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Prepared for:
The Ministry of Finance
Re:
Blue Hills Solar Microgrid Project
Date:
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EXECUTIVE SUMMARY

The Blue Hills Solar Project (The Project) is located in southern New Providence. The site is located one thousand two hundred and eighty-four feet (1,284 ft) west of Baillou Hill Road, four hundred and eight feet (408 ft) north from Carmichael Road and one hundred and eighty feet (180 ft) south of Primier's Avenue.

On September 1st, 2019, The Bahamas was impacted by category five hurricane Dorian. The impacts from hurricane Dorian were felt greatly on the islands of Grand Bahama and Abaco; although, some of the impacts was felt on the island of New Providence. The landfall of hurricane Dorian in The Bahamas resulted in the total damage of US $3.4 billion, approximately one percentage point of Gross Domestic Product (GDP), to infrastructures throughout the country. Given the magnitude of its impacts and effects on The Bahamas, it was determined that hurricane Dorian was not an isolated event but instead an example of an extreme climatic event that will most likely occur in the future. Because of this, the need to revitalize the country's energy system to a design that is able to withstand the increasing frequency and severity of extreme weather events has become imperative.

The Ministry of Finance (MoF) proposes to undertake the construction of a 92-acre state-of-the-art solar microgrid in Blue Hill as way to strengthen the isolated and interconnected grid networks in New Providence with resilient renewable energy sources. The design of The Project will be based on the existing local industry specifications and standards but will also be guided by internationally accepted standards in areas where the Building Code may not currently cover.

Baseline Assessments

The vegetation and avian populations of the site were investigated to record the existing conditions for the proposed area for The Project infrastructure.

Terrestrial assessments conducted show that the site currently consist of one (1) major terrestrial ecosystem which is an Interior Upland ecosystem. There are five (5) vegetation classes on the site, Dry Broadleaf Evergreen Forest, Mixed Forest, Pine Woodland, Human Altered Environment, and Inland Freshwater Wetland. A total of one hundred and eight (108) species were recorded on the site, including eleven (11) invasive species and nineteen (19) protected species.

A total of nineteen (19) avian species were recorded during the investigation including sixteen (16) permanent resident breeding and three (3) summer non-breeding migrant species. All species observed are protected under the Wild Birds Protection Act of The Commonwealth of The Bahamas, 1952. All species observed are considered of Least Concern by the International Union for Conservation of Nature (IUCN). No endangered birds were recorded, and one (1) endemic species was observed.

Anticipated Impacts and Mitigations

The anticipated physical impacts to the environment because of construction include groundwater quality, flooding, solid waste, noise pollution, light pollution, dust pollution, land clearing, landscaping, and wildlife. Socioeconomic impacts associated with The Project include traffic, land use, community impacts, and job generation.

Long-term negative impacts to the natural resources in the area are not expected to occur because of the proposed construction work. Construction will be closely monitored to prevent contamination of the adjacent terrestrial habitats and disturbances to the nearby communities. Management Plans will detail mitigation measures that must adhered to by the contractor to ensure protection of the environment.

The purpose of The Blue Hills Solar Microgrid Project Environmental Impact Assessment (EIA) is to assess and document existing conditions of The Project area and the potential impacts associated with the proposed project. The EIA has been designed to assist with achieving the Health, Safety, Social and Environmental (HSSE) Policy to ensure that all its activities during the construction phase are conducted in a manner that results in minimum adverse impacts to the environment. It details mitigation measures to avoid, negate and minimize or mitigate potential impacts that will be employed by management, staff and subcontractors during construction and operation.

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1.0 INTRODUCTION

1.1 Authorization

This Environmental Impact Assessment (EIA) has been prepared by JSS Consulting LTD. on behalf of the Ministry of Finance (MoF) for the proposed The Blue Hills Solar Microgrid Project, hereafter referred to as 'The Project." The Project is intended to conform to the standards, legislation and regulations of the Bahamian Government, the Department of Environmental Planning and Protection (DEPP) and relative international communities.

1.2 Purpose and Objective of the EIA

The purpose of EIA is to assess and document existing conditions of The Project area and the potential impacts associated with the proposed project. It provides recommendations to avoid, negate and minimize or mitigate potential impacts during construction and/or operational phases of The Project. This report will address factors that influence the development of The Project in this location including:

- Site conditions,
- Development designs,
- Existing terrestrial resources,
- Description of impacts and mitigations measures,
- Environmental Management Plan,
- Socio-Economic analysis, and
- Conclusions of the overall impacts from construction of the proposed project.

1.3 Scope of the EIA

Specific objectives of the EIA include:

- Prevent harm, damage and loss to personnel, the environment and community assets,
- Reduce to impact to surrounding vegetation types and wildlife,
- Prevention and mitigation of noise, dust and vibration impacts,
- Protection of groundwater resources,
- Minimize waste production and ensure correct waste management on site,
- Adhere to all environmental laws and regulations,
- Actively promote an environmentally responsible approach to The Project activities amongst the entire workforce,
- Involve and commit The Project Management as well as each employee to The Project,
- Maintain health and safety standards on site,
- Ensure Sub-contractors/Suppliers/Visitors apply the same or equivalent environmental practices as those defined by Employer and Contractor, and
- Document the existing biological environment of the site.

1.4 Background

The Bahamas was impacted on September 1st, 2019 by a category five Hurricane named Dorian, the strongest hurricane to make landfall within The Bahamas on record. Although other islands such as Grand Bahama and Abaco had greater impacts, the impacts and effects resulted in a total damage of $3.4 billion, leading to the loss of one percentage point of Gross Domestic Product within The Bahamas.

Given this, the Ministry of Finance has proposed to develop a 92-acre state-of-the-art solar farm. The development of Renewable energy (RE) along with the rehabilitation and modernization of the country's energy sector represented an opportunity to strengthen the isolated and interconnected grid networks of The Bahamas to withstand increasing frequency and severity of extreme weather events, such as hurricane Dorian. Additionally, the proposed development set forth by the Ministry of Finance will also presents opportunities that will raise awareness about RE as a new energy subsector for The Bahamas. This development can also lead to new employment and economic opportunities within the energy sector for Bahamian citizens.

2.0 PROJECT OVERVIEW

2.1 Project Objective

The objective of the proposed Project is to create an alternative source of energy that is sustainable, modernized and resilient to extreme weather events within The Bahamas. In addition to this, the Project aims to raise awareness to establishing Renewable energy as a new energy sector within the country and create employment opportunities for Bahamian citizens. The Project also aims to provide economic opportunities that can lead to an increase in the country's GDP through the establishment of a renewable energy source.

2.2 Project Scope of Works

Scope of works for the Project includes the installation of a ground mount solar farm on a 92-acre parcel of land in Blue Hills, Nassau, Bahamas. It is estimated that the microgrid will produce an output of 20mw and construction activities include the following:

- Land clearing activities
- Excavation and grading activities
- Utility installation

Additionally, construction activities also include the disposal of construction, domestic and vegetative waste to the New Providence Ecological Park (NPEP).

2.3 Project Design and Components

The Project includes the construction and installation of a 92-acre state-of-the-art ground mounted solar farm. The design of The Project shall be based on the existing local

industry specifications and standards but will also be guided by internationally accepted standards in areas where the Building Code may not currently address.

2.3.1 Utility Scale Ground Mount Facility

The design includes a 92-acre utility scale solar microgrid that will power up to 20 megawatts to the interconnected grid networks located within Blue Hills. The design will include HDG steel that will be mounted and reinforced with ground screws to ensure ground stability. Each mount will be installed at a custom tilt angle between 5^{o} – 35^{o}, 1^{o} increments prior the placement of solar panels and will consist of corrosion resistant hardware. Upon the ground mount installation, the solar panels will then be installed and secured to the mounting structure with mid clamps that include a built-in wire management system.

