation or review of the ESMP, as agreed with the borrower. For consultation purposes, appropriate information will be provided in location(s), format(s), and language(s) to allow for affected parties to be meaningfully consulted, to form an opinion and to comment on the proposed course of action. EIAs and/or other relevant environmental analyses will be made available to the public consistent with the Bank's Disclosure of Information Policy (OP-102). During execution, affected parties should be kept informed of those project-related environmental and associated social mitigation measures affecting them, as defined in the ESMP.*

Consistent with the consultation policy above, the IDB established guidelines for stakeholder engagement and disclosure specific to the Climate-Resilient Coastal Management and Infrastructure Program ESA/ESMP. These requirements are outlined below:

1. Consultations on ESA and ESMP
 - Meaningful consultation with affected stakeholders

- At least once during preparation of ESMP
- Must document consultations
- Summarize process and issues in this ESAR

2. Public disclosure of ESA

- Fit for disclosure ESA disclosed on the Bank's website prior to the IDBs final analysis meeting for the Program.
- Final ESA disclosed prior to the consideration of the Program for approval by IDBs Management.

Stakeholder consultations, including public participation, were completed for each of the proposed islands where infrastructure improvements are proposed to mitigate the coastal impacts of climate change. Details of stakeholder engagement for each island are found in Section 11.

6.2 National Legal and Regulatory Framework

While there is no consolidated environmental protection act in The Bahamas, environmental protection protocols are found ad hoc in legislation as found in Table 6.2-1 on the next page. A draft Environmental Planning and Protection Act was prepared in 2000 with subsidiary regulations pertaining to pollution and Environmental Impact Assessment (EIA) and a National Environmental Policy was prepared in 2005, but implementation of recommended legislation has not occurred.

The stipulation for an EIA is found within the Planning and Subdivision Act, 2010. Other associated permits that may relate to the environment such as the notification of coastal activity may fall outside the responsibilities of the MOEH. It is anticipated that permitting requirements will be outlined during Ministerial consultation and obligation to International Conventions through legislation.

As this program relates to infrastructure works for climate resilience, proposed engineering solutions may require the application of the following Acts with consultation provisions. For Consultation requirements by regulatory statute, please refer to Section Public Consultation 6.8.

Table 6.2-1: National Environmental Legislation

Environmental Law, Regulation, Policy	Subject	Summary	Relating to the Climate Resilient Program
Antiquities, Monuments, and Museum Corporation Act 1998, Chapter 51	To protect antiquities	An Act to provide for the preservation, conservation, restoration, documentation, study and presentation of sites and objects of historical, anthropological, archaeological and paleontological interest, to establish a National Museum, and for matters ancillary thereto or connected therewith.	Shall any contractor make a discovery of antiquities during construction, the AMMC shall be contacted immediately. This Act may pertain to works occurring in the vicinity of Junkanoo Beach due to proximity of historical buildings and past uses.
Archipelagic Waters and Maritime Jurisdiction Act, 1993	To establish the waters of The Bahamas and its exclusive economic zone	An Act respecting the territorial sea, archipelagic waters, internal waters and the exclusive economic zone of The Bahamas. Archipelagic Waters and Maritime Jurisdiction Act (Exclusive Economic Zone and Territorial Seas Limits Order) 2012 established the delimitation of boundaries between The Bahamas and Cuba.	This Act defines the territorial waters including the Exclusive Economic Zone.
Bahamas National Trust Act, 1959 Bahamas National Trust Amendment, 2013	Designation and management responsibility for National Parks	This Act and Amendment founded the Bahamas National Trust and grant it authority for the provision and oversight of National Parks in The Bahamas.	The BNT has responsibility for National Parks in The Bahamas as such it will be a key stakeholder for proposed works in East Grand Bahama, Andros, and Long Island. With relevance to Nassau, the 2013 Amendment allows the BNT to consult on matters of national importance.
Bahamas Protected Areas Fund Act 2014	To establish the Bahamas Protected Areas Fund	The Bahamas Protected Area Fund is a regulated organization for oversight of protected areas to ensure sustainable financing and management activities under the Caribbean Challenge Initiative and Caribbean Biodiversity Fund. It has responsibility for programs established for the management of an area protected for biodiversity, carbon sink, water resources, wetlands/blue holes, degraded or threatened ecosystem as such subjects are defined by the UN Convention to Combat Desertification, UN Framework Convention on Climate Change.	BPAF may be used as a long-term funding mechanism for climate-resilient programs, including institutional strengthening, relevant to designated protected areas. For the IDB program, this may include Andros, East Grand Bahama, and Long Island.
Bahamas Public Parks and Beaches Authority Act, 2014	To establish the parks and beaches authority and its responsibilities	An Act to establish the Public Parks and Beaches Authority, to provide for the property rights and liabilities of the Authority and to identify, regulate, maintain, develop, and conserve public parks and beaches and for connected purposes.	This Act is most relevant to New Providence where the BPP&BA exerts some control over Junkanoo Beach in terms of maintenance services and lifeguards.
Bahamas Spatial Data Infrastructure Act 2014	To establish the Bahamas National Geographic Information Services Centre (BNGIS) as a department of Government	BNGIS is to be a focal point for the collection of geospatial data, geographic information systems coordination of programs and regulations, GIS training, and GIS data	
Coast Protection Act, 1968 Chapter 204	To protect the coast	An Act to make provision for the protection of the coast against erosion and encroachment by the sea and for the purposes connected therewith. Coast protection work means any work or construction alteration, improvement, repair, maintenance, demolition or removal for the purpose of the protection of any land, and includes the sowing or planting of vegetation for said purpose. Protection means protection against erosion or encroachment by the sea. The Coast Protection Act stipulates in Section 3(1) that the Minister	As pertaining to the IDB climate resilient program, works relating to protection of the coastal environment being namely any new seawalls, groynes, or other structures that affect erosion and sediment patterns will require public notice. Repairs or maintenance on existing structures do not require notice.

		<p>(MOWUD) may carry out coast protection work as appears to be necessary or expedient.</p> <p>Consultation requirements for coastal protection works other than maintenance or repair require public notice. Section 4(1) the Minister must publish notice in a newspaper where he may consider for inclusion the provisions of (a-d). Following publication, Section 4(2), any person has 28 days to serve the Minister objection on any grounds mentioned in subsection (4).</p>	<p>Public notice shall be placed in a newspaper with a period of 28 days thereafter for a person to file objection to the Minister (MOWUD) based on any grounds mentioned in subsection (4).</p>
<p>Conservation and Protection of the Physical Landscape of The Bahamas, 1997 Chapter 260</p>	<p>Excavation, Landfill, Quarrying, Mining, Protected Trees Listing</p>	<p>This Act makes provisions for the regulation of activities including excavation, landfill, quarrying, mining, and harvesting of protected trees in The Bahamas for the purpose of conservation of maintenance of the environment. The Regulations include a list of protected tree species in The Bahamas.</p> <p>Excavation means the revealing or extraction by digging systematically into the ground, of physical natural resources (such as soil, rock, quarry, fill or sand) and in the Act includes:</p> <ul style="list-style-type: none"> (a) the removal of a hill or any or any portion of a hill; (b) the creation of a pit by lowering the natural ground level; © the extraction of physical natural resources for the purposes of – <ul style="list-style-type: none"> (i) creating a lake, a watershed or an area of the type commonly referred to as a drainage basin; (ii) any work connected with a canal, bulkhead, or pier or a proposed canal, bulkhead or pier (iii) protecting land against, encroachment by, or recovering land from, fresh or salt water; or (d) the removal of sand from any beach or dune; <p>Also – it is under this Act that it is responsibility of the Minister to regulate, monitor, and control –</p> <ul style="list-style-type: none"> 2(a) the physical landscape of The Bahamas for the purpose of preventing environmental degradation, flooding, denuding of hills, unnatural steep inclines and landslides; (b) the filling up of lands, wetlands and areas commonly referred to as ‘blue holes’, ‘natural ponds’, or ‘drainage basins’ (d) any excavation for the purpose of work which would affect any part of the coastline of The Bahamas; and € the digging up or removal of sand from beaches and sand dunes. <p>Application for Permit to Carry out Excavation or Landfill Operation: a permit for activities relating to excavation, sand mining, quarry mining, land clearing including the excavation of canals.</p>	<p>With regards to the IDB project, it is likely that a few proposed engineering solutions will require a permit for excavation. At this point dredging is not anticipated and the issue will be further assessed in technical studies during Program execution</p> <p>If proposed engineering solutions require excavation, a permit to Carry Out Excavation may be required to be submitted to MOWUD. Such permit requires the volume of excavation activities to exceed seventy-five (75) cubic yards in volume or such lesser or greater volume as specified by the Minister.</p> <p>In terms of consultation requirements – it is up to the Director of Physical Planning, Section 8(1), to give notice to the public for any interested person to object to the granting of a permit in writing. The public notice shall be issued in not fewer than 2 newspapers at intervals of not less than 3 days.</p> <p>This notice is not a regulatory requirement but at the discretion of the Director of Physical Planning.</p>

Environmental Health Services (Collection and Disposal of Wastes) Regulations 2004	To administer and outline waste collection and management facilities	Environmental Health Services (Collection and Disposal of Wastes) Regulations 2004 establish the collection and control of waste including waste facilities and other matters relating to wastes.	
Environmental Health Services (Fees and Services) Regulations 2000	To establish fees and services performed by the Department of Environmental Health Services	The Fees and Services regulations outline services and associated fee rates performed by the Department of Environmental Health Services. The Department may provide testing for air quality, water quality, and radioactive materials.	Requests may be made to the Department of Environmental Health Services for testing.
Environmental Health Services Act 1987	To promote and protect the public health and to provide for the conservation and maintenance of the environment	An Act to promote the conservation and maintenance of the environment in the interest of health for proper sanitation in matters of food and drinks, and generally for the provision and control of services, activities, and other matters connected therewith or incidental thereto.	Environmental Health Services (Collection and Disposal of Wastes) Regulations 2004 establish the collection and control of waste including waste facilities and other matters relating to wastes.
Fisheries Resources (Jurisdiction and Conservation) Act 1977	To protect fisheries and provide regulation for marine reserves/protected areas	An Act to make provision with respect to the conservation and management of the fishery resources of The Bahamas and to extend the limits of the jurisdiction of The Bahamas over such fishery resources and for matters connected therewith and incidental thereto. The Act establishes the economic fishery zone of The Bahamas.	This Act makes provision for Marine Protected Areas, which is relevant for the East Grand Bahama National Park and to Long Island for the potential Long Island Marine Management Area. The Department of Marine Resources has oversight of MPAs.
Forestry Act of 2010	To protect the forests and make declarations to use	The Act provides for utilization of forest products and non-timber forest products from the forest estate. It sets forth the management and conservation of the Forest estate and associated industries.	The application to harvest a protected tree species has moved from the Conservation and Preservation of the Physical Landscape Act to the authority of the Forestry Act, 2010. Though not anticipated, if any upland works require removal of vegetation, the presence of a protected tree species will warrant a permit. Of note, mangroves are not listed as protected.
Health and Safety at Work Act 2002	To protect human health and safety at work	The purpose of the Act is to: - secure the health, safety and welfare of persons at work- protect persons other than persons at work against risks to health or safety arising out of or in connection with the activities of persons at work- control the storage and use of explosive or highly flammable or otherwise dangerous substances, and generally preventing the unlawful acquisition, possession and use of such substances.	

<p>Planning and Subdivision Act, 2010 Planning and Subdivision Regulations (Application Requirements), 2011</p>	<p>To regulate the built environment</p>	<p>This Act regulates the development of the built environment through physical planning protocols across the archipelago of The Bahamas. The Act stipulates the process for subdivision approval subject to specific conditions with respect to the features of the proposed development or project including the preparation of an EIA/Environmental Impact Study (EIS).</p> <p>According to the Act, and relevant to the IDB program a building includes – (c) any dock, bulkhead, pier and any works for the protection of land against encroachment by, or for the recovery of land from fresh or salt water;</p> <p>With regards to the requirement for an EIA/EIS, Section 14(1) describes development attributes to which an EIA/ EIS would be prescribed: (a) likely to give rise to significant effects on the environment by virtue of its nature, size, or location (b) of national importance; (c) proposed for sensitive lands or for lands with natural importance; (d) significant in terms of size of complexity; (e) of a nature that may have potentially adverse environmental effects; or (f) a development of regional impact.</p> <p>Section (36)(7) for the Approval required for development stipulates that notwithstanding the provisions of this section, the classes of development specified in the <i>Third Schedule</i> are permitted and may be undertaken without permission of the Committee, but such development shall be subject to any conditions or restrictions imposed by any Regulations made under this Act or by any other legislation.</p> <p><i>Third Schedule – Development Permitted Without Approval</i> (4) Repairs to roads, bridges, and harbour installations. (5) Repairs to services and public infrastructure</p> <p>Should Site Plan Approval be required by the Committee unless excepted under Section (7)(5), all development other than subdivisions, Section 42(6) must within twenty-one (21) days after a complete application has been submitted to the Department engaged in a public hearing where the Director will give notice to the public of the application and the date on which a public hearing will be held.</p>	<p>Where proposed engineering solutions meet the definition of a building or development, it is the discretion of the Director of Physical Planning after communication with referral agencies to determine the applicability of the Site Plan Control and supporting documents (Application Regulations).</p> <p>However, the <i>Third Schedule</i>, identifies classes of development not requiring permission of the Committee. Relevant to the IDB program: (4) Repairs to roads, bridges, and harbour installations. (5) Repairs to services and public infrastructure.</p> <p>The executing agency (MOWUD) should meet with the Department of Physical Planning for a pre-submission consultation as outlined in the regulations to ascertain the application of Site Plan Control and/or the <i>Third Schedule</i> to the proposed works.</p> <p>Furthermore, supporting documents outlined in the Application Regulations (2011) which may be required include: 1) Planning Rationale 2) EIS 3) Traffic Impact Analysis 4) Heritage Impact Statement 5) Servicing Study 6) Comprehensive Development Plan 7) Noise Study 8) Archaeology Study 9) Soil/Geotechnical Study 10) Stormwater Management Study</p> <p>For the proposed project sites, an EIA/EIS may be required for: (a) New Providence/Junkanoo Beach – as being of national importance and which may have potentially adverse environmental effects. (b) East Grand Bahama – as being proposed for sensitive lands with natural importance as a National Park Area.</p>
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Port Authorities Act 1962	To provide regulation for the management and control of navigational areas	An Act to provide for the constitution and appointment of port authorities for New Providence and the Out Islands whereby the various ports and harbours of The Bahamas and the pilots and pilotage thereof and therein may be better regulated and controlled.	A letter of notification for coastal activity must be sent to the Port Department for any activity occurring in the sea. This Act is most relevant to proposed infrastructure works on the seabed in New Providence, namely the breakwater.
Public Works Act 1963	To provide for the physical development of The Bahamas	An Act to provide for the construction, management and development of public works, buildings, and road.	Building Regulations permits through the Building Control Department at MOWUD.
Water and Sewerage Act 1976	To establish the Water and Sewerage Corporation and to control water resources	An Act to establish a Water and Sewerage Corporation for the grant and control of water rights, the protection of water resources, regulating the extraction, use and supply of water, the disposal of sewage and for connected purposes	The Act mandates WSC to provide adequate facilities for drainage and the safe disposal of sewage and industrial effluents.
Wild Animals Protection Act 1968	To protect wild animals of The Bahamas	The Act provides a listing of protected animal species in The Bahamas	It is not anticipated that the project will impact protected animal species.
Wild Birds Protection Act 1987 Wild Bird Protection Act (Reserves),	To protect wild birds of The Bahamas	The Act protects the wild birds of The Bahamas and makes provision for the dedication of time periods for the hunting of specific species.	Wild Birds Reserves are outlined in these regulations. All wild birds are considered protected unless as indicated in the Act.

6.3 National Environmental Policies

The Bahamas has developed National Environmental Policy papers that guide internal policy planning and policy. These policies are not regulations and serve to guide policy making and internal Ministerial decision-making. National Policy documents also guide implementation or meet the requirements of International Conventions to which The Bahamas is party. These National Policy documents drive internal decision-making practices within various Government Ministries and Departments and are outlined in Table 6.3-1: Relevant National Policies on the next page.

Relevant National Policies		
Bahamas National Maritime Policy, 2015 (Draft)	The National Maritime Policy provides a guidance to expand the maritime sector through safe and sustainable practices.	<p>The Objectives of the Bahamas National Maritime Policy are:</p> <ol style="list-style-type: none"> 1) to expand the maritime sector for future economic development 2) to provide employment opportunities for Bahamians both nationally and internationally 3) to facilitate the training of mariners consistent with international norms 4) to establish programmed and protocols that enhance the safety of mariners and vessels 5) to upgrade port infrastructure and port services throughout the country <p>Program components are influenced by the maritime section namely for New Providence, East Grand Bahama, and Andros. The ability to safely navigate into port and access boats is vital for national economic development. Ensuring that harbours, such as Nassau Harbour, are secure during severe weather is an important component to mitigating risk to climate change.</p>
National Energy Policy 2013-2033	The National Energy Policy 2013 - 2033 outlines a plan for a modern diversified and efficient energy system that is affordable and secure while ensuring sustainability prosperity.	<p>The National Energy Policy outlines four (4) goals:</p> <ol style="list-style-type: none"> 1) Bahamians will embrace conversation through exploration of energy efficiency 2) The Bahamas will enhance generation capacity to provide a safe and reliable energy supply 3) The Bahamas will strive to be a leader in the opportunity for a diverse range of energy supplies to support the economy 4) The Bahamas will have the appropriate governance structures. <p>The National Energy Policy acknowledges the influence of atmospheric greenhouse gas emissions as contributors to global climate change. Reducing dependence on fossil fuels while increasing investment for renewable energy sources show commitment by The Bahamas to adapt to climate change.</p>
National Policy for the Adaptation to Climate Change 2005	Climate change assessment for the immediate and project adaptation techniques for The Bahamas	<p>The National Policy for the Adaptation to Climate Change outlines a national framework to meet the goals and objectives of the United Nations Framework Convention on Climate Change (UNFCCC). The Bahamas is committed to reduce greenhouse gases and address climate change impacts.</p> <p>As a Small Island Developing State, The Bahamas is vulnerable to the impacts of climate change. The Bahamas will strengthen coastal resilience through adaptation techniques such as the proposed infrastructure solutions for Andros, East Grand Bahama, New Providence, and Long Island.</p>
The Bahamas National Wetland Policy	The goal of the National Wetlands policy is to conserve, manage, and restore wetland wisely in conjunction with sustainable development practices.	<p>The Bahamas National Wetland Policy outlines a national framework to meet the goals and objectives of the Ramsar Convention, which The Bahamas signed on June 7, 1997. This policy paper provides direction to the Government for the management of wetlands and to identify wetlands of national importance.</p> <p>The National Wetland Policy highlights the importance of wetland features. While neither wetlands nor individual plant species such as mangroves are protected by law, this policy</p>

		document guides internal decision-making to review any project components that may interact with wetlands as defined by Ramsar.
National Invasive Species Strategy for The Bahamas, 2013	Identifies and recommends a management framework for the control and eradication of invasive species.	<p>The National Invasive Species Strategy for The Bahamas originally published in 2003, was updated in 2013 as part of the Global Environment Facility funded project, Mitigating the Threats of Invasive Alien Species in the Insular Caribbean (MITIASIC). It sets forth a management framework for the control and eradication of invasive species. Since 2003, The Bahamas has incurred problems with lionfish and cane toads, both considered invasive species. Invasive species are a threat to island biodiversity.</p> <p>Invasive species are a threat to island biodiversity and enhancing climate resilience must consider the influences of these species on the coastal environment. Australian pine and Scaevola species were most notable at Junkanoo Beach and should be removed. Invasive removal will also be a key aspect of Component 2 interventions in Andros.</p>
National Biodiversity Strategy and Action Plan, 1999	A plan to maintain biodiversity through sustainable development for a small island developing nation.	<p>The Bahamas government is committed to conserve biodiversity and to pursue sustainable development. This document highlights the role of biodiversity in the Bahamian social and environmental context and recommends measures to ensure its compatibility with future development.</p> <p>Climate change will inevitably place increased pressure on native species, particularly, if invasive species proliferate unabated. Performing ecosystem restoration while improving coastal resilience will help to maintain island biodiversity.</p>

Table 6.3-1: Relevant National Policies

6.4 International Conventions and Agreements

An outline of relevant international conventions to which The Bahamas is a signatory is provided in Table 6.4-1: International Conventions on the next page. While The Bahamas is a signatory to numerous International Conventions with relevance to coastal zone management and climate change, The Bahamas may not yet have supporting legislation to enact the Convention due to: 1) The Convention being not ratified; or 2) proposed legislation having not yet been tabled as a bill to Parliament. Where it exists, the legislation and/or policy document is cited below as to having relevance to the specific International Convention.