2.4 Utilities and Infrastructure

2.4.1 Electrical Power

The electrical power for the site will be provided by The Bahamas Power and Light (BPL). Detailed construction plans for the generators and accompanying electrical distribution system will be prepared and submitted to the BPL for review prior to commencement of construction activities.

2.4.2 Water and Sewage

Water and sewage services will be provided by The Bahamas Water and Sewerage Corporation (WSC). Potable water infrastructure throughout the proposed project facilities will be connected to WSC network. Potable water will be provided through this network and will follow standards set by WSC and the Department of Environmental Health Services (DEHS). The system will utilize a series of pumps to pressurize the distribution lines and supplying water to any buildings or fire hydrants present. The system will be laid out in a loop configuration with backflow prevention controls. Water pipelines lines will be located approximately three feet (3ft) underground.

During the construction phase Portable Toilets will be used on site. These portable toilets should be kept away from any open water body or wetland, be serviced at least twice per week by a licensed contractor and secured to prevent them from tipping over.

All potable water and sewage construction plans will be prepared and submitted to WSC for review and approval prior to commencement of construction activities

2.4.3 Roadways and Drainage

Roadways are proposed to provide access to all solar microgrids and buildings throughout the site. The roadways will be for vehicle use and constructed of asphalt. All roads will be crowned to allow for proper drainage and the water generated should flow into the drainage system.

Stormwater from the roads and buildings will be collected in drainage swales/basins and conveyed to stormwater retention areas throughout the site. The retention area should allow for a fast rate of flow and be large enough to prevent overflow.

The drainage design includes a series of drainage basins that will collect water from the concrete/asphalt surfaces and roadways. Water collected from drainage basins will be directed to a 150 ft to 180 ft deep disposal well.

Special care should be taken to ensure that roadway drainage and stormwater discharge does not enter the wetlands on site.

3.0 PROJECT DESCRIPTION

3.1 Geographic Location

The Project site is located in western New Providence, The Bahamas (See Figure 1). New Providence is 7 miles long and 21 miles wide; and approximately 315 miles from Florida, USA. The site is located one thousand two hundred and eighty-four feet (1,284 ft) west of Baillou Hill Road, four hundred and eight feet (408 ft) north from Carmichael Road and one hundred and eighty feet (180 ft) south of Primier's Avenue.

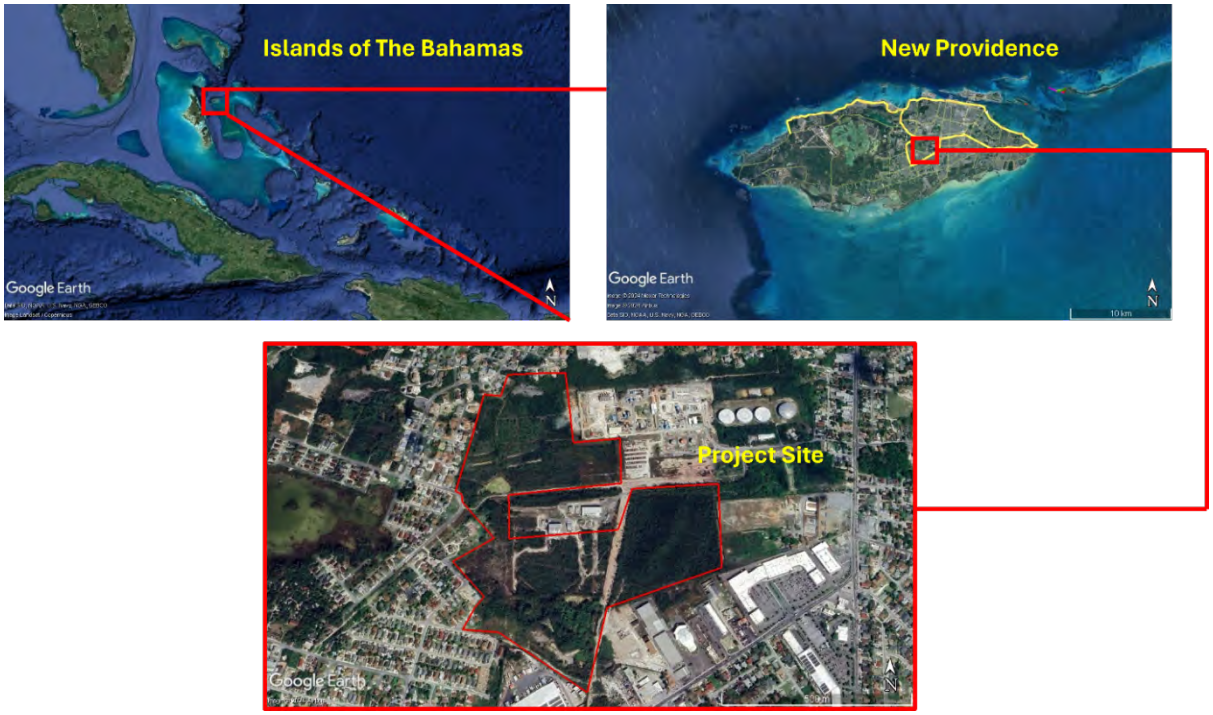

Figure 1: Blue Hills Solar Microgrid Location Map

3.2 Climate and Weather

The climate of The Bahamas consists of a tropical maritime wet and dry climate, with occasional winter incursions of modified polar air. As a result, Nassau does not receive frost, sleet, snow, or extreme temperatures. In the month of August, Nassau has recorded temperatures ranging from an average high of 90° F (32° C) to an average low of 77° F

(25° C). In January, the average high temperature is 79° F (26° C), and the average low is 65° F (18° C).

Humidity is high all year long in Nassau, usually maintaining around 80% humidity in the summer. Precipitation is highest from May through October. The average annual rainfall is about 44 inches (1,120 mm), occurring mostly during the summer. The high precipitation values can be attributed to extreme storm events, such as hurricanes and tropical storms. Historically, given the geographical location of The Bahamas archipelago, the islands are subject to regular natural disasters that include hurricanes, storms and cyclones. In addition to this, the low-laying topography of The Bahamas makes the country particularly vulnerable to flooding caused by storm surges and sea level rise.

The Bahamas presents high risk to hurricane hazards with islands in the northern and southern part of the country experiencing more intense winds. This risk is then further increased during the months of August, September and October when there is an increase in temperatures, rainfall patterns and other climatic trends. Throughout the years, storm surges, strong winds and floodings resulting from hurricanes, tropical storms, and heavy rain have led to a number of damaged houses, public buildings, roads, airports, energy and power line, health care facilities, etc., throughout The Bahamas.

It is noted that the proposed site is less likely to impacted by storm surges, strong winds, floods, or other severe weather impacts given the proposed location for The Project. According to *Hurricane City, et al.,* the last major hurricane to make landfall in New Providence over the last ten years was Hurricane Matthew in 2016 (Nassau Bahamas History with Tropical Cyclones, n.d.). Additionally, it was also reported that the current average years between direct major hurricane hits to New Providence is once every 6 years (Nassau Bahamas History with Tropical Cyclones, n.d.); thus, making the site area less likely to receive a direct hit from a major hurricane. Furthermore, the current site area is less likely to suffer impacts from flooding caused by severe weather due to the fact that it is not located within a flood zone.

3.3 National Parks

The Blue Hills Solar Microgrid project site does not fall within the boundary of a national park but is located approximately eight hundred and fifty feet (850 ft) east of the Harold & Wilson Ponds National Park.

4.0 ENVIRONMENTAL LAWS, REGULATIONS AND REQUIREMENTS OF THE BAHAMAS

The Owner and Contractor will be required to utilize accepted regulatory standards as a minimum to the protect the environment, the health and safety of all personnel (Contractor, Sub-contractors and third parties) working on The Project, and any others who may be affected by The Project activities.

4.1 National Environmental Codes and Regulations Applicable to The Bahamas

Construction of The Project must comply with a range of national legislation, regulations, strategies and policies in order to provide for the management of environmental effects. There are fifteen (15) legislations that are relevant and applicable to the management of the physical and natural environment of the proposed Project as outlined in Table 1.

Table 1: National Environmental Laws in The Bahamas

Act Title	**Year Enacted**	**Comments**
Water & Sewerage Corporation Act	1976	Provides regulatory framework for the management of water resources in The Bahamas.
Environmental Health Services Act	1987	Provides the framework for environmental regulations that will ensure compliance for The Project. The Act authorized the Department of Health Services (DEHS) to develop regulations that prevent and control air pollution, soil contamination and preserve water quality.
Wild Animals Protection Act	1968	Prohibits the taking, capturing or hunting of any animal without a permit.
Wild Birds Protection Act	1952	Prohibits the taking, capturing or hunting of any animal without a permit. Protects birds and eggs during closed season.
Plants Protection Act	1916	Relates to plant disease and controls importation of plants to prevent outbreaks of exotic disease and establishment of unwanted species.
Conservation and Protection of the Physical Landscape of The Bahamas Act	1997	Protects physical landscape from environmental degradation, flooding and removal of hills; regulates filling of wetlands, drainage basins or ponds; prohibits digging or removing sand from beaches and sand dunes; prevents harvesting or removing protected trees. In order to perform activities that may affect the physical landscape of The Bahamas, permits must be obtained for these activities. The Department of Physical Planning issues the permits and enforces the regulations.

Planning and Subdivision Act	2010	This Act provides for: A land use planning-based development control system led by policy, land use designations and zoning. Prevention of indiscriminate division and development of land. Promotion of sustainable development in a healthy natural environment. Maintenance and improvement of the quality of the physical and
The Forestry Act	2010	Protects wetlands, water reserves, endemic flora and fauna and protected trees. It establishes a legal framework for the long-term sustainable management of forests, a governmental forestry agency and a permanent forest estate. It requires a license for timber cutting and other activities in the Forest Reserves. The Act mandates that a National Forest Plan be developed every five years to govern management activities, such as harvesting and reforestation measures, prescriptions for fire prevention, wildfire suppression and prescribed burning and
The Private Roads and Subdivision Act	1961	This Act enables the Department of Physical Planning to regulate road construction and subdivision development.
Disaster Preparedness Response Act	2006	This Act provides for a more effective organization of the mitigation of, preparedness for, response to and recovery from emergencies and disasters.
The Ministry of the Environment Act	2019	This Act establishes the Ministry of the Environment to oversee the integrity of the environment of The Bahamas, to make the minister responsible therefore a corporation sole, to establish the environmental administration fund and the environmental trust fund and for matters connected thereto.
The Environmental Protection (control of plastic pollution) Act	2019	This Act prohibits single use plastic food ware and non-biodegradable and biodegradable single use plastic bags. Prohibit the release of balloons; regulate the use of compostable single use plastic bags and for connected matters.

The Environmental Planning and Protection Bill	2019	The Act provides for the prevention or control of pollution, the regulation of activities and the administration, conservation and sustainable use of the environment and for connected purposes. The Bill has been enacted by the Parliament of The Bahamas and if sent to the Gazette during the time of this project the legislation will be enforced.
Environmental Impact Assessment Regulations,	2020	To provide procedures for a Certificate of Environmental Clearance (CEC). The Regulations provide procedures for the review of proposed projects inclusive of monitoring and compliance requirements. The Regulations dictate the requirements for a CEC.
Health and Safety at Work Act	2002	This Act makes provisions relating to health and safety at work and for connected purposes. It details the general duties of employers and employees at work.

4.2 National Environmental Policies in The Bahamas

Table 2: List of relevant National Policies in The Bahamas

Relevant National	**Subject**	**Summary**
National Policy for the Adaptation to Climate Change 2005	Climate change assessment for the immediate and project adaptation techniques for The Bahamas	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 (UNFCC). The Bahamas is committed to reduce greenhouse gases and address climate change impacts.
National Invasive Species Strategy for The Bahamas, 2013	Identifies and recommends a management framework for the control and eradication of invasive species.	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.
National Biodiversity Strategy and Action Plan, 1999	A plan to maintain biodiversity through sustainable development for a small island developing nation.	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.

4.3 ISO 1400

The ISO 14000 is a set of industry standards that provide practical tools for companies and organizations of all kinds looking to manage their environmental responsibilities.

ISO 14001:2015 and its auxiliary ISO 14006:2011 concentrate on the enhancement of environmental systems. The remaining standards in the family concentrate on strategies including life cycle analysis, labelling, audits, and messaging, in addition to environmental issues like climate change, loss of biodiversity, and depletion of natural resources. Benefits associated with ISO 1400 include risk management, cost reduction, and operational excellence.

4.4 Occupational Safety and Health Administration (OSHA)

In the absence of specific health and safety construction regulations, contractors should adhere to the Occupational Safety and Health Administration (OSHA) regulations. OSHA is an agency of the United States Department of Labour. OSHA's mission is to "assure safe and healthy working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education and assistance". The agency is also charged with enforcing a variety of whistle-blower statutes and regulations. OSHA's workplace safety inspections have been shown to reduce injury rates and injury costs without adverse effects to employment, sales, credit ratings, or firm survival. Regulations such as the use of Personal Protective Equipment (PPE), housekeeping, safety training and education, fall protection and working in confined space etc.

4.5 Government Departments

Government departments that will be involved with aspects of approval and permitting of this project include:

Department of Environmental Planning and Protection DEPP

The Department of Environmental Planning and Protection (DEPP) will review and approve the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for The Project. Monthly environmental reports will be submitted to DEPP.

Forestry Unit

The Forestry Unit will authorize and provide permits for harvesting and removal of protected trees.

Ministry of Public Works

The Ministry of Public Works will authorize and provide permits for activities and maintain physical infrastructure in the country.

Department of Physical Planning

The Department of Physical Planning will authorize and provide permits for activities such as excavation, filling, roadworks, and all construction activities.

Ministry of Finance

The Ministry of Finance will be responsible for the funding of the microgrid/solar farm project.

Ministry of Energy and Transport

The Ministry of Energy and Transport will authorize licenses for operation of the infrastructure and supervise the maintenance of microgrid networks.

5.0 PROJECT ALTERNATIVES

5.1 No Action Alternative

The "No Action" alternative would be to let The Project site remain in its present condition. This alternative will preserve the natural state of area; however, the benefit of having an additional energy generation facility in The Bahamas would not be realized. The development of a solar microgrid would significantly reduce the exorbitant electrical expenses caused by fuel import fees and subsequently pass them on to consumers. It would also increase the reliability of energy distribution within the country by offsetting load shedding while reducing greenhouse gas emissions.

5.2 Alternative Locations

There were no alternative locations considered for the Blue Hills Solar Microgrid project site. However, the Ministry of Finance has identified several ideal sites throughout New

Providence that can be used as areas to develop additional solar farms. As a result, this leaves room for the future development of more microgrids. This will further revitalize the energy sector and allow The Bahamas to meet the mandate set forth by the current governing body to ensure the country develops modern energy infrastructure that enhances energy generation capacity, and efficiency.

5.3 Alternative Technology

No alternative technology was suggested for the Blue Hills Solar Microgrid Project. This is because the PRU solar ground mount racking system proved to be the most efficient for the scope of the project.

6.0 ENVIRONMENTAL BASELINE ASSESSMENT

6.1 Biological Environment

6.1.1 Botanical Assessment

The vegetation on The Project site were investigated to record the existing natural environment Field studies were conducted on the 20th - 22nd and the 24th - 27th of June 2024.The purpose of the study was to map vegetation types, determine floristic diversity, identify the presence and abundance of invasive species and conduct a protected species survey in the areas of proposed works.