Table 6.4-1: International Conventions

International Convention/Organization	Subject	Summary	Related Legislation, Policy, Permits, If Applicable
Cartagena Convention Ratified: June 24, 2010	An agreement for the protection and development of the marine environment in the wider-Caribbean region	<p>The Convention provides a legal framework for cooperation in the wider Caribbean region. Three technical agreements support the Convention which include:</p> <ul style="list-style-type: none"> - Protocol for Co-Operation in Combating Oil Spills - Protocol for Specially Protected Areas and Wildlife (SPAW) - Protocol Concerning Pollution from Land-based Sources and Activities (LBS) <p>Contracting parties must adopt measures to prevent, reduce, and control pollution from: ships, dumping, sea-bed activities, airborne pollution, and pollution from land-based sources and activities.</p>	<p>Environmental Health Services Act</p> <p>Conservation and Protection of the Physical Landscape Act, 1997</p> <p>Marine Mammal Protection Act 2005 & Regulations 2005</p>
Convention on Biological Diversity Signed: June 12, 1992	To preserve species diversity	<p>The Bahamas is a signatory to the Convention on Biological Diversity which came into force December 1993. It has three main goals: a) The conservation of biological diversityb) The sustainable use of components of biological diversityc) The fair and equitable sharing of the benefits arising out of the utilization of genetic resources</p>	<p>National Biodiversity Strategy and Action Plan, 1999</p> <p>Conservation and Protection of the Physical Landscape of The Bahamas, 1997. The Act provides a listing of protected tree species. A permit to remove a protected tree species is now under the Forestry Act 2010.</p> <p>Bahamas National Trust Act 1959.</p>
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Signed: March 20, 1979	To protect species through the regulation of wildlife trade	<p>CITES regulates the trade of wildlife through a classification system that restricts movement of endangered species. Trading of species may require permits as dictated by the Convention.</p>	<p>Relevant Legislation:</p> <p>Marine Mammal Protection Act 2005 & General Regulations 2005</p> <p>Wildlife Conservation and Trade Act 2004</p>

Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) Signed: June 7, 1997	This convention provides a framework for the international protection of wetlands as contributors for human resources and moreover, for avifauna which do not adhere to international boundaries.	<p>The Bahamas is a signatory to the Convention on Wetlands of International Importance, also known as the Ramsar Convention. This convention provides a framework for the international protection of wetlands as contributors for human resources and moreover, for avifauna which do not adhere to international boundaries.</p> <p>Ramsar defines wetlands as ‘areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters’.</p> <p>The Bahamas has 1 site, Great Inagua National Park, designated as Wetlands of International Importance (Ramsar Sites).</p>	<p>Planning and Subdivision Act 2010, wetlands are defined according to the Ramsar Convention. The Act considers wetlands as sensitive environmental features.</p> <p>National Wetland Policy refers to Ramsar Convention to prioritize the protection of wetland features.</p> <p>Wild Birds Protection Act 1987 and Wild Bird Reserves</p> <p>Bahamas National Trust Act 1959 and Amendment</p>
United Nations Convention on the Law of the Sea Signed: July 29, 1983	To govern the sea with delineation of national boundaries and rights	The Bahamas ratified the Law of the Sea in 1983 and the Convention came into force in 1994. The premise of UNCLOS is to provide for good ocean governance, define the exclusive economic zone (EEZ), and establish innocent passage and the rights of States to limit the rights of innocent passage related to marine resources conservation and pollution control.	National Biodiversity Strategy and Action Plan, 1999 Bahamas National Maritime Policy 2015
United Nations Convention to Combat Desertification and Drought Signed: November 10, 2000	To combat desertification and to mitigate the effects of drought	The Convention is a proponent for sustainable development by addressing social and economic issues that directly impact land degradation.	Bahamas Protected Areas Fund 2014 Forestry Act 2010 Planning and Subdivision Act 2010

<p>United Nations Framework on Climate Change Signed: June 1992</p> <p>Kyoto Protocol Signed: April 9, 1999</p> <p>Paris Agreement Ratified: August 22, 2016</p>	<p>To stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with climate systems</p>	<p>The Bahamas is a signatory to UNFCCC which entered into force in March 1994. The UNFCCC was the culmination of climate negotiation at the Rio Earth Summit in 1992. This summit established a framework with an aim to stabilize atmospheric greenhouse gas. Subsequent annual Conferences of Parties have attempted to create a legally binding and universal agreement on climate and control of anthropogenic outputs. The Kyoto Protocol was developed under the UNFCCC to provide emissions targets and timetables for developed countries. The Paris Agreement as put forth at the Conference of the Parties (COP21) in December 2015. The agreement has not yet come into force as it requires at least 55 parties to have ratified the agreement. The agreement sets forth a global action plan to combat climate change by limiting global temperature rise to below 2 degrees Celsius. Furthermore, the agreement seeks to accelerate actions and investments needed for a sustainable low carbon future.</p>	<p>The Bahamas has no specific legislation related to the control of greenhouse gas emission.</p> <p>Related Legislation: Forestry Act 2010 Bahamas Protected Area Fund 2014</p> <p>National Documents: National Energy Policy 2013-2033 aims to reduce greenhouse gas emissions with a goal of 30% renewables in the energy mix by 2033 National Policy for the Adaptation to Climate Change, 2005 The First National Communication Report of The Commonwealth of The Bahamas Under the Framework Convention on Climate Change, 2001 The Second National Communication Report of The Commonwealth of The Bahamas Under the Framework Convention on Climate Change, 2014</p>
<p>Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea Signed: September 2016 Not yet in force</p>	<p>To conserve the Sargasso Sea</p>	<p>The Hamilton Declaration is currently signed by seven (7) nations, including The Bahamas. The Sargasso Sea covers nearly 5 million km² and is so named for the seaweed, Sargassum. Sargassum mats and windrows act as major nursery and spawning areas. Of note, it is the only place where the European and American eel are known to spawn.</p>	<p>Merchant Shipping (Oil Pollution) Act Environmental Health Services Act Conservation and Protection of the Physical Landscape Act, 1997 Marine Mammal Protection Act 2005 & Regulations 2005 Coast Protection Act, 1968 Archipelagic Waters and Maritime Jurisdiction Act, 1993</p>

6.5 Roles and Responsibilities of Government Departments

The Government of The Bahamas is based on the Westminster system. As a Commonwealth nation it recognizes Her Majesty Queen Elizabeth II as the Head of State where the Governor-General serves as the Queen's representative in The Bahamas. The Executive branch is comprised of the Cabinet, which provides direction and control over government affairs. The Legislative branch is Parliament including the House of Assembly and the Senate, which creates laws. The Judicial branch, including the Supreme Court and Court of Appeal, upholds the Constitution of The Commonwealth of The Bahamas and practices under common law.

In the context of the proposed program, Ministerial support will play a pivotal role to implement and build resilience to coastal risks. The roles and responsibilities of the relevant Ministries and Departments are outlined in Table 6.5-1.

As applicable to BH-L1043, the MOWUD will be the executing agency. As such, it will have oversight and Ministerial responsibility during project execution, planning and construction stages, with operational oversight dependent on project location. MOWUD is expected to retain oversight for all project components with the exception of Western Esplanade/Junkanoo Beach which will be returned to the BPP&BA.

Specific arrangements for management of the proposed Program will be agreed with GOBH and reflected in the final project documents, including the ESMP. Based on initial discussion with MOWUD, capacity to manage environmental and social issues could be strengthened through the hiring of specialists in the proposed Project Execution Unit; specifically there is no environmental and social specialist in the Ministry at this time and elaboration of environmental and social monitoring guidance would need to be developed in the Project Operation Manual.

Table 6.5-1: Roles and Responsibilities of Government Departments

Ministry or Department	Responsibilities	Relating to the Proposed Program
Ministry of Works and Urban Development (MOWUD)	MOWUD has oversight for the built environment and administers the Building Control Act and Regulations	Permits relating to buildings and DPP
Department of Physical Planning (DPP)	DPP is within MOWUD. It administers the Planning and Subdivision Act 2010, permitting requirements for the Conservation and Protection of the Physical Landscape Act.	Site Plan Application
Ministry of the Environment and Housing (MOEH)	MOEH has responsibility for oversight for matters relating to the environment and housing including the following agencies and departments: BEST Commission, Environmental Health Services, BPP&BA, Bahamas Mortgage Corporation, BNGIS	
BEST Commission (BEST)	The BEST Commission was established in 1994 to manage the implementation of multilateral environmental agreements and review EIA and management plans for development projects within the Bahamas. BEST acts as a coordinating agency within MOEH on matters that relate to the environment such as BNT, Port Department, Water and Sewerage Corporation, Department of Marine Resources, Department of Meteorology.	Referral department for discussion on applicability of EIAs, EMPs, or general environmental review of project components
Bahamas National Geographic Information Services (BNGIS)	BNGIS is responsible for the collection of spatial data.	Spatial Data Repository
Bahamas Public Parks and Beaches Authority (BPP&BA)	Established in The Bahamas Public Parks and Beaches Authority Act (2014), BPP&BA is mandated to control, plan, design, develop, administer, manage and maintain public parks and beaches.	Park Maintenance
Department of Environmental Health Services	DEHS is responsible to promote and protect human health and the environment as mandated by the Environmental Health Services Act, 1987 and Environmental Health Services Regulations. Divisions of DEHS include the National Ozone Unit (Montreal Protocol) and Environmental Monitoring and Risk Assessment Division. Other responsibilities for DEHS include assistance with oil and pollution spill clean-up, solid waste management, effluent discharge and any emissions permits.	National Ozone Unit Oil Spill Clean-up Response Environmental Monitoring and Risk Assessment Division Solid Waste Management Effluent Discharge/Emissions Permits
Ministry of Transport and Aviation	The Ministry of Transport and Aviation has authority over the transportation section including the port department.	
Port Department	The Port Department has oversight for changes in coastal water and with navigation.	Notice of Activity for the Coastline
Department of Marine Resources	The Department of Marine Resources pertains to the fisheries of The Bahamas. There are several areas designated as Marine Protected Areas, which fall under the management by the DMR. The DMR must also sign off on any proposed coral relocation projects.	Marine Protected Areas, Coral Relocation
Bahamas National Trust (BNT)	BNT has oversight and management for the National Parks of The Bahamas.	Consultation required with BNT if in the vicinity of a National Park.

6.6 Environmental Permit Requirements

The environmental permitting process in The Bahamas follows a policy of precedent rather than regulatory requirements, except where permits are explicitly stated as outlined in Section 6.2 such as the Removal of a Protected Tree Species permit within the Forestry Act Regulations. The requirement for an EIA for a specific program component will depend on discussion with the Executing Agency, MOWUD, specifically, DPP, and its referral to BEST at MOEH at MOWUD's discretion for consultation. Based on the findings of this ESAR, it is expected that EIAs would be required for the works at Junkanoo Beach and East Grand Bahama. Agreement on responsibility and timing for this will be elaborated in the Project Operation Manual and will be the responsibility of the PEU. The EIA and environmental overview process is detailed below.

The BEST Commission facilitates the environmental approval process within MOEH. In short, a project developer and local environmental consultant meet with BEST for an initial scoping or screening meeting to establish a project's Term of Reference. An EIA is submitted to BEST following the established TOR and after review is either approved or returned with comments to be addressed. Following EIA approval, BEST may request an Environmental Management Plan (EMP) complete with monitoring program prior to construction start. A timeline estimation for EIA and EMP approval is project specific and based on project scale and scope. It can be expected that both documents will receive approval within a period of three to six months depending on the ability to respond to comments, if any. Please refer to Section 14.2 for the environmental permitting process in The Bahamas.

In The Bahamas following the conclusion of an EIA, environmental management and monitoring have become an integral component during the construction of development projects. Acceptance and adoption of this practice by Government allows for institutional oversight and encourages communication between the developer and Government during the construction process. Involvement of Government strengthens institutional capacity for identification, implementation, and monitoring of health, safety, and environmental best management practices. Effective management and frequent monitoring provide the tools necessary to manage potential impacts and to introduce corrective action when required.

6.7 Non-Governmental Organizations (NGOs)

Non-governmental organizations supporting environmental outreach and education include The Nature Conservancy (TNC), Bahamas Reef Environment and Education Foundation (BREEF), Friends of the Environment (FRIENDS), Andros Conservancy & Trust (ANCAT), Nature's Hope for South Andros, and Ocean CREST Alliance of Long Island.

6.8 Public Consultation

Public consultation will follow the regulations of the Government of The Bahamas and the IDB Environmental and Safeguards Policy, whichever is more stringent. While the Planning and Subdivision Act 2010 makes provision for public consultation if an EIA is requested, the process for public consultation

varies between agencies which each have their own internal policies. Additional public consultation for individual components of the program during execution will depend on project location, scope, and scale or as determined by the coordinating Ministry.

Public notice, not to be confused with public consultation, is a regulatory requirement under the Coast Protection Act for coastal protection works other than for maintenance or repairs. This notice is to be published in a newspaper and may outline the project components at the Minister's discretion. The Act does not require public consultation in the form of a meeting merely written notice in a newspaper. Similarly, the Conservation and Protection of the Physical Landscape Act provides the Director of Physical Planning with the option to provide public notice prior to issuance of a permit, i.e. excavation but does not require public consultation.

As noted in Section 6.2, Consultation requirements per the regulatory regime as pertaining to the program are outlined below (See next page):

Figure 6.8-1: Consultation Requirements by Regulations

Act	Consultation Requirements	Responsible Agency
Coast Protection Act	<p>As pertaining to the IDB climate resilient program, works relating to protection of the coastal environment being namely any new seawalls, groynes, or other structures that affect erosion and sediment patterns will require public notice. Repairs or maintenance on existing structures do not require notice.</p> <p>Consultation requirements for coastal protection works other than maintenance or repair require public notice. Section 4(1) the Minister must publish notice in a newspaper, where he may consider for inclusion the provisions of (a-d). Following publication, Section 4(2), any person has 28 days to serve the Minister objection on any grounds mentioned in subsection (4).</p>	MOWUD
Conservation and Protection of the Physical Landscape Act	<p>With regards to the IDB project, it is likely that few proposed engineering solutions will require a permit for excavation. At this point dredging is not anticipated and the issue will be further assessed in technical studies during Program execution</p> <p>In terms of consultation requirements – it is up to the Director of Physical Planning, Section 8(1), to give notice to the public for any interested person to object to the granting of a permit in writing. The public notice shall be issued in not fewer than 2 newspapers at intervals of not less than 3 days.</p> <p>This notice is not a regulatory requirement but done at the discretion of the Director of Physical Planning.</p>	DPP, MOWUD
Planning and Subdivision Act, 2010	<p>Section (36)(7) for the Approval required for development stipulates that notwithstanding the provisions of this section, the classes of development specified in the <i>Third Schedule</i> are permitted and may be undertaken without permission of the Committee, but such development shall be subject to any conditions or restrictions imposed by any Regulations made under this Act or by any other legislation.</p> <p><i>Third Schedule – Development Permitted Without Approval</i></p> <p>(4) Repairs to roads, bridges, and harbour installations.</p> <p>(5) Repairs to services and public infrastructure</p> <p>Should Site Plan Approval be required by the Committee unless exempted under Section (7)(5), all development other than subdivisions, Section 42(6) must within twenty-one (21) days after a completed application has been submitted to the Department engage in a public hearing where the Director will give notice to the public of the application and the date on which a public hearing will be held.</p> <p>To determine the relevance of the Planning and Subdivision Act, 2010, to proposed engineering solutions, it is recommended that Pre-submission consultation is held with the Department of Physical Planning. Projects of national importance and complexity such as Junkanoo Beach may warrant Site Plan Control. Proposed works for Long Island such as drainage wells, seawalls, and native landscaping are considered outside the purview of the Act or may fall under Application (Regulations).</p>	DPP, MOWUD

7 Baseline Environmental Indicators

7.1 General Climate Conditions of The Bahamas

The climate of The Bahamas is considered sub-tropical; it lies in a transition zone between the temperate and tropical zone. The archipelago spans 450 miles in longitudinal extent from 21°N to 27.5°N, hence, the northern Bahamas experiences cooler winters, while the southern Bahamas is markedly drier. The climate of The Bahamas is influenced by the sea particularly, the Gulf Stream which lies between Florida and the Great Bahama Bank⁸. Rainfall is highest between the months of May and November with peaks during June and October.