6.1.1.1 Methodology

Vegetation types were mapped and verified by walking along the interior and the perimeter of the site using existing footpaths, and surveyor transects. Vegetation Type taxonomy was based on Areces et al. (1999). Vascular plant species occurring in each vegetation type were recorded and used to compile a floral list (See Table 3). Plant taxonomy was based on Correll and Correll (1982). The presence, location, and abundance of vascular species listed under the National Invasive Species Strategy for The Bahamas (2013), and the Protected Trees Order (2021) were noted when encountered.

The primary objective of protected species potential estimations is to estimate the total protected species potential across the site as per DEPP regulations. The Department of Forestry requirements for conducting a protected species survey in The Bahamas stipulate that one (1) 0.1-acre plot must be surveyed for every ten (10) acres of vegetation to be impacted, assuming that the vegetation is homogenous across those ten (10) acres. To assess the relative abundance of protected species recorded, Google Earth software was used to select areas for nine (9) 66ft x 66ft square sampling plots on the site (See Figure 3). The plot was sized using a string line on a reel and a 100-meter measuring tape. Once the plot was established, the number of protected species observed within the plot was recorded (See Table 5). Logger's tape was used to determine the diameter at breast height of mature trees and a hypsometer was used to determine each tree's height. To avoid double counting or missing a plant, flagging tape was placed on individual plants when counted. In areas with a high number of small species,

inappropriate for flagging, the botanist counted per quadrant to avoid double counting or missing a plant.

6.1.1.2 Observations/Findings

6.1.1.2.1 Habitat Description

The terrestrial site spans ninety-two (92) acres and contains one (1) terrestrial ecosystem, Interior Upland. There are five (5) vegetation classes observed on the site, Dry Broadleaf Evergreen Forest, Mixed Forest, Pine Woodland, Human Altered Environment, and Inland Freshwater Wetland. The site topography can generally be described as flat with low-lying areas once a part of a swash system from Harold Pond within the interior and southern perimeter of the proposed project site. In addition to this, Pit Caves and solution holes are also present within the interior of the site.

Furthermore, Eolian ridges were observed on the northern (east-west ridge) and southern (north-south ridge) perimeters of the proposed site. Soil type can be described as limestone substrate throughout the site. Vegetation growth can be described as both primary growth in the undisturbed portions of the site and secondary growth in areas disturbed by human activity or natural disturbances.

6.1.1.2.1.1 Interior Upland

There are five (5) interior upland vegetation types observed on the site, Dry Broadleaf Evergreen Forest, Mixed Forest, Pine Woodland, Human Altered Environment, and Inland Freshwater Wetland.

6.1.1.2.1.1.1 Dry Broadleaf Evergreen Forest

Dry Broadleaf Evergreen Formations are interior upland vegetation types that consist of broadleaf deciduous plants on sandy and/or limestone substrate. These formations are classified by the height of trees and the presence of a well-defined canopy. A dry broadleaf evergreen forest is present in both the northeastern and southeastern sections of the proposed project site on Eolian ridges. It is composed of native botanical species such as *Canella winterana* (Wild Cinnamon), *Exothea paniculata* (Butterbough), and *Lysiloma sabicu* (Horseflesh). It also contains karst topography such as pit caves and solution holes.

Photo 1: *Coccoloba diversifolia-Guapira obtusata-Ardisia escallonioides* Forest Alliance in southeastern section of the project site.

Photo 2: *Solution hole observed in the DBEF on the project site.*

6.1.1.2.1.1.2 Mixed Forest Habitat

Mixed Forests are transitional areas between two (2) separate vegetation classes and contain both broadleaf deciduous plants and needle-leaved botanical species. A mixed forest is present within the interior of the site between the dry broadleaf evergreen forest and the pine woodland vegetation classes. It consists of species such as *Lasiacis divaricata* (Wild Bamboo Grass), *Psychotria ligustrifolia* (Smooth Wild Coffee), and *Swietenia mahoganii* (West Indian Mahogany).

Photo 3: *Gymnanthes lucidus-Pinus caribaea var bahamensis-Coccoloba diversifolia* Mixed Forest Alliance.

6.1.1.2.1.1.3 Pine Woodland Habitat

Pine Woodland or Pine Barren habitats are interior upland vegetation types referred to as 'fire climax communities' due to the predominant *Pinus caribaea var bahamensis* (Bahamian Pine) dependency on fire for survival. This vegetation type also consists of a shrub layer of broadleaf deciduous plants on limestone substrate. A pine woodland habitat is present within the site's interior and consists of species such as *Diospyros crassinervis* (Featherbed), *Ernodea littoralis* (Golden Creeper), and *Passiflora bahamensis* (Bahamian Passionflower).

Photo 4: Inland Seasonal Wetland

6.1.1.2.1.1.4 Human Altered Environment

Human-altered environments are defined as areas in which the natural habitat has been altered or degraded by human activities. These areas consist of mainly regenerating, pioneer, and invasive species. There are two (2) types of Human Altered Environment Habitat observed on the project site, *Sporobulus domingensis-Leucaena leucocephala-Rhynchospora floridensis* Scrubland Alliance, and *Schinus terenbinthifolius-Sphagneticola trilobata-Terminalia catappa* Forest Alliance.

***Sporobulus domingensis-Leucaena leucocephala- Rhynchospora floridensis* Scrubland Alliance**

This vegetation class is present on the edges of the intact pine woodland and dry broadleaf evergreen forest. Plants are 1-3ft in height and consists of species such as, *Linum bahamense* (Bahama Flax), and *Scaevola taccada* (White Inked Berry).

Photo 5: *Sporobulus domingensis-Leucaena leucocephala-Rhynchospora floridensis* Scrubland Alliance.

***Schinus terenbinthifolius-Sphagneticola trilobata-Terminalia catappa* Forest Alliance**

This vegetation class is present in the southern section of the proposed project site and is inundated with illegal dumping & seasonal flooding. Trees are greater than 20ft in height and consist of species such as *Casuarina equisetifolia* (Australian Pine), *Cocos nucifera* (Coconut Palm), and *Terminalia catappa* (West Indian Almond).

Photo 6: *Schinus terenbinthifolius-Sphagneticola trilobata-Terminalia catappa Forest Alliance*

6.1.1.2.1.1.5 Inland Freshwater Pond/Wetland

Inland freshwater wetlands are inland ponds characterized by standing freshwater and hydrophytic plants that are replenished through seasonal rains. An inland freshwater wetland is located within the western section of the site and contains hydrophytic botanical species such as *Cladium mariscus* (Saw Grass), and *Sabal palmetto* (Sabal Palm). This vegetation class is bordered by a small section of pine woodland on its eastern perimeter and a human-altered environment habitat on its northern and southern perimeters.

Photo 7: Inland Freshwater Wetland

6.1.1.2.2 Vegetative Map

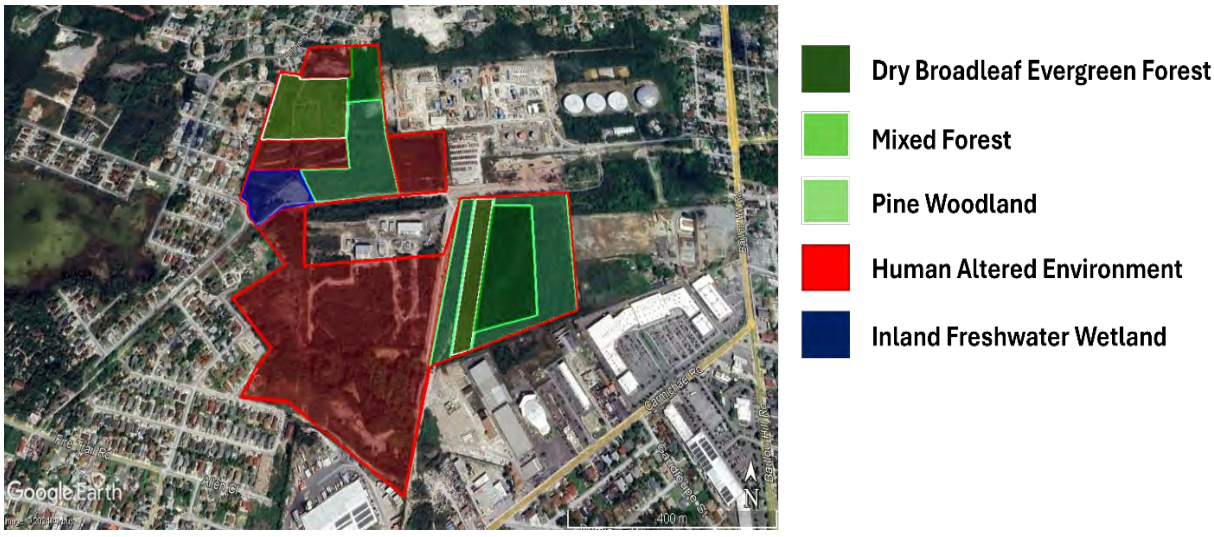

Figure 2: The Blue Hills Solar Microgrid Project Vegetative Map

6.1.1.2.3 Vascular Plant Diversity

Species diversity and richness on the site are in line with what is expected of a site that consists of one (1) terrestrial ecosystem, five (5) vegetation classes, and substantial clearing due to human activities and previous natural disturbances. A total of one hundred and eight (108) species were recorded on the site, including eleven (11) invasive species and nineteen (19) protected species (See Table 3). * Denotes protected species observed on the site.

Table 3: Vascular Plant Species recorded on The Project site

Table 3 Key: **DBEF** = Dry Broadleaf Evergreen Forest, **MF** = Mixed Forest**, PW** = Pine Woodland, IFP = Inland Freshwater Pond, **HAE** = Human-Altered Environment

Family	**Botanical Name**	**Common Name**	**Location**				
			DBEF	**MF**	**PW**	**IFP**	**HAE**
Fabaceae	*Acacia choriophylla*	Cinnecord	✓	✓	✓		✓
Pteridaceae	*Acrostichum danaeifolium*	Leather Fern				✓	
Fabaceae	*Albizia lebbeck*	Woman's Tongue					✓
Arecaceae	*Archonophoenix alexandrae*	Alexander Palm					✓
Primaulaceae	*Ardisia escallonioides*	Marlberry	✓				
Papaveraceae	*Argemone Mexicana*	Mexican Poppy					✓
Asteraceae	*Baccharias dioica*	Brooms Bush					✓
Polygalaceae	*Badiera oblongata*	Oblong Polygala	✓				
Fabaceae	*Bidens alba*	Beggar's Tick	✓		✓		✓
Orchidaceae	*Bletia purpurea**	Pineyard Pink			✓		✓
Boraginaceae	*Bourerria succulenta*	Strong Back	✓	✓	✓		✓
Burseraceae	*Bursera simarouba**	Gumbo Limbo	✓		✓		✓
Malpighiaceae	*Byrsonima lucida*	Guiana Berry	✓	✓	✓		
Fabaceae	*Caesalpinia bahamensis**	Bahama Brasilletto	✓		✓		✓
Fabaceae	*Canavalia rosea*	Bay Bean					✓
Canellaceae	*Canella winterana**	Cinnamon Bark	✓	✓			
Caricaceae	*Carica papaya*	Paw Paw					✓

Lauraceae	*Cassytha filiformis*	Love Vine	✓	✓	✓		✓
Casurinaceae	*Casuarina equisetifolia*	Australian Pine					✓
Rubiaceae	*Chioccoca alba*	Snowberry	✓	✓			
Rubiaceae	*Chioccoca parvifolia*	Pineland Snowberry			✓		
Chrysobalanaceae	*Chrysobalanus icaco*	Coco Plum		✓		✓	✓
Sapotaceae	*Chrysophylum oliviforme*	Satin Leaf	✓	✓	✓		
Cyperaceae	*Cladium mariscus*	Saw Grass				✓	
Fabaceae	*Clitoria ternatea*	Blue Pea					✓
Tiliaceae	*Corchorus hirsutus*	Wooly Booger					✓
Celestraceae	*Crosspetalum rhacoma*	Poison Cherry	✓				
Lauraceae	*Damburneya coriacea*	Lancewood	✓	✓			
Fabaceae	*Delonix regia*	Royal Poinciana					✓
Ebenaceae	*Diospyros crassinervis*	Featherbed	✓	✓			
Putranjivaceae	*Drypetes lateriflora*	Guiana Plum	✓				
Apocynaceae	*Echites umbellatus*	Wild Potato	✓	✓	✓		✓
Poaceae	*Elocharis sp.*	Elocharis sp				✓	
Rubiaceae	*Erithalis fruticose*	Black Torch	✓	✓			✓
Rubiaceae	*Ernodea littoralis*	Golden Creeper			✓		
Erythroxylaceae	*Erythroxylum aerolatum*	False Cocaine	✓	✓	✓		
Myrtaceae	*Eugenia axillaris*	Red Stopper	✓	✓	✓		
Myrtaceae	*Eugenia foetida*	Spanish Stopper	✓				
Orchidaceae	*Eulophia maculate*	African Spotted Orchid	✓				
Gentianaceae	*Eustoma exaltatum*	Marsh Gentian				✓	✓
Sapindaceae	*Exothea paniculata*	Butterbough	✓	✓			

Fabaceae	*Galactia spiciformis**	Milk Pea	✓	✓			✓
Nyctaginaceae	*Guapira discolor**	Small leaved Blolly	✓	✓	✓		
Nyctaginaceae	*Guapira optusata*	Big Leaf Blolly	✓	✓	✓		
Rubiaceae	*Guettarda scabra*	Rough Velvet Seed	✓		✓		✓
Euphorbiaceae	*Gymnanthes lucidus*	Crabwood	✓	✓	✓		
Boraginaceae	*Heliotropium currasicum*	Rooster Comb					✓
Sapindaceae	*Hyperlate trifoliata*	White Iron Wood	✓				
Convolvulaceae	*Ipomoea indica*	Morning Glory					✓
Convolvulaceae	*Jacquemontia havanensis*	Havana Vine			✓		
Oleaceae	*Jasminum Fluminense*	Jasmine vine					✓
Asteraceae	*Koanophllon villosum*	Jack-Ma-Da	✓	✓	✓		✓
Verbenaceae	*Lantana involucrate*	Wild Sage	✓	✓	✓		✓
Poaceae	*Lasiacis divaricate*	Wild Bamboo	✓		✓		
Asteraceae	*Lepidaploa arbuscula**	Vernonia			✓		✓
Fabaceae	*Leucaena leucocephala*	Jumbey	✓				✓
Arecaceae	*Leucothrinax morrisii**	Thatch Palm	✓	✓	✓		✓
Linaceae	*Linum bahamense**	Bahama Flax			✓		✓
Fabaceae	*Lysiloma latisliquum**	Wild Tamarimd		✓	✓		✓
Fabaceae	*Lysiloma sabicu**	Horse Flesh	✓	✓			
Anacardiaceae	*Magnifera indica*	Mango					✓
Euphorbiaceae	*Manihot esculenta*	Cassava					✓
Poaceae	*Megathyrsus maximus*	Guinea Grass					✓
Sapindaceae	*Melicoccus bijugatus*	Guinep					✓
Anacardiaceae	*Metopium toxiferum*	Poison wood	✓	✓	✓		