Table 7.1-1: Average High and Low Air Temperature - Nassau⁹

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
High	77.3	77.5	79.7	81.8	84.6	87.3	89.1	89.3	88.4	85.4	81.8	78.7
Low	62.1	62.5	63.8	66.2	69.8	73.3	74.7	74.8	74.4	71.9	68.0	63.8

Generally, prevailing winds are from the northeast with a rotation to the southeast during the summer months, May to September. In winter, wind may shift to the northwest due to cold fronts emanating from North America. According to the Bahamas Department of Meteorology, the average wind speed is eight (8) knots.

7.2 Ecosystems of The Bahamas

The geographical isolation of the Bahamian islands from the continental United States, Cuba, and Hispaniola contribute to its ecological profile. In large part, the islands of The Bahamas portray ecosystems consistent with sub-tropical to dry sub-tropical vegetation. Though a single country, the longitudinal range of the islands does influence terrestrial and marine flora and fauna. The northern Bahamian islands experience wetter and hotter summers and cooler winters than the southern islands. Hence, the northern islands, Grand Bahama, Abaco, Andros, and to lesser extent, New Providence are known as the Pine Islands for vast swaths of *Pinus caribaea* vs. *bahamensis*, Caribbean Pine. To the extreme south, the vegetation of Inagua is shrub like and dwarfed, particularly in eastern Inagua due to limited rainfall, year-round heat, and high evapotranspiration rates. Of note, there are no freshwater rivers in The Bahamas. The Bahamas has the following ecosystems:

- Tidal Creeks and Flats
- Rocky Shore
- Wetlands/Mangrove
- Hypersaline Ponds
- Coppice Forests
- Pine Forests
- Blue Holes and Subsurface Karst Formations
- Coral Reefs
- Seagrass Beds

⁸ Sealey, N. E. (2006). *Bahamian Landscapes* (3rd ed.). Macmillan Caribbean.

⁹ Ibid.

- Deep Open Ocean

7.2.1 *Geology and Soils*

The Bahamas are located on the North American plate and consist of two (2) carbonate banks, the Great Bahama Bank and the Little Bahama Bank. The islands are composed of Holocene sediment deposits and sedimentary rock, predominantly limestone. Limestone is a naturally porous material and easily eroded by rainfall and surface runoff¹⁰. Karst formations such as blue holes and solution cavities result from erosion of limestone by weather. Hence, The Bahamas has numerous subsurface cavities and channels that transport water often with tidal influence.

7.2.2 *Hydrology*

Freshwater is a scarce resource in The Bahamas. Freshwater accumulates in unconfined aquifers known as the Ghyben-Herzberg lens. Rainwater seeps through the porous limestone rock surface layer to accumulate in a layer on top of saltwater due to the density differentials. The two layers are separated by a thin layer of brackish water. This fragile state of freshwater is compounded by a high evapotranspiration rate for limited groundwater recharge. Hence, the freshwater resources of The Bahamas are highly vulnerable to degradation and anthropogenic pollution. Specific vulnerability factors include:

- Intrusion of seawater: Over abstraction, sea level rise, and storm surge
- Pollution: Anthropogenic sources namely sewerage, petroleum products, industry, agriculture, and landfill leachate

7.3 Coastal Aspects of The Bahamas

7.3.1 *Coastal Ecosystems*

Dominated by a maritime environment, The Bahamas has three (3) distinct ecosystems: coastal and shallow shelf, pelagic, and deep water. There is a total estimated 3,542km² of shoreline in The Bahamas. The Bahamas' exclusive economic zone is estimated to be approximately 242,970 square miles.

National Maritime Policy defines these ecosystems as¹¹:

- Coastal and Shallow Shelf Ecosystems: The shallow coastal waters of the submerged banks are warm and clear, lacking significant impacts from rivers or other land-based run-off. The coastal ecosystems therefore support extensive coral reefs, seagrass meadows, mangroves, and areas of wetland, which combine to support the tourism and fishery sectors in The Bahamas.
- Pelagic Ecosystem: Extending to a depth of approximately 1,000m, the pelagic ecosystem sustains an enormous food network from plankton to top marine predators such as marlin and tuna and are also attractive to deep-driving whale and dolphin species. The proximity of this deep water offshore environment creates exciting sport fishing opportunities and convenient shipping lanes for cargo and cruise ship lines.

¹⁰ Lytle, M. (2006). *The Geology of The Bahamas*. University of Miami.

¹¹ Bahamas Maritime Authority. Ministry of Transport and Aviation. (2015). *The Bahamas' National Maritime Policy - Draft*.

- **Deep Water Ecosystem:** The deep sea environments of The Bahamas include the waters at depths greater than 1,000m, the ocean floor, submarine canyons, and the adjacent deep Atlantic Ocean. The environment is dark, cold, and has limited food supplies with the majority of food supplies falling from the surface.

7.3.2 Coastal Erosion and Flood Potential

With average elevations of less than ten (10) meters¹², and hydrologic records showing the sea level has risen by one (1) foot over the last century, The Bahamas is at risk for coastal flooding and is likely to accelerate with sea level rise due to climate change. Coastal flooding places beaches and coastal communities at risk for inundation and erosion impacts. Moreover, Simpson et al. identified that 36% of The Bahamas' major tourist resorts, 38% of airports, 14% of road networks, and 90% of ports will be at risk if there is a 1m rise in sea level¹³.

For New Providence, Environmental Resources Management is currently preparing the Sustainable Nassau Action Plan, which includes a Hazard and Risk Study. For New Providence, two of the three hazards prioritized for the study focused on flooding being: coastal flooding and inland flooding¹⁴.

Table 7.3-1: Potential Impacts of Sea Level Rise¹⁵

The Bahamas	1m SLR	2m SLR	3m SLR	4m SLR	5m SLR	6m SLR
Land Area	10%	17%	30%	50%	68%	81%
Population (2010 est)	5%	8%	12%	19%	29%	42%
Urban Area	3%	7%	13%	23%	33%	44%
Wetland Area	15%	23%	41%	65%	78%	84%
Agricultural Land	3%	7%	14%	34%	38%	51%
Crop and Plantation Land	2%	6%	11%	21%	36%	53%
Major Tourism Resorts *	9%	11%	24%	26%	35%	50%
Airports	13%	25%	38%	69%	81%	91%
Road Networks	2%	6%	11%	19%	30%	43%
GDP (2008 est)	4%	8%	12%	19%	29%	42%

*These are major tourism resorts and not all resorts.

Coral reefs are at increased risk due to sea level rise due to potential drowning by rising seas, increased erosion of the coastline could increase sediment within the nearshore zone, reducing the amount of sunlight by burying the coral. Projections from climate models also suggest that ocean warming and acidification will impact reefs. Reefs in the area will annually experience thermal stress severe enough to cause bleaching after 2040. Coral calcification may decline as much as 10% by 2040 due to ocean acidification¹⁶. The most

¹² ICF Consulting. (2005). *The Bahamas National Report - Integrating management of watersheds and coastal areas in SIDS of the Caribbean*.

¹³ Simpson, M. (2010). *Quantification and Magnitude of Losses and Damages Resulting from the Impacts of Climate Change: Modelling the Transformational Impacts and Costs of Sea Level Rise in the Caribbean*. UNDP: Barbados.

¹⁴ Environmental Resources Management. (2016). *Sustainable Nassau Action Plan: Hazard and Risk Study (Draft)*

¹⁵ Simpson, M. (2009). *An Overview of Modeling Climate Change Impacts in the Caribbean Region with contribution from the Pacific Islands*. Barbados, West Indies.: United Nations Development Programme (UNDP).

¹⁶ Burke, L., & Maidens, J. (2004). *Reefs at Risk in the Caribbean*. . Washington, DC: World Resources Institute .

threatened coral reef areas in The Bahamas are those surrounding tourism destinations: Grand Bahama, New Providence & Paradise island, and Eleuthera.

7.3.3 Hurricane Risk

Over the course of two hurricane seasons, The Bahamas experienced landfall by two major hurricanes; Hurricane Joaquin in 2015 and Hurricane Matthew in 2015.

Hurricane Joaquin impacted the eastern and southern Bahamas in October 2015. The Category 3 hurricane had maximum sustained winds of 115 mph (185 km/hr). In addition to hurricane strength winds, Joaquin inflicted extreme flooding and storm surge events. A number of the islands experienced storm surges up to 5.5m affecting nearly 5,000 people¹⁷. The estimated total damage to the affected island was \$104,788,224¹⁸.

The outfall from Hurricane Matthew is still being calculated, but the storm significantly impacted portions of New Providence, Andros, the Berry Islands, and Grand Bahama. Hurricane Matthew inflicted storm surges and damaging winds that disabled power, blocked transportation routes, and generated landscaping debris.

7.4 East End Grand Bahama Ecosystem

Grand Bahama is the northernmost island of The Bahamas and is split into three administrative areas: Freeport, East Grand Bahama and West Grand Bahama. The project site is located in East Grand Bahama which is also the location of the Northshore/Gap National Park and East Grand Bahama National Park. East Grand Bahama has numerous creek systems that extend from the shores deep into the interior. A Rapid Ecological Assessment (REA) by the BNT described these creeks as being comprised of mangrove communities (dwarfed and fringing) nestled within a pine woodland¹⁹. The area is very flat and mostly undeveloped. Fringing mangrove along the tidal creeks and large channels provide appropriate habitat for a variety of commercially important fish and numerous birds that thrive on the islets that make up the chain of the East Grand Bahama Cays. The extensive intact mangrove forests are also corridors to the offshore reef system for commercially important species of fish (groupers, snappers grunts, and bonefish) and lobster that move out to the deeper reefs as adults. The causeways are contributing to varying degrees of sedimentation and algal growth leading to habitat degradation.

The REA botanical assessment for East Grand Bahamas, identified seven (7) endemic species with one endemic species, *Symphotrichium lucayanum*, known only to occur in the Pine Woodlands of Grand Bahama, observed at a single location.²⁰ Similarly, four (4) endemic avian species were sighted during the avian assessment²¹. All wild bird species are protected under the Wild Birds Protection Act.

7.5 Long Island Ecosystem

¹⁷ Hurricane Joaquin Pathfinders Task Force. (2015). *Summary Report*.

¹⁸ Inter-American Development Bank. (2016). *Draft Assessment of the effects and impacts of Hurricane Joaquin, The Bahamas*.

¹⁹ Cant-Woodside, S. (2016). *Rapid Ecological Assessment East Grand Bahama*. Bahamas National Trust.

²⁰ Ibid.

²¹ Ibid.

Long Island is a narrow island along a north to south axis and approximately 80 miles long. Long Island's windward Atlantic coast is characterized by cliffs and caves with pockets of sandy beaches. The western or leeward coast faces the Great Bahama Bank and is characterized by shallow waters and mangrove coastal areas.

Central Long Island, Gray's to Scrub Hill, has a windward eastern ridgeline with a relatively flat leeward side. The eastern shoreline is predominantly rocky shore with scattered pocket beaches. The coppice of the ridgeline transitions to buttonwood formations, mangroves and rocky shoreline on the western coastline. Along the Queens Highway vegetation is a mixture of coppice in elevated areas to buttonwood and mangroves in lower areas subject to periods of soil saturation. Seawalls are currently being erected where the Queens Highway immediately abuts the rocky shore.

Of note, Long Island is also considered an Important Bird Area because of the presence of West Indian Whistling Ducks, designated as vulnerable by the IUCN. It is important to note that the designation of an Important Bird Area is not regulated unless designated as Wild Bird Reserve under the Wild Bird Protection Act (Reserves) or as a National Park. All wild birds in The Bahamas are considered protected unless otherwise stipulated in the Wild Birds Protection Act. Whistling Ducks have made a remarkable come back and are now known to be sighted on other islands in the vicinity of Hog Island, Long Island. The primary threats to this species are considered habitat fragmentation, predation and hunting. In the context of Long Island, relevant habitat degradation is the draining of wetlands, particularly considering the island's extensive salt mining industry in the past. Therefore this Program has the potential to make positive contributions through the restoration of wetland ecosystems.

Presently, Long Island has no established National Parks. Discussions have taken place with local residents for the creation of a multi-use marine protected area to be known as the Long Island Marine Management Area (LIMMA). LIMMA discussions have been facilitated by the Bahamas National Trust in collaboration with Ocean CREST Alliance, an NGO based on Long Island.

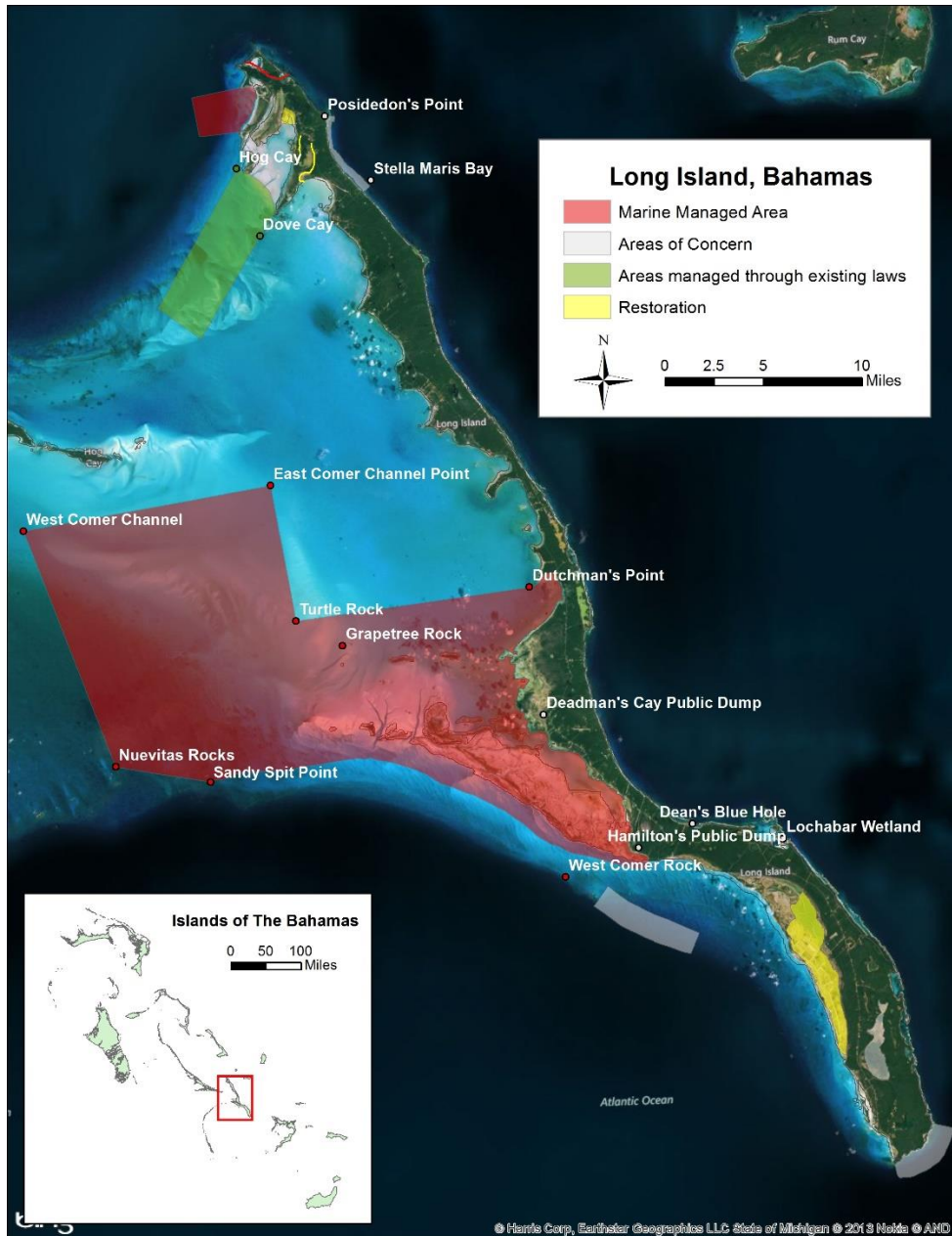


Figure 7.5-1: Proposed Protection Areas Long Island (Ocean Crest Alliance)

7.6 Western Esplanade to Junkanoo Beach Ecosystem

New Providence, home to the country's capital Nassau, is the most populated island of The Bahamas. The island is mostly flat, with swamps and shallow lakes.

The area from the Western Esplanade to Junkanoo Beach is developed for commercial, recreational, and industrial uses. The existing landscape is a sandy shore interspersed with man-made coastal structures to prevent erosion and safeguard the coastline. The upland is comprised of impervious paved surfaces, roads, parking lots, and sidewalks, with open unpaved areas for hosting of events. Particularly around the area of

Junkanoo Beach, invasive species such as Australian Pine and Hawaiian Inkberry are interspersed with native sea grape shrubs and ground cover.

7.7 Andros Ecosystem

Andros is largest island in The Bahamas, although it is comprised of several large land masses separated by tidal creeks. Andros is characterized by a low-lying, muddy western coast with extensive seagrass beds and mangroves. The West coast borders the Great Bahama Bank, a shallow bank which extends more than 100 km offshore. In contrast, the eastern side of the island is flanked by an island-long barrier reef before rapidly dropping off into deep water approximately 3 km offshore.

Separated by the Tongue of the Ocean, Andros is situated to the west of New Providence island and is the western most island on the Great Bahama Bank. A barrier reef parallels the coast of Andros, marking the end of the coastal shallows and the beginning of the Tongue of the Ocean. On land, an eastern ridgeline is exposed to near-continuous NE trade winds whereas the inland and western areas are sheltered. The coastline is mixture of rocky shore, sandy beaches, and mangrove formations.

The landscape of Andros varies from North to South. North Andros has numerous tidal creeks interspersed amidst a pineland and wetland landscape. Elsewhere, the landscape is dotted with blue holes. Travelling south, the landscape experiences lower relief, fewer creeks, and smaller bodies of waters. Andros receives a surplus of rainfall that is stored in Ghyben-Herzberg lens just beneath the surface. The pinelands sit above the freshwater lens. Similar to other Bahamian islands, rainfall varies even within the island with North Andros receiving more rainfall than South Andros.

There are five protected areas on Andros, encompassing almost one third of the island. The largest is the West Side National Park, which encompasses the western coast of the Island. Other protected areas include: Blue Hole National Park, the Crab Replenishment Reserve and the North and South Marine Parks.