Rubiaceae	*Morinda citrifolia*	Noni					✓
Fabaceae	*Mucuna pruiens*	Monkey Tamarind					✓
Myrtaceae	*Myrcia zuzygium*	Myrtle of the River	✓	✓	✓		
Passifloraceae	*Passiflora bahamensis**	Bahamian Passionflower			✓		
Passifloraceae	*Passiflora suberosa*	Juniper Berry	✓	✓			
Lamiaceae	*Petitia domingensis*	Fowl Berry	✓	✓	✓		
Phyllanthaceae	*Phyllanthus epiphyllanthus*	Rock Bush	✓	✓	✓		✓
Myrtaceae	*Pimenta dioica*	All Spice					✓
Pinaceae	*Pinus caribaea var. bahamensis**	Bahamian Pine		✓	✓		
Nyctaginaceae	*Pisonia aculeata*	Cat Claw	✓	✓			
Fabaceae	*Pithecellobium keyense*	Rams Horn	✓	✓	✓		✓
Rubiaceae	*Psychotria ligustrifolia*	Smooth Wild Coffee	✓	✓	✓		
Dennstaedtiaceae	*Pteridium aquilinum*	Bracken Fern		✓	✓		✓
Rubiaceae	*Randia aculeata*	Box Briar	✓	✓			
Rhamnaceae	*Reynosia septentrionalis*	Darling Plum	✓	✓			
Cyperaceae	*Rhynchospora floridensis*	White-head Rush			✓		✓
Euphorbiaceae	*Ricinus communis*	Castor Bean Plant					✓
Arecaceae	*Sabal palmetto**	Sabal Palm			✓	✓	
Goodeniaceae	*Scaevola taccada*	White Inked berry					✓
Anacardiaceae	*Schinus terebinthifolius*	Brazilian Pepper Berry					✓
Cyperaceae	*Scleria lithosperma*	Scleria	✓	✓			
Fabaceae	*Senna chapmanii**	Stinking Pea					✓
Sapotaceae	*Sideroxylon foetidissimum*	Mastic	✓	✓			
Sapotaceae	*Sideroxylon salicifolium*	Willowbustic	✓	✓			
Simaroubaceae	*Simarouba glauca*	Paradise tree	✓	✓			

Smilacaceae	*Smilax havanensis*	Chaney Briar	✓	✓	✓		
Solanaceae	*Solanum erianthum*	Poke Weed					✓
Asteraceae	*Sphagneticola trilobata*	Wedelia					✓
Verbenaceae	*Starchytarpheta jamaicensis*	Blue Potterweed					✓
Scrophulariaceae	*Stemodia maritima*	Pond Bush				✓	✓
Meliaceae	*Switenia mahogani**	West Indian Mahogany	✓	✓			
Bignoniaceae	*Tabebuia bahamensis*	Five Finger	✓	✓	✓		
Combretaceae	*Terminalia catappa*	West Indian Almond					✓
Sapindaceae	*Thouinia discolor**	Quick Silver Bush		✓	✓		
Bromeliaceae	*Tillandsia ultriculata*	Wild Pine	✓	✓			
Boraginaceae	*Tournefortia volubilis*	Soldier Vine	✓	✓	✓		
Commelinaceae	*Tradescantia spathacea*	Graveyard Lily					✓
Celtidaceae	*Trema lamarckianum*	Pain-In-Back	✓	✓	✓		✓
Turneraceae	*Turnera ulmifolia**	Bahamian Buttercup					✓
Typhaceae	*Typha domingensis*	Cattail				✓	
Boraginaceae	*Varronia bahamensis**	Cats Tongue	✓	✓	✓		✓
Sterculiaceae	*Waltheria bahamensis*	Bahamian Walteria		✓	✓		✓
Sterculiaceae	*Waltheria indica*	Sleepy Morning		✓	✓		✓

6.1.1.2.4 Invasive Species

Eleven (11) invasive species were observed on the site. These species are outlined below along with their occurrence, abundance on the site, and recommendation for control (See Table 4). Species that are recommended for control are species whose richness and distribution are too enormous to eradicate but whose spread can be stifled through various mitigative measures. Whereas species recommended for eradication are species whose richness and distribution are relatively small and hence can be eradicated.

Table 4: Invasive species recorded on the MOF Proposed Blue Hill Solar property site, New Providence, The Bahamas

Species	**Occurrence and Abundance**	***Recommendations**
Albizia lebbeck, Woman's Tongue.	1-20ft seedlings and 20-25ft mature trees within the HAE on the proposed project site.	Control
Casuarina equisetifolia, Australian Pine.	1-20ft seedlings and 20-50ft tall trees within the HAE on the proposed project site.	Control
Impomoea indica, Morning Glory.	Clusters of vines are distributed sporadically throughout the HAE on the project site.	Control
Jasminum fluminense, Jasmine Vine.	Clusters of vines are distributed sporadically throughout the HAE on the project site.	Not Listed
Leucaena leucocephala, Jumbey.	1-6ft tall trees within the HAE and DBEF on the proposed project site.	Control
Megathyrsus maximus, Guinea Grass.	1-3ft tall plants within the HAE on the proposed project site.	Not Listed
Mucuna pruriens, Monkey Tamarind.	Clusters of vines are distributed sporadically throughout the HAE on the project site.	Eradication
Ricinus communis, Castor Bean Plant.	1-8ft tall plants within the HAE on the proposed project site.	Control
Scaevola taccada, White Inked Berry.	1-3ft tall plants within the HAE on the proposed project site.	Eradication
Schinus terebinthifolius, Brasillian Pepper Berry.	1-20ft seedlings and 20-25ft trees within the HAE on the proposed project site.	Eradication
Sphagneticola trilobata, Wedelia.	Clusters of vines are distributed sporadically throughout the HAE on the project site.	Control

*Recommendations as per the National Invasive Species Strategy for the Bahamas, 2013

Photo 8: *Schinus terebinthifolius* (Brasillian Pepper Berry).

6.1.1.2.5 Protected Species

There were nineteen (19) protected species observed on the proposed project site. Eighteen (18) are listed in the Forestry Act Declaration of Protected Trees Order 2021 and one (1) is listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna & Flora (CITES).

The Forestry Act Declaration of Protected Trees Order 2021 lists one hundred and twenty-seven (127) vascular plant species as protected. Eighty-six (86) species are listed as Endemic, Endangered, or Threatened and forty-one (41) are listed as Cultural or Historical and Economic. Endemic species are species that are native and restricted to the archipelago, island groupings, or specific islands. Cultural or historical species are species that are of historical or cultural importance such as species utilized for boat building and straw work. Nineteen (19) species listed on the Forestry Act Declaration of Protected Trees Order 2021 were recorded at the site (See Table 5).

Endemic, Endangered, or Threatened Protected Trees

There were five (5) botanical species observed on the site that are listed under the subsection of Endemic or Endangered or Threatened Species (Schedule 1) in the Act. These species are *Linum bahamense* (Bahama Flax), *Lepidaploa arbuscula* (Vernonia), *Passiflora bahamensis* (Bahama Passionflower), *Thouinia discolor* (Quicksilver Bush), and *Varronia bahamensis* (Cat's Tongue).

Cultural, Historical, or Economic Protected Trees

Thirteen (13) of the nineteen (19) species, *Bursera simarouba* (Gum Elemi), *Caesalpinia bahamensis* (Bahama Brasiletto), *Canella winterana* (Wild Cinnamon), *Galactia spiciformis* (Spiciform Milk Pea), *Guapira discolor* (Small leaved Blolly), *Leucothrinax morrisii* (Thatch Palm), *Lysiloma latisiliquum* (Wild Tamarind), *Lysiloma sabicu* (Horseflesh), *Pinus caribaea var bahamensis* (Bahamian Pine), *Sabal palmetto* (Sabal Palm), *Senna chapmanii* (Bahama Senna), *Switenia mahogani* (West Indian Mahogany),

and *Turnera ulmifolia* (Bahamian Buttercup) are listed under the subsection Cultural or Historical and Economic (Schedule 2) in the Act.