8 Socio-Economic Indicators

With tourism accounting for 40% of economy, the socio-economic well-being of The Bahamas' economy is intricately linked with the coastal environment. The Bahamas is highly vulnerable to natural disasters, sea level rise (SLR) and storm surge associated with increasing intensity of extreme weather events. Infrastructure improvements support economic growth and in turn alleviate poverty through job creation during construction, improved access to basic services, and employment opportunities. This ESAR provides background data to develop the parameters for a comprehensive analysis of social aspects during the design stage.

8.1 Socio-Economic Situation

The Bahamas economy is supported primarily by tourism. Tourism accounts for 40% of the economy, followed by the financial services sector. According to the World Travel and Tourism Council, 'The direct contribution of Travel and Tourism to Gross Domestic Product is expected to be BSD 1,648.4 million (21.7% of total GDP) in 2011 rising by 3.1% to BSD 2,226.3 million (22.6%) in 2021.'

The Bahamas has three (3) primary categories of visitors: stopover, cruise stopover, or cruise visitors.

- Stopover Visitor. Persons staying for 24 hours or more, i.e. hotel visitors or boaters or yachters.
- Cruise Stopover Visitor. This category pertains primarily to Grand Bahama where visitors come to The Bahamas on a cruise ship but stay in land based accommodations and stay 24 hours or more.
- Cruise Visitor. Persons visiting The Bahamas by cruise ship and using the cruise ship for their accommodation.

In 2015, nearly 70% of visitors chose to come to The Bahamas for the beaches followed by climate with 53% of stopover visitors²². Moreover, 84% of visitors intended to enjoy beaches with 71% intending to rest and relax. All in all, 77% of stopover visitors rated their beach experience as good or excellent. The climate and natural resources of The Bahamas, namely the beach, influence the success of the tourism industry and overall visitor experience. Any changes to the natural resources and climate due to climate change will likely alter the decision-making process by the potential visitor in his or her choice of travel destination.

8.2 Population & Gender Breakdown

In 2010, The Bahamas had an estimated population of 351,461 with approximately 70% of the population living on the island of New Providence where the capital of Nassau is located. Ninety percent of the country's population lives on New Providence, Grand Bahama, and Abaco followed by Eleuthera, Andros, and Exuma, which collectively account for another 6.4% of total population.

8.2.1 Population Projections

²² Research and Statistics Department. (2015). *Islands of The Bahamas Tour Operator and Media Survey*. Ministry of Tourism.

Population projections for years 2010 to 2040 are given in three variants, high, medium, and low. The high variant projects the populations to rise from 351,500 in 2010 to 475,260 in 2040 which represents a total population of increase of 35.2% with an average annual growth rate of 1.2%. The medium variant, the most probable variant, projects a population of 454,060 by 2040 with an average annual growth rate of 0.97% and overall 29.2% population increase. The low variant projects the population to increase to 433,130 following an annual average growth rate of 0.77%²³. The table below summarizes the population projections 2010 – 2040 based on the medium variant.

Key Demographic Indicators
Projected Population (Medium Series): 2010-2040
Components of Population Growth

Table 8.2-1: Project Population Growth 2010-2040

Demographic Indicators	Projections						
	2010	2015	2020	2025	2030	2035	2040
Total Population '000	351.50	369.67	389.41	408.93	427.06	442.14	454.06
Avg. Annual Growth Rate	0.96	0.99	1.02	0.92	0.8	0.62	0.46
No. Births	5,090	5,530	6,040	6,260	6,320	6,180	6,050
Crude Birth Rate	14.5	14.9	15.5	15.3	14.8	14.0	13.3
No. of Deaths	2,130	2,270	2,470	2,800	3,190	3,650	4,140
Crude Death Rate	6.1	6.1	6.3	6.8	7.5	8.3	9.1
Natural Increase	2,960	3,260	3,570	3,460	3,130	2,530	1,910
Natural Increase Rate	0.84	0.88	0.92	0.85	0.73	0.57	0.42
Total Immigrants	400	400	400	300	300	200	200

8.3 Labour Force

The most recent Labour Force and Household Income Survey reflects the state of employment as it existed May 2016. The Department of Statistics released the study for May in August 2016. The survey indicates a national unemployment rate of 12.7%. Youth unemployment (15-24 years) remains higher at 25.8%. Overall labour participation is 76.90% with 62% of the total labour force employed by the private sector.²⁴

The Bahamas completed the Household Expenditure Survey in 2013; the report provides the latest statistics on living conditions in The Bahamas since the 2001 Bahamas Survey of Living Conditions. In 2001, The Bahamas had an overall poverty rate of 9%, however, this figure climbed to 12.7% in 2013. There is

²³ Department of Statistics. (2015). *Population Projections 2010-2040*. Government of the Commonwealth of The Bahamas.

²⁴ Department of Statistics. (2016). *Labour Force and Household Survey*. Government of the Commonwealth of The Bahamas.

disparity in the distribution of the poverty rate with the Family Islands having the highest rate of 17.2% compared to New Providence at 12.4%²⁵. While the rate is higher in the Family Islands, the majority of the poor are located on the most populated island of New Providence. The average income in The Bahamas is B\$37,716 with a median income of B\$28,957. Mean and median income levels on New Providence were higher than Grand Bahama and Abaco.

The concentration of wealth and employment on New Providence masks the living conditions in the Family Islands. Restricted by low populations, aging infrastructure, and access only by sea or air, the Family Islands experience greater levels of poverty amidst social exclusion from the more prosperous areas of New Providence and Grand Bahama.

8.4 New Providence

New Providence is the most populated island of The Bahamas with a population of 246,329 persons and an average household size of 3.4 persons²⁶, representing approximately 70% of the population of The Bahamas. The population distribution by gender is roughly equal. The population in the district where Junkanoo Beach is located is 8,292.

Tourism is an important economic activity in this area. Cruise ships berth at Prince Georges Wharf located in the center of downtown Nassau. Nearly three million cruise ship visitors arrived from January through October 2016 to Nassau/Paradise Island, representing a 4.9% increase over 2015²⁷. The total cruise tourism expenditures for the period 2014/2015 were \$373.1 million²⁸. These expenditures contribute to 7,954 jobs. Cruise visitors to The Bahamas spend on average \$82.83 per passenger; less than average cruise destination spending (\$103.83²⁹). A proportion of the cruise ship passengers use Junkanoo Beach and shop at the vending stalls. There are no data available on the number of cruise ship passengers that use the entire area of Junkanoo Beach or the net revenues generated at the stalls however, a baseline study to be undertaken during Program execution will generate data on these aspects as visitation and revenues are expected to increase with the restoration of the beach.

²⁵ Department of Statistics. (2013). *Household Expenditure Survey*. Government of the Commonwealth of The Bahamas.

²⁶ Department of Statistics. (n.d.). *2010 Census Report*. Government of the Commonwealth of The Bahamas

²⁷ Ministry of Tourism. (2016). *Cruise Visitor Arrivals By Port of Entry 2016*.

²⁸ Business Research & Economic Advisors. (2015). *Economic Contribution of Cruise Tourism to the Destination Economies: A Survey-based Analysis of the Impacts of Passenger, Crew, and Cruise Line Spending*. Florida-Caribbean Cruise Association and Participating Destinations.

²⁹ Ibid



Figure 8.4-1: Detailed Map of New Providence Project Site

The area where the groynes are to be constructed is outside of the main use beach area (see Figure 8.4-1), where major tourist activity and vending occurs. The main restaurants and places of lodging are immediately adjacent to this main section of the beach. The main use beach area will remain accessible to tourists and pedestrian access to vendors will be uninterrupted in the area where the groynes will not be constructed. Tourist attendance is limited on the western section of the beach to be targeted for groyne construction due to limited sand. The beach has receded here and the investment aims to address that coastal erosion issue.

Junkanoo Beach is adjacent to a highly active port facility (Arawak Cay) that experiences the transportation and movement of equipment, trucks and containers on a daily basis and does not hamper tourist activity. This is because access to the facility is non-intrusive, yet the facility itself is quite large to hold enough heavy equipment, personnel and materials. This industrial space can be used as a staging area during groyne construction to avoid any encroachment on public use areas.

In addition, at the Western Esplanade, there is wide area seaward of the road available to locate equipment during construction works if need be. With these options for staging areas, tourist road traffic will not be disrupted within the vicinity of the construction site. As further evidence of this point, the Pointe Hotel, a large development of considerably greater magnitude than the groynes proposed by the Program, has an already demarcated construction site east of Junkanoo beach. A steady influx of tourists walks to the beach on a daily basis despite issues along the Pointe development with accessibility such as damaged pavements and blocked access to the beach.

In summary, given the proposed location for the construction of the groynes away from the main beach, the many options for staging areas during construction, the short likely duration of construction (less than 4 months), closure of the main use areas of Junkanoo Beach is highly unlikely. Should temporary closure of some parts of the beach be necessary to restore damaged segments, provisions will be taken to secure the health and safety of all stakeholders being tourists, local residents, vendors, and members of the public and private sectors. In addition, further consultations with stakeholders will take place following the baseline studies and during the final design stages as well as during construction to solicit feedback on how to minimize disruptions in use (i.e., by adjusting the timing of construction, using signage) and any other

potential impact. It is intended that consultations be held with stakeholders by the Ministry as the project is to be executed.

8.5 Grand Bahama

Grand Bahama has a total population of 51,368 persons with an average household size of 3.4 persons³⁰. The population distribution by gender is roughly equal. The district where the project site is located has a population of 10,127. The project area includes the settlements of Pelican Point, McLean's Town, Sweetings Cay and High Rock. Economic activity in the area is primarily fisheries (bonefishing, lobster, conch) and related tourism.

8.6 Andros

Andros has a total population of 9,221 persons with an average household size of 3.1 persons³¹. The population distribution by gender is roughly equal. The population of North Andros is 3,898 and South Andros is 3,592. 80% of economic activity is related to natural resources, particularly agriculture, tourism and fisheries.

8.7 Long Island

Long Island has a total population of 3,094 persons. The population distribution by gender is roughly equal. The northern project area includes Deadman's Cay Settlement (population 382), the major settlement at the center of the island and the location of the primary airport. The Deadman's Cay airport connects Long Island to the capital of Nassau. The southern project area includes Mangrove Bush Settlement (population 142). Buckley's Settlement (population 54), McKenzie Settlement (population 53) and Cartwright Settlement (population 109) are also in the project area. Economic activity is primarily a mixture of bonefishing, flyfishing and employment in the construction industry.

9 Environmental and Social Impact, Risk, and Vulnerability

This section identifies the environmental and social impacts associated with the proposed Program across the various islands. The impact assessment ensures that the proposed climate infrastructure investments align with the climate-resilient program goals for sustainability and comply with the environmental and social policies outlined in Section 6.

Since project components are distributed across four (4) islands with total project financing limited to \$26 million, the proposed infrastructure works are considered small-scale. Each project component was evaluated and chosen to maximize the overall cost-benefit ratio for improved climate resiliency and social benefits. As a result, overall environmental and social impacts are considered beneficial with techniques

³⁰ Department of Statistics. (n.d.). *2010 Census Report*. Government of the Commonwealth of The Bahamas

³¹ Department of Statistics. (n.d.). *2010 Census Report*. Government of the Commonwealth of The Bahamas.

provided to mitigate and manage adverse impacts where identified. The proposed investments are outlined in Table 8.7-1.

Given the relatively small-scale of the investment program, these measures are intended as pilot initiatives to demonstrate how improved coastal science and management can increase the effectiveness of coastal risk reduction measures. These initiatives target drainage, road improvements, and ecosystem restoration. Longer-term climate adaptation infrastructure requires significant financing and feasibility assessment across the Bahamian archipelago to identify and prioritize risk reduction measures.

This ESA is being prepared according to the IDB Environmental and Social Safeguards policies and the regulatory requirements of The Bahamas. Project components may require additional Ministerial consultation and applications for permits to comply with Bahamian law.

Table 8.7-1: Register of Proposed Investments at Specific Project Locations

Location	Component	Proposed Investment Activity
Long Island		
	Drainage Improvements	Drainage improvements may include the installation of wells at the Deadman's Cay Airport and at specific locations along the Queen's Highway.
	Road Improvements	Road improvements may include by-pass road and possible road raising.
	Ecosystem Restoration	Natural restoration through plantings to improve climate resilience.
East Grand Bahama Causeway		
	Drainage Improvements	Drainage improvements along the Grand Bahama Causeway (removal or partial removal of causeways and installation of large culverts)
	Road Network Improvements	Road network improvements to allow for uninterrupted access between East and West Grand Bahama (possible road raising, road rehabilitation).
	Ecosystem Restoration	Ecosystem restoration by installation of culverts to improve creek tidal flows.
New Providence		
	Shoreline and Beach Enhancements	Beach restoration and nourishment to facilitate shoreline stabilization, which includes removal of invasive plant species and possibly groynes.
	Drainage Improvements	Drainage improvements may include the installation of wells and/or culverts along West Bay Street.
	Breakwaters	Repair or new build to east and west breakwaters
Andros		
	Natural infrastructure for hazard resilience	Conservation and restoration of coastal ecosystems, eradication of invasive species and other approaches for natural infrastructure
Component Three		
	Institutional strengthening	Enhancements to governance and policy Information management, including monitoring and data collection Capacity building and outreach Sustainable finance strategy

9.1 Do Nothing Alternative

Should the project not move forward, the result would be equivalent to the do ‘nothing’ alternative. The Bahamas will continue to be subject to the influences of climate change namely sea level rise, increased frequency and intensity of storms, acidification of the ocean, and sea surface temperature rise.

Climate change will have deleterious effect on The Bahamas as much of the country exists only a few meters above sea level. The coastal environment and economic and social well-being (health and safety) of Bahamians will be negatively affected with no investment to climate adaptation measures. Nationally, one meter of SLR would place 36% of major tourism properties, 38% of airports, 14% of road networks and 90% of sea ports at risk³². The economic costs of these impacts are estimated at \$869 million and \$946 million in projected annual costs to the tourism industry for mid and high SLR scenarios in 2050, respectively and \$10.6 to \$20.9 billion in capital costs for the same two scenarios³³.

9.2 Direct Environmental and Social Impacts

The objective of Climate-Resilient Coastal Management and Infrastructure program is to build resilience to coastal risks (including those risks associated with climate change) through enhanced coastal protection infrastructure and management of the coast. The analysis of impacts for the proposed infrastructure works were evaluated within context of this objective and measurable results. Climate change will have a direct impact on the environment and economy of The Bahamas.

Measurable Results:

- Recovery of economic activities
- Avoided damages to coastal infrastructure
- Lowered maintenance costs
- Extent of ecosystem restoration
- Enhanced national capacity to manage coastal risks

³² IDB. ((To be published)). *Hazard and Risk Study - Sustainable Nassau Action Plan*.

³³ Simpson, M. (2010). *Quantification and Magnitude of Losses and Damages Resulting from the Impacts of Climate Change: Modelling the Transformational Impacts and Costs of Sea Level Rise in the Caribbean*. UNDP: Barbados.

Table 9.2-1: Environmental and Social Impacts

East Grand Bahama	<p>OBJECTIVE: To improve transport security and reduce vulnerability to extreme weather events in tandem with ecological restoration to foster healthy tidal creek systems.</p> <p>CUMULATIVE IMPACT: Enhanced asset protection of infrastructure, roads and services, to provide greater security for transport linkages and creating opportunities for National Park designation of natural resources with tidal creek ecosystem restoration.</p>			
Drainage Improvements - Culverts - Removal of causeways - Well installation	Environment	- Restoration of historic tidal flow - Improved water quality - Improved mangrove health, marine biodiversity & ecology	- Reduced damage due to inclement weather and extreme storm events - Improved environment increasing tourism appeal - Potential for improved local fishing	- Temporary impacts during construction - Risk of temporary increased suspended sediment in water - Temporary displacement of marine species - Impacts to blue holes or underground karst formations
	Social	- Reduction of roadway flooding - Improved disaster resiliency	- Positive impact for bone fishing industry	- Construction may temporarily restrict access - Construction and community health and safety during construction - Disruption to current traffic patterns, i.e. removal of the West Gap Causeway would generate additional travel for users commuting east to west to access the North Riding Point dock
Road Network Improvements	Environment	- Improved drainage to prevent runoff & pollutants from entering the high fresh water table		- Potential for temporary increase in suspended sediment - Pollution run-off during storm events - Potential biodiversity impacts at site of by-pass
	Social	- Improved infrastructure linking communities to the mainland - Reduced number of road closures	- Improved access for visitors to East Grand Bahama and cays	- Temporary disruption to normal traffic routes with some delays likely - Construction health and safety - Land compensation to land owner- Construction and community health and safety during construction
Ecosystem Restoration	Environment	- Restoration of historic tidal flow - Improved water quality - Improved mangrove health, marine biodiversity & ecology	- Conservation of coastal environment - Modelling information may be used to further understand protected areas - Improved management of a protected area - Long term protection of natural capital	- Restoration of creek flows may impact species adapted to existing current conditions which may cause some species displacement

	Social	<ul style="list-style-type: none"> - Maintain and enhance commercial fishery operations with improved access and water quality restoration - Creates linkages and opportunities for interagency cooperation with the Bahamas National Trust as a protected area 	<ul style="list-style-type: none"> - Opportunities for ecotourism by local residents - Increased coordination between local government, local communities, Bahamas National Trust, and Government - Increased cultural appreciation and understanding of the logging industry - Expanded opportunity for school visitation and nature based education 	<ul style="list-style-type: none"> - Potential for conflicts and strained relationships between parties with competing uses of National Park resources such as commercial fisherman vs. conservationists. The park management plan should incorporate all stakeholder influences for effective implementation.
New Providence - Western Esplanade to Junkanoo Beach	<p>OBJECTIVE: To provide a strategic, climate-risk resilient, integrated management plan for the coastline between Junkanoo Beach and Arawak Cay that can then lead to effective and sustainable management improvement through interventions including hard and soft engineering.</p> <p>CUMULATIVE IMPACT: Enhanced short-term asset protection of infrastructure, roads and services, for the benefit of local residents and tourists between Western Esplanade and Junkanoo Beach. Technical studies and analysis of coastal processes will contribute to improved management of this shoreline.</p>			
Drainage Improvements	Environment	<ul style="list-style-type: none"> - Improving long-term coastal resilience to a critical frontage for key infrastructure, economic activities, and tourist activities 	<ul style="list-style-type: none"> - Increase in the understanding of nearshore environment and coastal processes within the area - Reduced vector breeding areas 	<ul style="list-style-type: none"> - Noise, vibration and dust impacts
	Social	<ul style="list-style-type: none"> - Improved traffic flows - Complements downtown Nassau regeneration objectives for aesthetic enhancements to Nassau Harbour frontage 	<ul style="list-style-type: none"> - Improved resilience to climate change (reduced flood risk) - Improved access for locals and visitors during and after storm events - Preservation of heritage sites 	<ul style="list-style-type: none"> - West Bay Street is a very busy road and construction could temporarily impact traffic - Temporary impact on use of beach/tourist facilities during construction - Construction and community health and safety during construction
Shoreline and Beach Enhancement	Environment	<ul style="list-style-type: none"> - Removal of invasive species - Habitat creation 	<ul style="list-style-type: none"> - Opportunity for native shoreline planting - Monitoring program for shoreline assets, infrastructure and coastal features 	<ul style="list-style-type: none"> - Advanced coastal assessment is required which may delay implementation - Construction activities may temporarily increase turbidity levels - Noise, vibration and dust impacts - Temporary acoustic noise and vibration disturbance to marine biodiversity

	Social	<ul style="list-style-type: none"> - Improved visitor experience - Improved aesthetics - Opportunities to develop and expand Junkanoo Beach to Arawak Cay for use by locals and visitors - Early stakeholder engagement - Increased recreational experiences for local water sports 	<ul style="list-style-type: none"> - Strategy to link in with regeneration objectives for the Nassau frontage to look at generating increased revenue from tourism - Enabling opportunities for urban regeneration and enhancing tourism - Improved coastal access with benefits for health and well-being for users- Increased property values - Enhanced appreciation for the coastal environment 	<ul style="list-style-type: none"> - Temporary closures possible for works which may deter visitors and decrease tourist spending for vendors - Impacts on livelihoods during construction for beach vendors and/or local employees - Increased visitor numbers to Junkanoo beach could increase pollution risk due pressures on facilities, waste management - Additional use and/or vendors will contribute to vector problems, i.e. rodents and mosquitos - Encouraging swimming and use in an active harbour poses a safety risk - Construction and community health and safety during construction
Long Island: Central Long Island	<p>OBJECTIVE: Enhanced asset protection of infrastructure, roads and services and reduced flood risk vulnerability by placement of site-specific drainage wells and sea walls to improve community resilience to flash flooding and storm surge.</p> <p>CUMULATIVE IMPACTS: A coordinated program of drainage wells placed in historic flood zones, including the airport, and creation of a bypass road around Scrub Hill will enhance community safety and security through improved transport linkages.</p>			
Drainage Improvements - Well installation - Culverts	Environment	<ul style="list-style-type: none"> - Reduce timeframe for standing water, saltwater or freshwater, in a single area which may affect water quality and strain vegetation 	<ul style="list-style-type: none"> - Removal of standing water aids vector control 	<ul style="list-style-type: none"> - Construction of improved drainage infrastructure has the potential to impact mangrove areas through freshwater inundation - Temporary impacts due to potential for increased suspended sediment in waterbodies, creeks or the sea (some of which are protected areas, considered critical habitat) - Impacts related to constructing off island and bringing by barge

	Social	<ul style="list-style-type: none"> - Reduction in frequency of flooding on road network and airport - Increased recovery time from flooding after large storm events - Increased safety and security to communities 	<ul style="list-style-type: none"> - Improved resilience to climate change 	<ul style="list-style-type: none"> - Residual risk of flooding from storm surge - Temporary disruption of road and airport during well installation - Temporary disturbance due to noise and vibration - Construction and community health and safety during construction
Road Improvements- Flood retaining walls- Sea walls- Increase road elevation-Bypass Road (Scrub Hill)	Environment	<ul style="list-style-type: none"> - Reduction in frequency of flooding on the road network, the airport, and critical infrastructure - Reduce saltwater intrusion to freshwater habitat 		<ul style="list-style-type: none"> - Potential for negative shoreline impacts due to wave refraction if seawalls are not constructed according to coastline dynamics - Seawalls remove habitat or change shoreline conditions
	Social	<ul style="list-style-type: none"> - Reduced flooding to residential properties - Facilitate transportation 	<ul style="list-style-type: none"> - Improved resilience to climate change to local residents - Increased safety and security to communities. 	<ul style="list-style-type: none"> - Temporary road delays due to lane closures or narrow verges - Construction and community health and safety during construction
Ecosystem Restoration	Environment	<ul style="list-style-type: none"> - Increase in mangrove areas and associated ecosystem services - Reduced flooding - Improved drainage and improvements to water quality 	<ul style="list-style-type: none"> - Improved resilience to climate change - Long term protection of natural capital 	<ul style="list-style-type: none"> - Temporary impacts on water quality due to increased suspended sediment in water courses - Temporary acoustic noise and vibration disturbance (particularly during piling activities and demolition) to marine cetaceans and coastal organisms, particularly fish, marine mammals, and sea turtles
	Social	<ul style="list-style-type: none"> - Increased knowledge of ecosystem benefits 	<ul style="list-style-type: none"> - Community involvement from early stages - Increased knowledge of high risk areas 	
Andros	<p>OBJECTIVE: To demonstrate the effectiveness of natural infrastructure for shoreline stabilization and protection through restoration of coastal natural habitats (mangroves, reefs) in line with the Andros Master Plan developed using an ecosystem-based approach.</p> <p>CUMULATIVE IMPACTS: A coordinated program of natural infrastructure pilot projects to demonstrate the effectiveness of an ecosystem-based approach while enhancing protection of infrastructure assets.</p>			

Natural Infrastructure for Hazard Resilience	Environment	<ul style="list-style-type: none"> - Conservation and restoration of coastal ecosystem -Eradication of invasive species -Information management for monitoring an data collection 	-Information management for hazard resilience	<ul style="list-style-type: none"> - Temporary impacts on water quality due to increased suspended sediment in waterbodies -Potential impact to benthic ecology
	Social	<ul style="list-style-type: none"> -Increased knowledge of ecosystem benefits -Protects transport links for sustainable communities 	<ul style="list-style-type: none"> -Community involvement from early stages -Improved resilience to climate change -Improved safety and security to communities 	<ul style="list-style-type: none"> -Temporary road delays due to land closures -Potential to limit shoreline storage space for fishing vessels
Institutional Strengthening	OBJECTIVE: to increase MOWUD's capacity to engage in coastal resilience project formulation through enhancing institutional capacity and integrated planning..			
	Environment	Improved planning and management of coastal resources, including implementation of natural infrastructure		
	Social	Reduced risk and vulnerability		

9.2.1 *Environmental and Social Impacts – Direct and Indirect*

Overall Negative Impacts

Negative impacts pertain largely to adequate employment of best management practices during construction and implementation of a maintenance regime to installed infrastructure. Best management practices should be outlined in an Environmental Management Plan and enforced through environmental monitoring during project execution.

- **Vegetation.** Installation of infrastructure will result in an unavoidable loss of vegetation. Habitat loss is considered site-specific and limited to the area of the construction footprint. Where feasible, habitat loss will be mitigated by replanting of native species. Elsewhere, proposed habitat restoration such as mangrove planting in Andros and ecosystem restoration on East Grand Bahama may be considered off-site mitigation for infrastructure disturbance. On New Providence, removal of invasive species is considered a positive impact.
- **Avifauna.** Impacts to avifauna are considered temporary and likely to occur only during the construction period. Avifauna are anticipated to return upon works completion.
- **Biodiversity.** It is recognized that habitat loss, fragmentation, and invasive species pose a threat to the biodiversity of small island states. Habitat degradation will be limited to the construction footprint. Impacts to biodiversity may result from changes in hydrologic regimes due to the installation of culverts, which will alter tidal flows, intensity, and water quality. Thus, culvert design should carefully consider environmental conditions in order to potentially improve mangrove health.
- **Hydrology and Tidal Regime.** Historical land use change such road construction have blocked tidal regime and creek flows, impacting surrounding waters and coastal environment and contributing to the degradation of mangroves and marine ecology. Species that adapted to the altered water conditions may be negatively impacted by a return to historic tidal flows, however the objective of the works is to restore the natural flows and ecosystem to their original condition as recommended by the Bahamas National Trust.
- **Erosion and Sedimentation.** The potential for erosion and sediment impacts are greatest during the excavation and construction phases. Implementation of best management practices as outlined in the framework ESMP will limit the extent of impacts. Suspended sediment in the water column creates turbid conditions blocking sunlight and altering predator/prey relationships. Prolonged periods of turbidity can result in degradation of phytoplankton, coral, and other photosynthetic dependent species. Sediment impacts are greatest during shoreline construction works such as sea wall installation or culvert installation within a tidal creek. The ESMP will include an Erosion and Sediment Management Plan.
- **Freshwater Resources.** Saltwater intrusion to freshwater resources accumulated in Ghyben-Herzberg lens is a potential outcome of climate change due to sea level rise. In Ghyben-Herzberg lens, the lower density of freshwater allows it to accumulate above a layer of saltwater with a shallow zone of brackish water separating the water types. Any changes to drainage patterns have the potential to negatively impact the freshwater lens. Increased impervious surface areas accelerate runoff potential and carry pollutants. Installation of drainage wells may inadvertently allow for saltwater intrusion to the freshwater lens. In the case of Long Island, Hurricane Joaquin generated a storm surge flooding areas of Long Island such as Scrub Hill with saltwater rather than rainwater.

Grand Bahama and Andros have high water tables with freshwater resources within several ft of the surface. The ESMP will include a Water Monitoring Plan.

- **Waste Management (Liquid and Solid).** Poor waste management practices inclusive of solid waste and sewerage, undermine the local environment. Improper disposal of construction debris and personal litter can result in pollution. On New Providence, increasing visitor numbers to the Junkanoo Beach and Western Esplanade will place pressure on existing waste management practices. Additional concerns surround the management of liquid wastes at the Western Esplanade and Junkanoo Beach. Septic tanks are standard practice in the Family Islands. The ESMP will include a Waste Management Plan.
- **Air and Noise Pollution.** Noise and air pollution impacts are anticipated to be temporary during construction. Adherence to best management practices such as work performed only during daylight hours will lessen overall impacts. Improved access to East Grand Bahama will likely increase visitors to formerly remote places such as the Gap. Locals and tourists will contribute to elevated background noises, which may discourage some avian species. Likewise use of watercraft in areas previously inaccessible will increase subsurface noise levels. On New Providence, the encouragement of visitors to Junkanoo Beach and Western Esplanade will increase crowd volume detracting from the overall beach aesthetic and potentially impacting local businesses in the near vicinity. Additionally, any increase in traffic volumes or pedestrian walkways will place further pressure on existing congestion along West Bay Street exacerbating air pollution and noise from idling vehicles. The ESMP will include a Noise and Air Pollution Monitoring Plan.
- **Dust.** Dust impacts are anticipated to be temporary during construction works. Works on Junkanoo Beach may cause fine sediment to become airborne. It is recommended that best management practices are used such as speed control, frequent watering, work suspension during heavy north winds, and street cleaning.
- **Impacts on Local Communities.** Roads works may impede and/or delay transportation routes including access to local shops/restaurants. Adherence to best management practices, such as providing advance notice of construction start date, using road work and diversion signage, performing works on off-peak days and a community consultation and engagement plan. The ESMP will include a Community Consultation and Engagement Plan including a Grievance Mechanism. Program works that may elicit end user conflicts, such as East Grand Bahama where the livelihoods of commercial fishermen and conservationists may be influenced by protected area management and alteration of existing tidal networks, should have advanced stakeholder consultation for a culturally-tailored management plan.
- **Health and Safety.** The ESMP will include a Health and Safety Plan for construction, for both workers and community.
- **Cultural Heritage.** Given the proximity of historical sites to the project area, namely Junkanoo Beach, it is recommended that the contractor cease all works and report immediately to the Antiquities, Monuments, and Museums Corporation upon discovery of any artifacts.

Overall Positive Impacts

Overall, installation of selected infrastructure works will be beneficial to the residents of The Bahamas. Climate change is exacerbating existing issues of drainage, coastal protection, and ecosystem degradation, which in turn are affecting the social well-being of Bahamians. Asset protection – infrastructure for roads and services ranked as the highest benefit for all selected project sites based on the feasibility studies.

- **Asset Protection and Disaster Resilience.** The Bahamas can expect increased frequency and intensity of hurricanes due to climate change. Protection of existing infrastructure assets (roadways and services) is of high priority for all project sites. Maintaining transportation linkages is essential for economic activity as well as for securing human health and safety. Hurricane Joaquin overwhelmed existing drainage structures on Long Island and the storm surge resulted in severe flooding impeding intra-island transport from the North to the South of Long Island. Installation of drainage improvements such as wells and storm surge protection features such as seawalls will help to maintain road network integrity during storm events.
- **Ecosystem Restoration.** Past anthropogenic disturbances such as the placement of roads in creek systems altered the natural tidal flows in East Grand Bahama. Restoring tidal flows with the installation of culverts will foster regeneration of ecosystems and improve overall biodiversity. Elsewhere, removal of invasive plant species on Junkanoo Beach and the Western Esplanade is considered a positive impact. On Long Island, mangrove planting and native shoreline planting will provide additional shoreline protection and improve coastal aesthetics.
- **Social Benefits.** Social benefits vary by project site but relate largely to the reliance on road networks for access to goods and services. Disruption to road networks affects local access to economic activities whether it be the Queen's Highway on Long Island, McLean's Town causeway on East Grand Bahama, or West Bay Street on New Providence. Improving drainage on these road networks reduces the risk from coastal and flash flooding from rain events.
- **Enhanced Capacity Benefits.**

Indirect Social Benefits

With the greatest benefit derived from asset protection of infrastructure, roads and services, it stands that local communities will experience indirect social and environmental impacts.

At present, the following are constraints to improved quality of living:

- Absence of Master Plans for comprehensive island planning
- Higher construction and maintenance costs
- Aging infrastructure with increasing demand, traffic loads, and passenger and cargo volumes at ports
- Vulnerability to natural hazards such as hurricanes, flooding, storm surge, and climate change

The installation of climate resilient infrastructure may contribute to positive outcomes for raising the standard of living through:

- Economic diversification through upgrade of social and economic infrastructure
- Transportation infrastructure improvement to support sustainable development of the Family Islands

- Improved connectivity within the island will enhance access to basic services, markets, and employment opportunities
- Poverty reduction efforts through increased economic activity in the local and tourism sectors
- Modern infrastructure promotes community pride

9.3 Project Vulnerability Factors

Natural hazards

- Storms
- Flooding
- Tsunamis
- Sea level rise
- Increase sea surface temperatures and deep ocean temperatures
- Ocean acidification
- Saltwater inundation of freshwater lens
- Coastal erosion
- Coral reef degradation - bleaching/disease

Anthropogenic threats

- Unregulated and unsustainable overfishing/fishing practices
- Coastal pollution
- Marine debris
- Sewage
- Ballast discharge
- Oil spills
- Ship groundings
- Erosion from coastal development
- Invasive species (lionfish/terrestrial species)

10 Environmental and Social Management Plan

An Environmental and Social Management Plan (ESMP) is a written guide that identifies relevant management techniques, including Best Management Practices (BMPs) and Emergency Response Plans, based on site-specific conditions and potential impacts as documented in an Environmental and Social Impact Assessment, or in the case of the proposed program, this ESA. This ESMP serves as a framework to outline measures that are to be implemented to minimize potential adverse environmental impacts and safety hazards associated with the proposed development project. An environmental management program ensures that mitigation measures are implemented to achieve a final product commensurate with environmental goals and specific agreements related to this will be elaborated in final project documents.

Importantly, environmental management is a systematic approach that integrates environmental policy and planning with continuous monitoring of implementation techniques to improve environmental compliance to achieve the goals of sustainable development. Environmental compliance is achieved through a monitoring program. The environmental monitoring program includes on-site visits, a monitoring checklist, and weekly/monthly reporting. BEST provides oversight for environmental monitoring and has outlined the responsibilities for the duties of an Environmental Manager.

10.1 Objectives of the ESMP

The ESMP has the following objectives:

- Ensure good management practices to minimize environmental impacts including: minimal disturbance to pre-existing natural environment and cultural resources, prevention of pollution, protection of water resources, and waste management
- Define the environmental management plan, management protocol including: documentation, monitoring, and reporting guidelines, and evaluation procedures
- Provide pertinent information and training to the owner, operator and workforce regarding environmental obligations
- Ensure site safety and health for workforce, residents, and visitors
- Comply with all applicable laws, regulations, standards, and guidelines
- Establish effective communication protocols to manage and facilitate the implementation of BMPs, emergency response, and overall environmental compliance

10.2 Responsibility for Environmental and Social Management

The Executing Agency will be responsible for developing the Program Environmental Management and Monitoring Program, and ensuring that all projects under the Program of works comply with the framework ESMP and site-specific ESMPs developed by the PEU during execution. Specific arrangements for environmental and social management will be agreed with GOBH and detailed in final project documents.

10.3 Contractor Responsibility

It is the obligation of MOWUD together with any Contractors or Subcontractors to develop and comply with all the requirements and stipulations identified therein. Acceptance of the Construction ESMP

reiterates the commitment by MOWUD to minimize and prevent environmental effects to the extent possible while ensuring human health and safety. Ultimately, the Contractor accepts the conditions of the ESMP to construct works per the ESMPs provisions to maintain environmental compliance. The Contractor will identify and assign roles and responsibilities for project environmental management. The ESMP is a dynamic document that is continuously updated to reflect changes to methodologies and/or site conditions.

10.4 Mitigation Measures

Mitigation is the practice of reducing or eliminating known adverse environmental and/or social impacts associated with a particular project. When avoidance of an adverse impact is not feasible, mitigation techniques through the implementation of best management practices during construction and operation, can effectively manage the anticipated negative outcome.

As outlined in **Error! Reference source not found.**, environmental impacts vary by project location and proposed infrastructure investment. The identified adverse impacts have been assessed and correlated to recommended mitigation techniques as noted in Table 10.4-1:Environmental below. Costs for environmental management and monitoring have been incorporated into the Program budget as: (i) technical studies under Components 1 and 2 and (ii) shoreline management plans under Component 3. Additional management costs related to this Program include: (i) hiring of environmental and social specialist in MOWUD, (ii) hiring of monitoring and evaluation specialist in MOWUD, (iii) travel for monitoring and (iv) consultations.