6.1.1.2.5.1.1 International Legislation, Policy & Agreements

The Convention on International Trade in Endangered Species of Wild Fauna & Flora (CITES) is a transnational treaty to conserve and protect endangered flora and fauna from the threats of international trade. CITIES have three (3) appendices (I, II, III) that contain lists of species that are provided with distinct types of protection from overexploitation. One (1) orchid species, *Bletia purpurea* (Pineyard Pink) are listed in CITIES Appendix II. This listing prohibits the harvesting and trade of native orchids.

Table 5: Protected Species recorded on the proposed Blue Hills Solar Microgrid Project site

#	**Species Recorded**		**Location**
	Botanical Name	**Common Name**	
1	*Bursera simarouba*	Gum Elemi	1-20ft tall seedlings and saplings within the PW, MF, & DBEF on the site. 20-25ft mature trees within the DBEF & MF on the proposed project site.
2	*Caesalpinia bahamenis*	Bahama Brasiletto	1-4ft tall mature trees within the PW on the project site.
3	*Canella winterana*	Wild Cinnamon	1-6ft tall seedlings and saplings within the DBEF on the project site.
4	*Galactia spiciformis*	Spiciform Milk Pea	Clusters of vines are distributed sporadically throughout the PW on the project site.
5	*Guapira discolor*	Small-leaved Blolly	1-6ft tall seedlings and saplings within the DBEF, PW, & MF on the proposed project site.
6	*Leucothrinax morrisii*	Thatch Palm	12-31in tall seedlings in addition to 31 in-96 in (8ft) tall mature trees within the PW on the project site.
7	*Lepidaploa arbuscula*	Vernonia	1-3ft tall trees within the PW on the project site.
8	*Linum bahamense*	Bahama Flax	6in-12in tall trees within the HAE and PW on the project site.
9	*Lysiloma latisiliquum*	Wild Tamarind	1-20ft seedlings and saplings within the DBEF,

			PW, and MF on the project site. 20-25ft mature trees within the DBEF, MF, and PW on the project site.
10	*Lysiloma sabicu*	Horseflesh	1-20ft seedlings and 20-25ft tall mature trees within the DBEF on the project site.
11	*Passiflora bahamensis*	Bahamian Passionflower	Clusters of vines are distributed sporadically throughout the PW on the project site.
12	*Pinus caribaea var bahamensis*	Bahamian Pine	1-3ft tall seedlings, 3-20ft tall saplings, and 20-50ft tall mature trees within the PW on the project site.
13	*Sabal palmetto*	Sabal Palm	12-31in tall seedlings in addition to 31 in-84 in (7ft) tall mature trees within the DBEF, PW and MF on the project site.
14	*Senna chapmanii*	Bahama Senna	1-3ft tall herbaceous plants within the human-altered environment and PW on the project site.
15	*Swietenia mahogani*	West Indian Mahogany	1-20ft tall seedlings within the PW, MF, and DBEF on the project site. 20-25ft tall trees, with >12 in DBH within the DBEF & MF on the project site.
16	*Thouinia discolor*	Quicksilver Bush	1-6ft tall trees within the PW on the project site.
17	*Turnera ulmifolia*	Bahamian Buttercup	1-3ft tall herbaceous plants within the human-altered environment and PW on the project site.
18	*Varronia bahamensis*	Cat's Tongue	1-6ft tall herbaceous plants within the human-altered environment, DBEF, MF, and PW on the project site.

Photo 9: *Turnera ulmifolia* (Bahamian Buttercup).

6.1.1.2.5.1.2 Protected Species Count

Nine (9) randomly selected plots were established to estimate the number of protected species on the project site (See Figure 3). The number of protected species per plot was determined using plot sampling methodology (See Table 6). The estimated number of individual protected species across the entire project area was also determined by taking into account the average number of trees per acre and multiplying the subsequent quotient by the total acres surveyed (See Table 7).

Figure 3: Protected Species Plot Map

Table 6: Protected species survey plot results from the proposed Coral Solar Microgrid Project site, New Providence, The Bahamas

Plot	Location	Species	#
1	25°02'22.07"N 77°21'36.12"W	*Bursera simarouba,* Gum Elemi	25
		Canella winterana, Cinnamon Bark	2
		Leucothrinax morrisii, Thatch Palm	40
		Swietenia mahogani, West Indian Mahogany	5
2	25°02'18.79"N 77°21'39.37"W	*Bursera simarouba,* Gum Elemi	4
		Leucothrinax morrisii, Thatch Palm	29
		Pinus caribaea var. bahamensis, Bahamian Pine	23
		Swietenia mahogani, West Indian Mahogany	1
		Thouinia discolor, Quicksilver Bush	1
		Turnera ulmifolia, Bahamian Buttercup	5
		Varronia bahamensis, Cat's Tongue	8
3	25°02'15.61"N 77°21'38.84"W	*Bursera simarouba,* Gum Elemi	2
		Caesalpinia bahamensis, Bahama Brasiletto	18
		Leucothrinax morrisii, Thatch Palm	72
		Pinus caribaea var. bahamensis, Bahamian Pine	16
		Sabal palmetto, Sabal Palm	1
		Varronia bahamensis, Cat's Tongue	22
4	25°02'12.47"N 77°21'34.71"W	*Caesalpinia bahamensis,* Bahama Brasiletto	31
		Lepidaploa arbuscula, Vernonia	1

		Leucothrinax morrisii, Thatch Palm	89
		Pinus caribaea var. bahamensis, Bahamian Pine	73
		Thouinia discolor, Quicksilver Bush	4
		Varronia bahamensis, Cat's Tongue	5
5	25°02'16.93"N 77°21'43.39"W	*Bursera simarouba,* Gum Elemi	17
		Caesalpinia bahamensis, Bahama Brasiletto	3
		Leucothrinax morrisii, Thatch Palm	31
		Pinus caribaea var. bahamensis, Bahamian Pine	12
		Thouinia discolor, Quicksilver Bush	14
6	25°02'07.23"N 77°21'25.00"W	*Bursera simarouba,* Gum Elemi	11
		Leucothrinax morrisii, Thatch Palm	27
		Pinus caribaea var. bahamensis, Bahamian Pine	7
		Sabal palmetto, Sabal Palm	3
		Swietenia mahogani, West Indian Mahogany	1
7	25°02'03.53"N 77°21'25.19"W	*Bursera simarouba,* Gum Elemi	11
		Canella winterana, Cinnamon Bark	1
		Galactia spiciformis, SpiciForm Milk Pea	1
		Leucothrinax morrisii, Thatch Palm	25
		Swietenia mahogani, West Indian Mahogany	2
8	25°01'58.06"N 77°21'34.37"W	No protected species were observed.	0
9	25°01'59.37"N 77°21'38.77"W	No protected species were observed.	0

Table 7: Estimated number of protected species potential on the proposed Blue Hills Solar Microgrid Project site, New Providence, The Bahamas

Protected Species	Total # Recorded	Average per survey plot (#/9)	Total potential per acre (average x 10)	Total potential on site (# per acre x 92)
Bursera simarouba, Gum Elemi	70	7.78	77.8	7,158
Canella winterana, Cinnamon Bark	3	0.333	3.33	306
Caesalpinia bahamensis, Bahama Brasiletto	52	5.78	57.8	5,318
Galactia spiciformis, SpiciForm Milk Pea	1	0.111	1.11	102
Lepidaploa arbuscula, Vernonia	1	0.111	1.11	102
Leucothrinax argentata, Thatch Palm	313	34.77	347.7	31,996
Pinus caribaea var. bahamensis, Bahamian Pine	131	14.55	145.5	13,391
Sabal palmetto, Sabal Palm	3	0.333	3.33	306
Swietenia mahogani, West Indian Mahogany	9	1	10	920
Thouinia discolor, Quicksilver Bush	19	2.11	21.1	1,942

Turnera ulmifolia, Bahamian Buttercup	5	0.555	5.55	511
Varronia bahamensis, Cat's Tongue	35	3.88	38.8	3,578

While Table 7 provided estimated calculations based on the results of the sampling plots, the actual (more likely) abundance of protected species throughout the site might be lower based on observations as these species were only noted in the intact natural vegetated sections of the site due to prior disturbances.