Table 10.4-1: Environmental and Social Management Plan

Project Location		Environmental/Social Issue	Duration	Magnitude	Scope	Mitigation Measure	Recommended Output	Responsible Agency
Long Island: Central Long Island								
Construction	Drainage Improvements - Well Installation	Drainage works may impede traffic flow	Temporary	Moderate	Local	<ul style="list-style-type: none">• Environmental Management Plan<ul style="list-style-type: none">- Traffic Management Plan- Sediment and Erosion BMPs- Noise, Vibration, Air Quality BMPs- Storm Water Management BMPs- Waste Management BMPs- Contractors Commitment to Environmental Compliance- Emergency Protocols (Severe Weather, Spill Prevention and Cleanup)- Health and Safety Plan• Environmental Monitoring Program<ul style="list-style-type: none">- Monitoring Checklist- Traffic Safety- Protection of Sensitive Environmental Features (Mangroves)- Protection of Groundwater Resources• Technical Studies<ul style="list-style-type: none">- Drainage Review of Queen's Highway- Coastal Assessment for Deadman’s Cay Salinas (Bathymetry, Hydrodynamic Modelling, Baseline Biological Assessment)• Community Consultation and Engagement Plan<ul style="list-style-type: none">- Advanced Notice to Public for Works, Diversions, Road Closures- Information disclosure on MOWUD website/social media- Grievance Mechanism• Shoreline Management Plan<ul style="list-style-type: none">- Natural Coastal Protection Measures- Native Planting Guide- Mangrove Restoration Techniques	MOWUD, BEST	
		Noise, air quality, vibration due to construction	Temporary	Moderate	Local			
	Road Improvements - Flood retaining walls - Sea walls - Increase road elevation - Bypass road	Roads works may impede and/or delay transportation routes including access to the airport and local shops	Temporary	Moderate	Local			
		Suspended sediment in waterbodies impacting water quality	Temporary	Low	Local			
	Ecosystem Restoration	Suspended sediment in waterbodies impacting water quality	Temporary	Low	Local			
Operation		Improved drainage may impact mangrove areas through freshwater inundation	On-going	Low	Local	<ul style="list-style-type: none">• Operational Environmental Management Plan<ul style="list-style-type: none">- Vector Control- Periodic Maintenance Regime for Storm Drains- Waste Management Plan	MOWUD, DEHS	

New Providence - Northern Frontage Junkanoo Beach							
Construction	Drainage Improvements - Well Installation	Roads works may impede and/or delay transportation routes including access to local shops/restaurants Diversion to side streets to bypass West Bay Street may negatively impact residential neighbors by increased congestion and noise levels	Temporary	High	Local	<ul style="list-style-type: none"> • Environmental Management Plan <ul style="list-style-type: none"> - Traffic Management Plan - Sediment and Erosion BMPs - Noise, Vibration, Air Quality BMPs - Storm Water Management BMPs - Waste Management BMPs - Removal of Invasive Species - Contractors Commitment to Environmental Compliance - Emergency Protocols (Severe Weather, Spill Prevention and Cleanup) - Health and Safety Plan - Chance find procedure 	MOWUD, MOTA, Port Department, PPBA, DEHS, BEST, RBPf, RBDF
		Suspended sediment in waterbodies impacting water quality	Temporary	Low	Local	<ul style="list-style-type: none"> • Environmental Monitoring Program <ul style="list-style-type: none"> - Monitoring Checklist - Traffic Safety - Turbidity Monitoring - Invasive Species Removal - Protection of Groundwater Resources 	
		Noise, air quality, vibration due to construction	Temporary	Moderate	Local	<ul style="list-style-type: none"> • Technical Studies <ul style="list-style-type: none"> - Baseline Biological Assessment of Nearshore Marine Environment (Junkanoo Beach) - Breakwater Modelling for Bathymetry Data and Storm Surge Potential - Water Quality Report - Sand Transport and Source - Economic Analysis of Junkanoo Beach (Tourist and Local) 	
	Shoreline and Beach Enhancement	Suspended sediment in waterbodies impacting water quality	Temporary	Moderate	Local	<ul style="list-style-type: none"> - Economic Analysis of Junkanoo Beach (Tourist and Local) 	MOWUD, BEST, PPBA, BEST
		Displacement of marine benthic species. Works occurring in and near the water may temporarily displace marine species, it is anticipated that upon completion marine species will return	Temporary	Low	Local	<ul style="list-style-type: none"> • Shoreline Management Plan <ul style="list-style-type: none"> - Zoning and Appropriate Land-Use Assessment - Beach Nourishment and Maintenance Plan - Carrying Capacity of Junkanoo Beach - Climate Change Adaptation • Community Consultation and Engagement Plan <ul style="list-style-type: none"> - Advance notice of works, including coordination with stakeholders organizing and potential events in the area - Proactive engagement with local businesses 	

		Impact to use of beach and tourist facilities	Temporary	Moderate	Local	<ul style="list-style-type: none">- Information disclosure on MOWUD website/social media- Information disclosure on Tourism Ministry website/social media (aimed at visitors)- Grievance Mechanism	
Operation		Invasive Species colonization	On-going	Moderate	National/Local	<ul style="list-style-type: none">• Operational Environmental Management Plan<ul style="list-style-type: none">- Vector Control- Periodic Maintenance for Storm Drains- Waste Management Plan to include use of litter bins, scheduled waste removal- Invasive Species Removal to prevent recolonization- Beach Management Program- Tourist Health and Safety- Responsible Agency review• Safety Management System<ul style="list-style-type: none">- Tourist safety for water activities- Fire Prevention- Water quality monitoring Beach carrying capacity	MOWUD, PPBA, DEHS, BEST
		Increased visitor numbers to Junkanoo Beach may increase pollution risk	On-going	High	National/Local		
East Grand Bahama							
Construction	Road Network Improvements <ul style="list-style-type: none">- Well installation- Culverts	Installation of drainage improvements such as the culverts may impact road transport. Any disruption to the road network preventing accessibility to Freeport may result in lost wages and is a safety/security issue	Temporary	Moderate	National/Local	<ul style="list-style-type: none">• Environmental Management Plan<ul style="list-style-type: none">- Traffic Management Plan, i.e. road closures during the night, advanced notice of works- Sediment and Erosion BMPs- Noise, Vibration, Air Quality BMPs- Storm Water Management BMPs to prevent sediment and runoff with use of turbidity barriers and monitoring- Waste Management BMPs to prevent pollution of tidal creeks and waterbodies- Contractors Commitment to Environmental Compliance- Emergency Protocols (Severe Weather, Spill Prevention and Cleanup)- Health and Safety Plan• Community Consultation and Engagement Plan	MOWUD, BEST, BNT
		Noise, air quality, vibration due to construction. Noise may impact avian species with temporary relocation	Temporary	Low	Local		

		Waste management and site cleanliness	Temporary	Moderate	Local	<ul style="list-style-type: none">- Outreach and engagement strategies to consider the broader context of National Park management planning process- Advanced Notice to Public for Works, Diversions, Road Closures- Information disclosure on MOWUD website/social media Grievance Mechanism	MOWUD, BEST, BNT
	Ecosystem Restoration	Increased suspended sediments in the water column	Temporary	Low	Local		
		Displacement of marine benthic species. Works occurring in and near the water may temporarily displace marine species, it is anticipated that upon completion marine species will return	Temporary	Low	Local		
Operation		Invasive Species colonization	On-going	Low	Local	<ul style="list-style-type: none">• Operational Environmental Management Plan<ul style="list-style-type: none">- Periodic removal of invasive species to prevent recolonization- Waste management• National Park Management Plan<ul style="list-style-type: none">- Review stakeholder park uses with sustainable development goals• Appropriate Uses Guide• Eco-tourism Assessment and Investment Incentives	MOWUD, BNT
		Natural Resources and Park Management for appropriate uses of newly accessible tidal creeks and park areas	On-going	Moderate	Local		
Andros: Natural Resources and Park Management for appropriate uses of newly accessible tidal creeks and park areas							
Construction	Natural Infrastructure for Hazard Resilience	Impacts on water quality due to suspended sediment	Temporary	Low	Local		MOWUD, BEST, BNT

		Impact to benthic ecology. Works occurring in and near the water may temporarily displace marine species, it is anticipated that upon completion marine species will return	Temporary	Low	Local	<ul style="list-style-type: none"> Environmental Management Plan <ul style="list-style-type: none"> Traffic Management Plan Sediment and Erosion BMPs Noise, Vibration, Air Quality BMPs Storm Water Management BMPs to prevent sediment transfer including turbidity barriers and turbidity monitoring Waste Management BMPs Contractors Commitment to Environmental Compliance Emergency Protocols (Severe Weather, Spill Prevention and Cleanup) Community Consultation and Engagement Plan <ul style="list-style-type: none"> Advanced Notice to Public for works/projects Information disclosure on MOWUD website/social media Grievance Mechanism 	MOWUD, BEST, BNT
		Road delays	Temporary	Low	Local		MOWUD, BEST
Operation		May limit shoreline storage of boats. Restoring native vegetation along the shoreline may impede access to boats docked along the shore and/or displace the storage of boats all together.	Long-term	Moderate	Local	<ul style="list-style-type: none"> Operational Environmental Management Plan <ul style="list-style-type: none"> Periodic removal of invasive species to prevent recolonization Consult with stakeholders 	MOWUD, Port Department, BEST
		Invasive species removal	On-going	Low	Local		MOWUD

10.5 Environmental and Social Monitoring Plan

Environmental monitoring through site inspection enforces the environmental protocols as identified in the ESMP. Monitoring is the enforcement mechanism to provide assurance of environmental compliance. The monitoring checklist is the mechanism within the environmental management system to document onsite practices, provide recommendations, and check for future compliance through consistent site inspection.

Invariably, the project locations and site-specific climate resilience needs dictate the proposed infrastructure investment. Given the range of project locations even within the four (4) islands and varied infrastructure improvements, best management practices may change from site to site. Subsequently, specific environmental management techniques will need to be tailored to each project site.

Aspects of Environmental Monitoring:

- A monitoring plan outlines the monitoring regime to enforce environmental compliance and to provide a record of documentation per the Environmental Management Plan.
- Scheduled and unscheduled Site visits to observe, document, and recommend actions for ensuring human health and safety and the environmental integrity of defined project area.
- Site inspections shall be documented in site inspection monitoring checklists, bimonthly reports, and summarized in monthly reports.
- The monitoring checklist and subsequent weekly, bimonthly, and/or monthly reports outline the parameters for environmental compliance through site inspections to determine adherence by the Contractor to Method Statements and make recommendations for improvement.

The checklist incorporates the requirements for environmental compliance including but not limited to: site management, water resources, materials, waste management and disposal, utilities, dust and air pollution, noise, and vegetation. A general environmental monitoring checklist is provided in Section 14.1.

11 Institutional Strengthening in Coastal Management

The feasibility studies identified the following opportunities to increase capacity to implement a risk resilient ICZM program:

- Strategic planning, with a coordinated approach to ICZM mainstreaming and implementation of regulatory requirements.
- Data sharing between agencies.
- Procedures to help standardize the effective implementation of public consultation procedures.
- Enhanced research functions to improve integration of scientific knowledge into decision-making.
- Monitoring and evaluation frameworks that form part of an agency's or Ministry's forward planning programme.
- Addressing human and financial resource challenges

Subsequent stakeholders' meetings held in preparation of the ESA will confirm these findings. Insufficient human resources compounded by poor delineation of Ministerial or departmental responsibility will hamper effective implementation of an ICZM programme.

11.1 Conformance to Bank Environmental and Social Policies

As a result of the analysis undertaken by this ESA and the feedback solicited during the stakeholder consultations, this ESA concludes that the negative impacts and risks are considered minimal to moderate, in line with the Banks categorization of the Program as B.

The works described in this ESA are generally small scale infrastructure enhancements or reparation, which are likely to cause mostly local and short term negative environmental and associated social and cultural impacts for which effective mitigation measures are readily available and will be implemented by MOWUD through an Environmental Management and Monitoring Program, and Project specific construction ESMPs.

12 Stakeholder Engagement

Ongoing stakeholder consultation is imperative for communication and community buy-in. Meetings with local government officials and public consultation will facilitate project understanding, attainment of knowledge, and present potential employment opportunities.

12.1 Stakeholder Consultation

Stakeholder consultation occurred at each of the four (4) proposed locations, with plans for additional consultation. Stakeholder consultation is defined as meeting with government officials, local government administrators, and the public. Additional public meetings will be convened in accordance with IDB policy guidelines.

12.1.1 East Grand Bahama

An IDB Mission toured East Grand Bahama on November 30, 2016. A follow-up site visit took place with an IDB representative and IDB consultants, on December 14, 2016. MOWUD coordinated attendance by Government representatives and a public stakeholder meeting held at 11am. A public meeting was held January 23, 2017 in East End Junior High School. The meeting was announced in the Tribune newspaper and through circulation of flyers. A summary of the ESA was made available beforehand. The MOWUD was represented by East Grand Bahama MOWUD representative and 29 persons attended.

12.1.2 Long Island

A site visit to Central Long Island took place on January 5th to January 6th, 2017, with participation of MOWUD, IDB representatives and consultants. A public meeting was held at the Clarence Town Community Centre on January 5th at 5pm. Long Island Government representatives guided the consultants on Friday, January 6th to areas of greatest concern to the local residents of Long Island. A public meeting was held January 31, 2017 in the Clarence Town Community Center. The meeting was announced in the Tribune newspaper, the Long Island Runner, through social media and circulation of flyers. A summary of the ESA was made available beforehand. The MOWUD was represented by the coastal engineer and 10 persons attended.

12.1.3 Nassau – Western Esplanade & Junkanoo Beach

A site visit to the Western Esplanade and Junkanoo Beach took place on December 20, 2016, including MOWUD, RBPF, IDB representatives and consultants. A follow-up stakeholder meeting was held on January 12, 2017 at 10:00 am at the IDB House on East Bay Street. Individuals attending represented BEST, Ministry of Tourism and IDB representatives and consultants. A public meeting was held January 25, 2017 in St. Mary the Virgin Church. The meeting was announced in the Tribune newspaper and through distribution of flyers. A summary of the ESA made available beforehand. The MOWUD was represented by two engineers and 15 persons attended.

12.1.4 Andros

In December 2016, OPM and Island Administrators convened open houses throughout Andros to present the draft Sustainable Andros Master Plan. Stakeholders were identified through a participatory process since July 2015 developing the Master Plan (BH-T1040), which is the basis for the BH-L1043 investments in Andros. Stakeholders were invited through communication channels established under BH-T1040, including the Andros Sustainable Development Master Plan Project Facebook page. A summary of the program was presented and made available in Mangrove Cay and South, Andros.

A detailed consultation report, detailing the key concerns raised during the meetings, as well as the way in which the Government responded, is being finalized and will be annexed to this document in 14.3 during the week of February 13, 2017.

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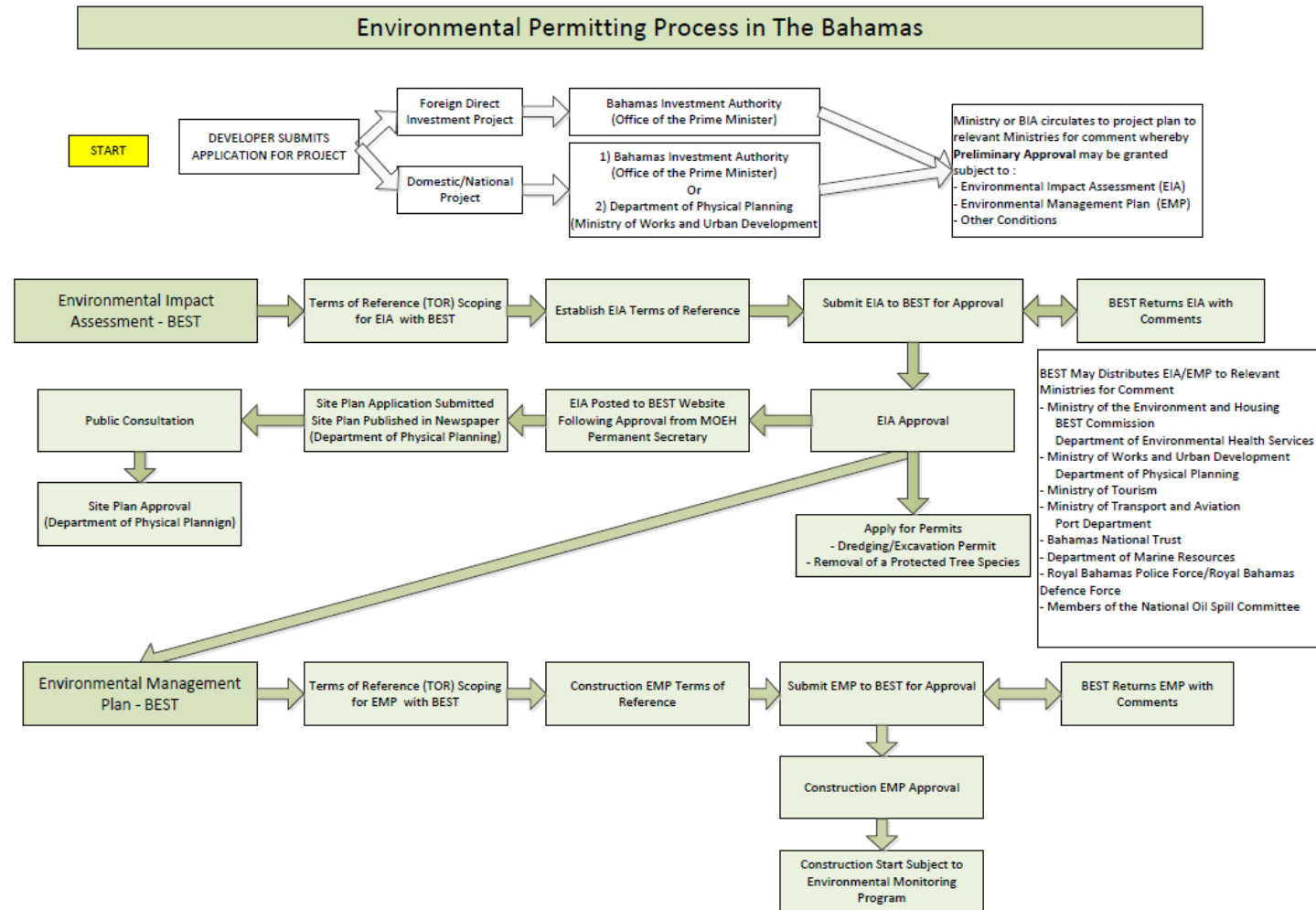
14 Appendix

14.1 Environmental Monitoring Checklist

Sample Monitoring Checklist					
Site:	Env. Specialist:	Date:	On-Site Supervisor:		
1	Site Safety and Health: Site Safety Officer on Site				
Monitoring Checklist		In Compliance			Comments
		YES	No	Ongoing	
1a	Personal Protective Equipment Used Appropriately				
1b	Proper safety requirements for works sites near water				
1c	Proper safety requirements signage for Safe Road and Hazardous Sites				
1d	Traffic management and access				
1e	Sanitary facilities are suitable and convenient				
1f	Adequate Freshwater drinking supplies				
1g	No eating on Site, No lunch service provided on Site				
1h	No smoking on Site				
2	Ground Water Management				
Monitoring Checklist		In Compliance			Comments
		YES	No	Ongoing	
2a	All diesel, fuels, and other toxic materials securely bundled in welded steel trays whose capacities are at least 110% of max. stored vol.				
2b	Refueling area next to storage tanks and on concrete apron in case of spillage				
2c	All mobile machinery is in good condition and free from engine, lubrication, and oil leaks with drip trays when not in use				
2d	Vector Control				
3	Protection of Water Bodies & Sediment Control				
Monitoring Checklist		In Compliance			Comments
		YES	No	Ongoing	
3a	Silt-traps and turbidity barriers adequately place:				
3b	Erosion Control Measures: silt fencing, check dams, sediment basins, sodding and other measures:				
3c	Water quality indicators, i.e. algae growth, oil sheen, dead marine life				
3d	Vegetated ground cover				
Quantitative Observations		Reading			
3e	Turbidity				
4	Vegetation				
Monitoring Checklist		In Compliance			

		Yes	No	Ongoing	Comments
4a	Temporary fencing in place adjacent to wetland areas				
4b	Proper care of roots (hand excavation and dressing)				
4c	Vegetation removed as needed				
4d	Native vegetation used in landscaping				
5	Materials & Solid Waste Management				
Monitoring Checklist		In Compliance			
		Yes	No	Ongoing	Comments
5a	Construction material storage area in preferred area				
5b	Suitable fuel storage and maintenance				
5c	Minimum 1 dumpster and 2 litterbins				
5d	General Tidiness of the Site				
5e	Stockpiles appropriately located with adequate containment measures				
5f	Ground surface debris disposed of at proper facility				
6	Dust & Air Pollution/Noise Control/Odour				
Monitoring Checklist		In Compliance			
		Yes	No	Ongoing	Comments
6a	Air quality				
6b	Speed restrictions adhered to				
6c	Dump trucks fitted with tarpaulins				
6d	No incineration along road corridors				
6e	Noise levels within recommended decibels for day/night				
6f	Observation of foul odours				
7	Miscellaneous				
7a	Accident Log - Any reported Environmental Incidents or Safety Accidents? Personnel Involved and Accident Details				
7b	Emergency Contingency Plans On-Site:				
	I, the Engineer, have read, understood, and affirm to the conditions and remarks cited by the above E.S.				
	Engineer	Date:			

14.2 Environmental Permitting Process in The Bahamas



This permitting process flowchart is based on project experience in The Bahamas; additional permits and Ministry consultations may be required.

14.3 Documentation of Stakeholder Meetings and Consultations

Summary of Consultations

GOBH, IDB and local consultants facilitated five public meetings on BH-L1043 in Mangrove Cay and South, Andros; Nassau, New Providence; Central Long Island and East Grand Bahama. The presentations delivered and materials distributed are available in Section 6 and 7.

Stakeholders were also engaged during due diligence via technical visits, stakeholder meetings and IDB missions. BH-L1043 preparation also built off consultation activities during the implementation of two related, IDB grant projects (1-Development of the Sustainable Andros Master Plan and 2- Feasibility studies for ICZM in The Bahamas and), which engaged stakeholders through a multi-sectoral Technical Advisory Committee, among other activities, particularly in Andros.

Table 1: Summary of BH-L1043 Consultation Activities

Date	Place	Type	Participants
Nov. 29, 2016	East End Grand Bahama	Technical Visit	MOWUD, local government, Ministry of Grand Bahama and IDB
Dec. 1, 2016	Administrator's Office, The Bluff, South Andros	Public Meeting	OPM, South Andros community members, local consultants and IDB
Dec. 2, 2016	Administrator's Office, Little Harbour, Mangrove Cay	Public Meeting	OPM, local consultants, community members, and IDB
Dec. 14, 2016	East End Grand Bahama	Technical Visit	MOWUD, local government, local consultants, community members, IDB
Dec. 20, 2016	Western Esplanade and Junkanoo Beach, Nassau	Technical Visit	MOWUD, RBPF, local consultants and IDB
Jan. 5/6, 2017	Central Long Island	Technical Visit	MOWUD, local government, local consultants, IDB
Jan. 12, 2017	IDB House, Nassau	Stakeholder Meeting	BEST, Min. of Tourism, local consultants, IDB
Jan. 23, 2017	East End Junior High School, Grand Bahama	Public Meeting	MOWUD, East Grand Bahama community members, local consultants and IDB
Jan. 25, 2017	St. Mary the Virgin Church, Nassau	Public Meeting	MOWUD, Nassau community members, local consultants and IDB
Jan. 30, 2017	Clarence Town Community Center, Long Island	Public Meeting	MOWUD, Long Island community members, local consultants and IDB

Andros

Summary

In December 2016, OPM and Island Administrators convened open houses throughout Andros to present the draft Sustainable Andros Master Plan. Stakeholders were identified through a participatory process since July 2015 developing the Master Plan (BH-T1040), which is the basis for the BH-L1043 investments in Andros. Stakeholders were invited through communication channels established under BH-T1040, including the Andros Sustainable Development Master Plan Project Facebook page. A summary of the program was presented in Mangrove Cay and South Andros, a handout on the project was distributed and there were no issues raised.

Minutes

Due to the open house format of this event, detailed minutes are not available.

Andros Sustainable Development Master Plan Project
November 24, 2016 · 🌐

Schedule for Andros Master Plan public open house which will be 9:30 am to 4:30 pm in each district:
Monday, Nov 28 - Administrator's Office, Nicholls Town, North Andros
Tuesday, Nov 29 - Clarence Bain Town Hall, Fresh Creek, Central Andros
Thursday, Dec 1 - Administrator's Office, The Bluff, South Andros
Friday, Dec 2 - Administrator's Office, Little Harbour, Mangrove Cay

andros
ECOSYSTEM-BASED
MASTER PLAN

Sustainable development of Andros up to 2040

Like Comment Share

7 Chronological

East Grand Bahama

Summary

During a visit of the IDB Mission and technical visit with GOBH, local government, IDB and local consultants, stakeholders from local communities, NGOs and government agencies were identified. MOWUD convened a public meeting on January 23, 2017 at the East End Junior High School, which was advertised in the newspaper and through flyers distributed by local contacts. The minutes of the meeting are provided below. A two-page summary of the program, including environmental and social impacts and risks was made available.

Minutes

Call to Order:

Mrs. Toni-Hudson Bannister, Officer in Charge at the Ministry of Works, Grand Bahama called the meeting to order at 6:45pm and a prayer was said by a MOWUD staff member.

Mrs. Bannister provided a few welcoming remarks to the audience and mentioned the collaboration of the MOWUD and the IDB for the establishment of an ICZM project in the Bahamas. Following this, she introduced Ms. Chitralekha Deopersad, IDB representative to speak.

Presentations:

Ms. Deopersad presented the Program, identified its purpose, and listed the three components of it. She then introduced Mrs. Janeen Ballard, the environmental specialist to speak.

Mrs. Ballard presented the risks, hazards and mitigation measures associated with the identified causeways and any potential works that were to be conducted for their improvement.

Discussion and Q&A:

Following the presentations, the floor was open to questions, suggestions and concerns which are as follows:

Question	Response
Have the sites been narrowed down?	Yes, the causeway sites are at West Gap Creek, Ridge Creek, Snapper Island Creek and Mc Lean's Town/August Creek
How are we to police the areas that are to be identified for protection works? (With more economic development, there will be	This is a good question and the idea of a security management plan will be forwarded to the rest of the team.

an influx of more people who would need policing).	
Where are the national park areas in relation to this project and can you show us a map?	The map in the Mott Mc Donald report was presented to the gentleman which delineates the location of national parks in EGB in relation to the causeways.
What is the next step forward from here?	Consultations in other islands will occur. Information is being collected for the development of a report which is to go into loan approval at a later time.
Since you are talking about causeways, have you all considered including the causeway at Gold Rock creek into the loan?	Not at this time, but your suggestion is duly noted.
How much money is to be channeled into our island?	Although we cannot provide specifics for each island, the general component allocations are as follows: Component One – 20M, Component Two – 3M, Component Three 3M
Who will be in charge of executing the project?	The Ministry of Works and Urban Development
Why is Andros being given 3M (in comparison to the other identified islands)?	Andros is also part of another project, an Ecosystem Based Management Plan that is already in the process of being conducted and the works being conducted at that island are very valuable.
Is construction going to be privatized?	We cannot answer that question, especially at this approval stage of the loan.
Are you going to follow up on the project?	There will be accountability. Cited interactions with IDB projects.
Can Sweeting's Cay be added to the list? It is difficult to access the Cay by boat because of the shallow banks in the area.	A person in the audience answered this: Sweetings Cay will be affected by improvement of the causeway at Snapper Island and noted that when the Engineer came to the site visit, she expressed that when the causeway is improved, there will be more flow from the creeks, and consequently less deposition at the sand banks at Sweeting's Cay.
Will there be any money for the other creeks?	Since the loan is to cover economically and technically viable options, the four causeways that were considered are based on studies conducted since 2015 by a local Technical Advisory committee, site visits and literature review. Additionally a study conducted by the BNT at these causeway locations, further validates a need for the project. Until studies of this kind can be conducted for the other suggested regions, they would be able to be accommodated into the loan at this time.

Refreshments were served and the meeting was convened at 8:30pm.

Long Island

Summary

During a technical visit with GOBH, local government, IDB and local consultants, stakeholders from local communities, NGOs and government agencies were identified. MOWUD convened a public meeting on January 31, 2017 at the Clarence Town Community Center, which was advertised in the newspaper, The Long Island Runner and through flyers distributed and posted on social media by local contacts. The minutes of the meeting are provided below. A two-page summary of the program, including environmental and social impacts and risks was made available. **I**

Minutes

Call to Order:

Mr. Antonne Taylor, Coastal-Structural Engineer at the Ministry of Works, called the meeting to order at 6:35pm. Mr. Taylor provided a few welcoming remarks to the audience and mentioned the collaboration of the MOWUD and the IDB for the establishment of an ICZM project in the Bahamas as well as the importance of ICZM in general.

Following this, he introduced Ms. Chitralekha Deopersad, IDB representative, and Janeen Bullard, Environmental Specialist. He then turned the conversation to Ms. Deopersad.

Presentation:

Ms. Deopersad presented the loan, identified its purpose and invited Ms. Bullard to speak.

Ms. Bullard presented the risks, hazards and mitigation measures associated with any potential works that were to be conducted for the coastal development in Long Island.

Discussion and Q&A:

Following the presentations, the floor was open to questions, suggestions and concerns which are as follows:

Question	Response
What is the timeline for the project?	The loan is intended to be approved for the end of March. In terms of construction, different studies need to be conducted before final designs can be prepared, and hence there is no set timeline at the moment.
Are you undertaking a long term venture?	What is intended is something that is sustainable over a long period of time.
Once the money is approved, is it guaranteed to come into our island?	Yes.
Can we speed up the process (of getting the money and starting construction)?	In order to prepare something sustainable the management of the project needs to be carefully monitored. Also there are certain procedures that need to be undertaken before a

	project can be approved at the IDB. I have worked on projects with them so I can attest to that.
Can you name some of those projects you have worked on with the IDB?	I have worked on the Baypoint Project, the Park Development Project and most recently, the Sustainable Development of Andros.
We need an airport fast.	We are mainly looking at ICZM initiatives.
Hamilton's was badly flooded. Runoff goes into a low area and causes flooding. We need to put in a temporary drain system into the "Ocean Hole" area.	We will have to look at topography first to ultimately come up with a design.
We need a bypass road at White Pond. This area was under water for 5 weeks after Joaquin. The government hasn't been doing enough for us.	Joaquin was an eye opener for the MOWUD. There was a rapid assessment report done by MOWUD immediately after the hurricane.
Many people are anxious about the issues being faced and we came to the forum because we wanted to hear something to ease our minds so we need to see some action (in terms of construction plans).	This is a long term project and the necessary precautions need to be undertaken to ensure sustainable developments are constructed and done correctly. There are also steps that need to be undertaken before the approval of a loan.
Did you all take a look at Buckley's, Hamilton's, the dykes?	Yes they were looked at during a technical visit before this meeting but there are still assessments to be made.
How long will these assessments take?	This is just a part of the project, there are further steps and analyses that need to be undertaken before final designs can be made.
Please look at Deadman's Cay and please ensure that Long Island is part of the project.	It is guaranteed that Long Island will be included in this project because it is a part of the loan.
When you came to do these assessments, did you come with any locals?	Yes the Chief Councilor, Mr. Ian Knowles showed them around when they came.

A few statements were also raised at the meeting where people wanted to voice their opinions.

Statement
In Hamilton's and Scrub Hill some wells didn't go deep enough and the water shot back up out of them with the high tides. We should think about putting a wider canal for the water to go out. Put one at the Salinas and put flood gates.
We drainage in the airport.
Something should be done about the garbage dumps. In high tide, the water pushes the garbage into the road.
A lot of people suffered with the Hurricane. About 50-70 people (elderly) died after the Hurricane because they lost everything in it.
There was no way water could get out of Petty's because of the flooding.
You should consider building a bypass road by White Pond/Scrub Hill. The name of the owner of the land to buy the property from is XX XX.
If the IDB is in this project they will have the best people to deal with the issues.

Closing remarks were made by Antonne and the meeting was convened at 7:34pm.

Refreshments were served afterwards.

Nassau, New Providence

Summary

Given that BH-L1043 investments target a popular beach (for locals and tourists) in Nassau, the capital of The Bahamas, the number and diversity of stakeholders is greater than at other sites. Through IDB missions, technical visits, stakeholder meetings and experience of implementing the IDB Sustainable Nassau project; affected parties were identified as: local businesses and employees, Arawak Cay Conch, Fish, Vegetable and Food Association, tourism sector, Port Authority, MOEH departments, police, Nassau Downtown Partnership and the general public. Many of these parties were consulted directly through meetings or during technical visits.

MOWUD convened a public meeting at St. Mary the Virgin Church on January 25, 2017, which was advertised in the newspaper and through flyers distributed by local contacts, including the Ministry of Tourism who directly distributed the flyers to Junkanoo vendors and business. The minutes of the meeting are provided below. A two-page summary of the program, including environmental and social impacts and risks was made available.

Minutes

Call to Order:

Mr. Antonne Taylor, Coastal-Structural Engineer at the Ministry of Works, called the meeting to order at 6:36pm. Mr. Taylor provided a few welcoming remarks to the audience and mentioned the collaboration of the MOWUD and the IDB for the establishment of an ICZM project in the Bahamas as well as the importance of ICZM in general. Following this, he introduced his engineering colleague Mr. Robert Mouzas, Ms. Chitralekha Deopersad, IDB representative, and Ms. Melissa Alexiou, Environmental Specialist. He then turned the conversation to Ms. Deopersad.

Presentations:

Ms. Deopersad presented the Program, identified its purpose, and listed the three components. She then introduced Mrs. Alexiou, the environmental specialist to speak.

Mrs. Alexiou presented the risks, hazards and mitigation measures associated with any potential works that were to be conducted for the coastal development of Junkanoo Beach

Discussion and Q&A:

Following the presentations, the floor was open to questions, suggestions and concerns which are as follows:

Question	Response
Are any other places being considered for ICZM improvement, for example the coast at Yamacraw?	Please direct that information to us after the meeting where we can discuss.
Are you taking tenders?	No. Actually the project is in a preliminary stage altogether since the loan is still being considered for approval.
If the breakwaters are not repaired, what is likely to happen to the beach?	It is agreed that the situation concerning the breakwaters should be looked at. However, the MOWUD will be in talks with the IDB on further collaboration on this matter at another time.
When do you estimate the project will start?	Approval of the loan is carded for the end of March but actual works will be undertaken by the MOWUD The actual implementation of works will take some time as there will be a number of studies that should take place even before designs are considered. Added to this, follow up town meetings would be considered in order to inform the public about said designs when they are made.
Have companies been selected to carry out work on this project?	No. There is a process that needs to occur even before that stage. The project is still in a preliminary stage where the loan is still in the process of being approved.
What would happen if construction were to occur on the western end of the beach at Arawak Cay where it is eroding?	Sand lost may be attributed to dredging of the channel and only modelling studies can be used to tell future scenarios. Once we understand what is happening from this, then we can stop the loss of sand from the beach.
New Providence is sinking and many places are under threat e.g. Fishing Hole and Queen's Cove.	This is because of Sea Level Rise. At the moment we are taking into consideration SLR in the design of our docks and culverts.
What is the cost of the project?	Component one is 20M. Component two is 3M and component three is 3M.
What is the lifespan of any construction?	Lifespan depends on material type (e.g. wooden vs. concrete). Lifespan also depends on a modeling estimation and estimated figures can't be given as a result until the modeling occurs.
There are other locations in the Bahamas that need coastal works, are you addressing those?	Right now the project is a pilot scheme. After the results have been proven with these pilot projects, then we can move on to considering other projects based on the results gathered.
There are some shifty plates in the sidewalk leading from Junkanoo Beach to the Pointe. They are corroded, broken and should immediately be replaced because they pose a risk to pedestrians.	The Pointe development is directly in charge of fixing that area, however mention would be made from the MOWUD to push them towards fixing the plates.
Will there be a follow up meeting to address our concerns and comments from this meeting?	Another meeting would be prepared to address the public after the design phase.

Additional statements include:

Statement
There is a buttress seawall at Grand Bahama at Wilson Town Beach where the design could be used as a suggestion for coastal protection as it is very strong and has not collapsed. It is about 4ft in width and 10ft in height.
A lot of sand is being lost at the western end of the beach at Arawak Cay. It is too rocky there as there is not enough sand left. Therefore it is suggested that data start to be collected in that area.
Erosion is the biggest concern at Junkanoo Beach. The beach is the single biggest point of outdoor activity for persons in Nassau. When the dredging took place it affected the beach. Any designs that are considered need to take into consideration an accountable and sustainable design and we are navigating a fine line between sustainability and commercial gain at the beach.
There is an encroachment of business expansion on the beach with 8 additional commercial buildings in the process of being approved. There are too many instances where sand is being removed to accommodate concrete.
The breakwaters are of special concern and if possible, should be considered in your scope. Because of the breakwaters, outside the harbor is rough and inside of it is calm.
The Pointe construction may have impacts on the ecological environment.
Locals are limited in the beach access they currently have.
Antonne: Baseline studies need to be undertaken in order to start fixing items. This includes wave and current measurements, littoral and sediment transport and looking at SLR and return periods.
Safety for visitors in Junkanoo beach is an issue. We need to get crosswalks because tourists regularly run across the road. We need handicap accessibility to the beach, especially when people need to get there from the hotel. We need better lighting as the area around the beach is very dark at nights. Poles that have fallen in the eastern end have not been fixed as yet since Hurricane Matthew. We also need safety for vendors. We need better electrical and water supply to shops since one shop recently caught a fire due to circuit overloading. We also have an issue with rats.
Arawak Cay is full of discarded conch shells that cause a bad smell ad harbor rodents and insects. However they can also be used to as fill for any proposed infrastructure. Maybe they can even be recycled for jewelry or sold to the Chinese.

15 6. Presentations

Nassau Presentation

ENVIRONMENTAL AND SOCIAL ANALYSIS – NEW PROVIDENCE

CLIMATE-RESILIENT COASTAL MANAGEMENT AND INFRASTRUCTURE PROGRAM (BH-L1043)

INTERAMERICAN DEVELOPMENT BANK

MELISSA ALEXIOU, ENVIRONMENTAL CONSULTANT **waypoint**
CONSULTING LTD



Climate-Resilient Infrastructure Objectives – New Providence

- **Objective:** To provide a strategic, climate-risk resilient, integrated management plan for the coastline from Western Esplanade to Junkanoo Beach that can then lead to effective and sustainable management improvement through interventions including soft and hard engineering.
- **Expected Benefits:** Enhanced asset protection of infrastructure, roads and services, for the benefit of local residents and tourists between Western Esplanade and Junkanoo Beach. Technical studies and analysis of coastal processes will contribute to improved management of this shoreline.

ENVIRONMENTAL AND SOCIAL IMPACTS – WESTERN ESPLANADE TO JUNKANOO BEACH

New Providence – Proposed Infrastructure Investments		
	Shoreline and Beach Enhancements	Beach restoration and nourishment to facilitate shoreline stabilization, which includes removal of invasive plant species.
	Drainage Improvements	Drainage improvements may include the installation of wells and/or culverts along West Bay Street.



ENVIRONMENTAL AND SOCIAL BENEFITS

- Improving long-term coastal resilience for key infrastructure, economic activities, and tourist activities
- Reduced flooding
- Improvement traffic flow on West Bay Street and access to Junkanoo Beach
- Aesthetic enhancement for



shoreline improvements

- Removal of invasive species which currently line Junkanoo Beach
- Improved coastal access for locals and tourists
- Improved local and tourist experience
- Aesthetic enhancement for Nassau



ENVIRONMENTAL AND SOCIAL – NEGATIVE IMPACTS

Drainage Improvements Negative Impacts

- Traffic delays during construction which may include diversions to residential neighborhoods and economic impacts
- Increased noise and vibration during construction
- Suspended sediment in waterbodies

Shoreline Improvements Negative Impacts

- Displacement of marine species
- Suspended sediment in waterbodies
- Increased visitor use and pollution pressures from crowd; i.e. increased litter, water quality issues
- Opposing land uses i.e. recreational beach, vendors, Nassau Harbour

MITIGATION MEASURES FOR IDENTIFIED IMPACTS

Mitigation Measures for Drainage Improvements and Shoreline Enhancement

- Environmental Management Plan (EMP)
 - Implement best management practices for preventing erosion and sediment transfer
- Traffic Management Plan
 - Provide advance notice of works, signage for diversion, workers directing traffic
- Zoning and Appropriate Use Land-Use Assessment
 - Assess sustainability of recreational, commercial, and infrastructure use of the area
- Long-term Shoreline and Beach Plan
 - Coastal assessment to review the breakwater and stabilization of beach enhancements
- Water Quality Assessment
 - Assess the water quality of Western Esplanade to Junkanoo Beach

THANK YOU.

Questions?

East Grand Bahama

ENVIRONMENTAL AND SOCIAL ANALYSIS – EAST GRAND BAHAMA

CLIMATE-RESILIENT COASTAL MANAGEMENT AND INFRASTRUCTURE PROGRAM (BH-L1043)

INTERAMERICAN DEVELOPMENT BANK

MELISSA ALEXIOU, ENVIRONMENTAL CONSULTANT



PRESENTED BY JANEEN BULLARD



Climate-Resilient Infrastructure Objectives – East Grand Bahama

- **Objective:** To improve transport security and reduce vulnerability to extreme weather events in tandem with ecological restoration to foster healthy tidal creek systems.
- **Expected Benefits:** Enhanced asset protection of infrastructure, roads and services, to provide greater security for transport linkages and creating opportunities for sustainable livelihoods (for ecotourism and fisheries) through tidal creek restoration.

The Gap Causeway



PROPOSED INFRASTRUCTURE IMPROVEMENTS – EAST GRAND BAHAMA

East Grand Bahama Causeway		
	Drainage Improvements	Drainage improvements along the Grand Bahama Causeway.
	Road Network Improvements	Road network improvements to allow for uninterrupted access between East and West Grand Bahama.
	Ecosystem Restoration	Ecosystem restoration by installation of culverts to improve creek tidal flows.



McCleans Town
Causeway &
Culvert



ENVIRONMENTAL AND SOCIAL BENEFITS

Drainage

Improvements

- Improving long-term coastal resilience for key infrastructure, economic activities, and tourist activities
- Reduced flooding
- Improved disaster resiliency (less damage due to inclement weather)

Road Network

Improvements

- Improved drainage to prevent runoff and pollutants from entering the high water table
- Improved infrastructure linkages
- Reduced number of yearly road closures

Ecosystem Restoration

- Restoration of historic tidal flows
- Improved water quality
- Improved mangrove health, marine biodiversity, and ecology
- Benefit for bonefishing industry & ecotourism opportunities
- Gain better understanding of protected areas and park management

ENVIRONMENTAL AND SOCIAL – NEGATIVE IMPACTS

Drainage & Road Network Improvements Negative Impacts

- Traffic delays during construction which may include diversions to residential neighborhoods and economic impacts
- Increased noise and vibration during construction
- Suspended sediment in waterbodies
- Impacts to blue holes and/or subsurface karst formations

Ecological Restoration Negative Impacts

- Suspended sediment in waterbodies
- Increased visitor use and pollution pressures from crowd; i.e. increased litter, water quality issues
- Potential conflicts between user groups, i.e. commercial fishing, bonefishing, protected areas

MITIGATION MEASURES FOR IDENTIFIED IMPACTS

Mitigation Measures for Drainage Improvements, Road Network Improvements, and Ecosystem Restoration

- Environmental Management Plan (EMP)
 - Implement best management practices for preventing erosion and sediment transfer
- Traffic Management Plan
 - Provide advance notice of works, signage for diversion, workers directing traffic
- Park Management Plan
 - A management plan that takes into consideration local stakeholder input for park uses and restrictions.

THANK YOU.



Technical
Meeting
December 14,
2016

Question
s?

Long Island

ENVIRONMENTAL AND SOCIAL ANALYSIS – LONG ISLAND

CLIMATE-RESILIENT COASTAL MANAGEMENT AND INFRASTRUCTURE PROGRAM (BH-L1043)

INTERAMERICAN DEVELOPMENT BANK

MELISSA ALEXIOU, ENVIRONMENTAL CONSULTANT

waypoint
CONSULTING LTD

PRESENTED BY JANEEN BULLARD



Deadman's Cay
Culvert

January 30, 2017

Climate-Resilient Infrastructure – Project Overview

- **Project Overview:** The overall project objective is to build resilience to coastal risks including those associated with climate change through enhanced coastal protection infrastructure and integrated management of the coasts. Based on this objective, key coastal infrastructure improvement sites were identified as an output of the design and feasibility analysis of risk-resilient ICZM project.
- The Program is comprised of three components.
 - (1) Sustainable coastal protection infrastructure for East Grand Bahama, Central Long Island and New Providence – Junkanoo Beach.
 - (2) Natural infrastructure for hazard resilience in Andros.
 - (3) Institutional strengthening for coastal risk management.

Climate-Resilient Infrastructure Objectives – Long Island

- **Objective:** Enhanced asset protection of infrastructure, roads and services and reduced flood risk vulnerability by placement of site-specific measures to improve community resilience to flash flooding and storm surge.
- **Expected Benefits:** A coordinated program of drainage wells placed in historic flood zones, including the airport, and potential for bypass roads to avoid prolonged flood areas will enhance community safety and security through improved transport linkages.
- **Future Technical Studies.** Technical studies will be undertaken to validate construction of proposed coastal resilience structures. These technical studies may include tidal measurements, sediment analysis, wave/current measurements.

PROPOSED INFRASTRUCTURE IMPROVEMENTS – LONG ISLAND

Long Island		
	Drainage Improvements	Drainage improvements may include the installation of wells at the Deadman's Cay Airport and at specific locations along the Queen's Highway.
	Road Improvements	Road improvements may include small retaining flood walls, embankments and possible road raising.
	Ecosystem Restoration	Natural restoration through plantings to improve climate resilience.

ENVIRONMENTAL AND SOCIAL BENEFITS

Drainage Improvements

- Reduced timeframe for standing water (salt or fresh) in a single area
- Improved disaster resiliency (less damage due to inclement weather)
- Increased safety and security

Road Network Improvements

- Improved drainage to speed recovery time following severe rain events
- Improved transportation networks for consistent traffic flow

Ecosystem Restoration

- Improved water quality
- Improved mangrove health, marine biodiversity, and ecology
- Improved resilience to climate change
- Long-term protection of natural capital
- Increased knowledge about climate resilience & coastal protection

ENVIRONMENTAL AND SOCIAL – NEGATIVE IMPACTS

Drainage & Road Network Improvements Negative Impacts

- Temporary disruption of road and airport during well installation
- Temporary disturbance of noise and vibration during construction
- Suspended sediment in waterbodies
- Construction of improved drainage infrastructure may impact mangrove areas due to freshwater inundation

Ecological Restoration Negative Impacts

- Suspended sediment in waterbodies during construction
- Temporary disturbance of noise and vibration during construction

MITIGATION MEASURES FOR IDENTIFIED IMPACTS

Mitigation Measures for Drainage Improvements, Road Network Improvements, and Ecosystem Restoration

- Environmental Management Plan (EMP)
 - Implement best management practices for preventing erosion and sediment transfer
- Drainage Review of the Queen's Highway/ Airport Safety Management Plan
 - Emergency Operations for Airport During Inclement Weather
- Shoreline Management Plan
 - Coastal Assessment for Deadman's Cay Salinas and Dike System (Influences of Hurricane Joaquin and Matthew)
 - Mangrove and Native Tree Planting Program



THANK YOU.



Questions?

16 7. Materials Distributed

Andros Materials

The Bahamas - Integrated Coastal Zone Management Program

Context. The Bahamas is highly vulnerable to natural hazards, including hurricanes which put at risk both economic activities and associated public infrastructure concentrated along the coast. These events are usually accompanied by severe coastal erosion and flooding, including in densely populated areas where the buffering effect of coastal habitats has been lost. Recently, Andros Island was particularly hit by Hurricane Matthew suffering as result from important social and economic damages.

The loss of natural capital in the coastal zone exacerbates the archipelago's overall environmental and socio-economic vulnerability. While information on The Bahamas' natural capital is limited, there is evidence of declining trends and increasing threats. Country-wide, main threats to coastal ecosystems include land-based pollution, habitat conversion, invasive species, disease outbreaks and other coastal risks such as natural disasters and climate change.

Approach. Integrated Coastal Zone Management (ICZM) in The Bahamas would help address the following challenges to the country's future resilience:

- Need for sustainable coastal protection infrastructure achieved through science-based analysis and design;
- Gaps in reliable, long-term coastal risk data limit understanding coastal risks and processes;
- Limited cross-sectoral planning, coordination and technical capacity;

Objective. To address these challenges, a Climate-resilient Coastal Management and Infrastructure Program financed through a Specific Investment Loan (SIL) is proposed that is tailored to the specific characteristics of the archipelago, recognizes immediate and medium-term priorities for coastal protection infrastructure and builds national capacity for ICZM. The program's objective is to build resilience to coastal risks (including those associated with climate change) through sustainable coastal protection infrastructure, including natural infrastructure and integrated management of the coast.

The Program - consists of three components:

- (1) Sustainable coastal protection infrastructure - at 3 priority sites (Nassau; Central Long Island and East Grand Bahama)
- (2) **Natural infrastructure for hazard resilience in Andros**
- (3) Institutional strengthening for coastal risk management

Nature as a first line of defense

More than 70% of the populated east coast of Andros coastline is currently buffered by coral reefs, seagrass, mangroves and wetlands and coppice. Extreme weather, sea-level rise and degraded coastal ecosystems are placing Androsians at greater risk of damage from coastal hazards. In islands endowed with rich biodiversity such as Andros, effective solutions should **leverage natural capital (i.e. mangroves and coral reefs)** for innovative natural infrastructure that is more adaptive and often less costly. With this in mind, under the Program a priority investment is proposed to demonstrate the effectiveness of natural infrastructure for shoreline stabilization and restoration, in line with the Andros Master Plan, which identifies opportunities for sustainable development for both people and nature and was developed using an ecosystem-based, participatory approach.



Figure 1. Mangroves provide coastal protection benefits

Why nature? Hardened shorelines are not always the best solution. Some can also negatively impact ecosystems and the benefits they provide to people. On Andros, seawalls in some places appear to be exacerbating erosion. A growing body of evidence suggests that coral reefs, mangrove and coppice forests, and seagrass beds can dampen waves and currents in the nearshore and retain sediments, affording protection for coastal communities and

infrastructure while maintaining or restoring the multiple benefits of coastal habitats for people and ecosystems now and in the future. A recent study, conducted as part of the Andros Master Plan preparation found that investing in targeted mangrove conservation and restoration projects in certain locations could help reduce coastal erosion and flooding on Andros.



Figure 2. Mangrove restoration in Belize and coral reef restoration in the Florida Keys

Nassau, East Grand Bahama and Long Island Materials

The Bahamas - Climate-Resilient Coastal Management and Infrastructure Program (BH-L1043)

Context. The Bahamas is highly vulnerable to natural hazards, including hurricanes which put at risk both economic activities and associated public infrastructure along the coast. These events are usually accompanied by severe coastal erosion and flooding, including in densely populated areas where the buffering effect of coastal habitats has been lost. The recent impact of Hurricane Matthew demonstrates these critical coastal risks and vulnerabilities.

Approach. Climate-resilient coastal management and infrastructure in The Bahamas would help address the following challenges to the country's future resilience:

- Need for sustainable coastal protection infrastructure achieved through science-based analysis and design;
- Gaps in reliable, long-term coastal risk data limit understanding coastal risks and processes;
- Limited strategic planning, cross-sectoral coordination and technical capacity.

Objective. To address these challenges, a Climate-resilient Coastal Management and Infrastructure Program financed through a Specific Investment Loan is proposed that is tailored to the specific characteristics of the archipelago, recognizes immediate and medium-term priorities for coastal protection infrastructure and builds national capacity for integrated coastal zone management. The objective is to build resilience to coastal risks (including those associated with climate change) through sustainable coastal protection infrastructure, including natural infrastructure and integrated management of the coast.

The Program - consists of three components:

- (1) Sustainable coastal protection infrastructure at three priority sites (**Nassau; Central Long Island and East Grand Bahama**)
- (2) Natural infrastructure for hazard resilience in **Andros**
- (3) Institutional strengthening for coastal risk management

Sustainable Coastal Protection Infrastructure. The objective is to build increased resilience to coastal hazards through science-based shoreline stabilization and coastal flooding control measures coupled with sustainable reconstruction of adjacent critical public infrastructure at three priority sites. Evidence from The Bahamas and internationally suggests that engineering solutions that are not designed based on analysis of site-specific coastal processes and potential climate change impacts are less than effective and short-lived. Effective solutions should also leverage natural capital (i.e., mangroves and coral reefs) for innovative natural infrastructure that is more adaptive and often less costly.

In **Central Long Island**, the Program envisions flood risk assessment and coastal flood reduction infrastructure to reduce vulnerability of infrastructure impacted by Hurricane Joaquin. In **East Grand Bahama**, this Program envisions coastal flood reduction infrastructure, road

rehabilitation and associated studies to improve road access for vulnerable coastal communities and restore hydrological flows. In **Nassau**, the Program envisions beach and dune stabilization measures and associated studies along Junkanoo Beach and adjacent nearshore waters to reduce shoreline and dune retreat and understand impacts of nearby developments.

What are the impacts? While the Program is expected to provide positive environmental and social benefits, there is the potential for temporary and localized, negative impacts associated with the construction of the shoreline stabilization works (see summary table below).

Table 1: Summary of Preliminary <u>Risks and Potential Negative Impacts</u> / <u>Mitigation Measures</u>
<p>ALL SITES:</p> <ul style="list-style-type: none"> • <u>Impact traffic through construction footprint</u> / <i>Plan traffic diversions if needed and inform stakeholders; monitoring</i> • <u>Disturbance from acoustic noise and vibration (aerial and underwater)</u> / <i>Limit working hours; monitoring in sensitive areas</i> • <u>Increased suspended sediments in water</u> / <i>Sediment traps or blankets; monitoring; management plan for any excavation</i> • <u>Invasive species</u> / <i>Invasive species removal plan and maintenance program to inform design</i> • <u>Impacts on terrestrial and marine ecology and birds</u> / <i>Pollution control and spill kits in place</i> • <u>Waste management</u> / <i>Best practice for site cleanliness, control pollution risk to waterbodies, waste management program</i> <p>LONG ISLAND:</p> <ul style="list-style-type: none"> • <u>Disruption of airport access</u> / <i>Ensure continued use of airport; plan traffic diversions if needed</i> <p>NASSAU:</p> <ul style="list-style-type: none"> • <u>Impact on the use of the beach and tourist facilities, including impacts to businesses and employees</u> / <i>Phased construction; coordination with stakeholders to avoid important events and peak season</i> • <u>Impacts on navigation of boats and marine transportation, including shipment of goods and services and cruise visitors</u> / <i>Marine traffic management plan; stakeholder consultation</i> • <u>Increased visitor numbers</u> / <i>Assess the current capacity of the area and recommend sustainable tourism practices and mitigation measures, including waste management</i> • <u>Congestion and noise on residential streets due to traffic diversions</u> / <i>Limit working hours; stakeholder consultation</i>

Additional information, including Environmental and Social Analysis, is available or will soon be available at: <http://www.iadb.org/en/projects/project-description-title,1303.html?id=BH-L1043>