6.1.2 Avian Assessment

An avian survey was conducted to identify the presence, abundance, and habitat utilization of avian species within the boundaries of the site.

6.1.2.1 Methodology

The assessment comprised 8 hours of active avian and ecological observations. Field studies consist of a summer avian survey (April-August), conducted on the 20th- 22nd and the 24th-27th of May 2024 between 8:00 am and 10:00 am. The avifauna of the area was assessed and recorded by walking along the perimeter of the site and within the interior of the site by utilizing established footpaths and roadways. Avifauna and fauna taxonomy is based on Currie et al (2019). Species numbers were recorded in the abundance categories, Single (1), Few (2-10), and Many (11-100). Species recorded were compiled for final abundance estimates. Status is based on the International Union for Conservation of Nature (IUCN).

6.1.2.2 Observations/Findings

6.1.2.2.1 Species Diversity

Nineteen (19) species were recorded during the summer avian survey (See Table 8).

Table 8: Avifauna observed on the proposed Blue Hills Solar Microgrid Project site

TABLE 8 KEY:

Range	Status
PRB = Permanent Resident Breeding	**LC =** Least Concern (Conservation-IUCN)
SRB = Summer Resident Breeding	**NT** = Near Threatened (Conservation-IUCN)
SRN = Summer Resident Non-Breeding	**IUCN =** International Union of Conservation of Nature
E = Endemic Species	
e = Endemic Subspecies	
I = Introduced Species	

Family	Scientific Name	Common Name	Master Observation	Range/ Conservation Status
Aramidae	*Aramus guarauna*	Limpkin	Single	PRB/LC
Ardeidae	*Butorides virescens bahamensis*	Green Heron	Single	PRB/e/LC
Trochilidae	*Calliphlox evelynae*	Bahama Woodstar	Few	PRB/E/LC
Charadriidae	*Charadrius vociferus*	Kill Deer	Few	PRB/LC
Caprimulgidae	*Chordeiles gundlachii*	Antillean Nighthawk	Single	SRB/LC
Thraupidae	*Coereba flaveola bahamensis*	Bananaquit	Few	PRB/LC
Columbidae	*Columbina passerina bahamensis*	Common Ground-Dove	Few	PRB/e/LC
Cuculidae	*Crotophaga ani*	Smooth-billed Ani	Few	PRB/LC
Falconidae	*Falco sparverius saprveroides*	American Kestrel	Single	PRB/LC
Laridae	*Leucophaeus atricilla*	Laughing Gull	Few	PRB/LC
Mimidae	*Mimus polyglottos polyglottos*	Northern Mockingbird	Few	PRB/LC
Passeridae	*Passer domesticus*	House Sparrow	Many	PRB/I/LC
Columbidae	*Patagioenas leucocephala*	White-crowned Pigeon	Many	PRB/NT
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	Few	PRB/LC
Columbidae	*Streptopelia decaocto*	Ring-necked Dove	Few	PRB/I/LC
Tyrannidae	*Tyrannus dominicensis*	Gray Kingbird	Few	SRB/LC
Vireonidae	*Vireo altiloquus*	Black-whiskered Vireo	Few	SRN/LC
Vireonidae	*Vireo crassirostris crassirostris*	Thick-billed Vireo	Few	PRB/e/LC
Columbidae	*Zenaida aurita*	Zenaida Dove	Single	PRB/LC

6.1.2.2.2 Range

A species' range is the geographic areas where the birds can be consistently found, e.g., migrant birds have seasonal ranges while restricted range species remain on the same island or in the same region year-round.

6.1.2.2.3 Permanent Resident Breeding

Permanent Resident breeding (PRB) species refers to the resident species that live and breed year-round throughout the Bahama Islands. There were eleven (16) PRB species (approximately 84%) of the species recorded during the survey.

6.1.2.2.4 Summer Resident Breeding

Summer Resident Breeding (SRB) species refers to summer migrants from North & South America that utilize the Bahama Islands as their breeding/nesting grounds. Two (2) of the species recorded on the site (approximately 11%) were SRB.

6.1.2.2.5 Summer Resident Non-Breeding

Summer Resident Non-Breeding (SRN) species refers to the summer migrants to the Bahama Islands from North and South America. One (1) species recorded on the site (approximately 5%) was SRN.

6.1.2.2.6 Endemic Species and Subspecies

Endemic species and subspecies are birds that exist only in The Bahamas. There was one (1) endemic species, *Calliphlox evelynae* (Bahama Woodstar), and three (3) endemic subspecies observed on the site, *Butorides virescens bahamensis* (Green Heron), *Columbina passerina bahamensis* (Common Ground-Dove), and *Vireo crassirostris crassirostris* (Thick-billed Vireo) approximately 21% of the species recorded.

6.1.2.2.7 Introduced Species

Introduced species are birds that were introduced to The Bahamas due to the illegal animal trade or human error. There were two (2) introduced species (approximately 11%) observed on the project site.

6.1.2.2.8 Conservation Status

6.1.2.2.8.1 Protected Species

All species observed during the site assessment are protected under the Wild Birds Protection Act Chapter 249 (Statute Law of The Bahamas).

6.1.2.2.8.2 Endangered Species

None of the species recorded are classed as endangered.

6.1.2.2.8.3 Habitat Utilization

Avifauna was observed utilizing a myriad of habitats. There was no feeding observed on the project site but the site does contain species such as *Bursera simarouba* (Gum Elemi), *Bourerria succulenta* (Strongback), and *Leucothrinax morrisii* (Thatch Palm) that contain flowers, fruits, and buds that can provide and attract food for avifauna. There was no

nesting observed on the proposed project site but *Zenaida aurita* (Zenaida Dove) was observed collecting nesting material. The site does provide seasonal habitats utilized by wading birds (Inland Freshwater Wetland/Pond & Seasonal Ponds) but does not provide habitats for sea birds (isolated rocks, intertidal zone). Additional avian field studies repeated over a period are likely to record other species on the site, these species would utilize the site for perching, nesting, and feeding.

6.1.2.3 Additional Observations/Findings

Terrestrial ecosystems support a myriad of other fauna besides avifauna. These species depend on and aid in the overall health of the ecosystem. The proposed project site contains reptiles, amphibians, mollusks (gastropoda), and a myriad of arthropods (arachnids, insects, crustaceans, and hymenopterans) see table 9 below.

Table 9: Additional terrestrial fauna observed on the proposed Blue Hills Solar Microgrid Project site, New Providence, The Bahamas

Family	Scientific Name	Common Name
Nyphalidae	*Anartia jatrophae guantanamo*	White Peacock
Polychrotidae	*Anolis distichus distichus*	Bark Anole
Polychrotidae	*Anolis sagrei ordinatus*	Cuban Brown Anole
Araneidae	*Argiope argentata*	Silver Argiope
Bulimulidae	*Bulimulus sp.*	No Common Name
Cerionidae	*Cerion spp*	Peanut Snail
Colubridae	*Cubophis vudii vudii*	Brown Racer snake
Lycaenidae	*Cyclargus thomasi*	Thomas Blue Butterfly
Nyphalidae	*Danaus plexippus megalippe*	Monarch Butterfly
Cicadidea	*Diceroprocta bonhotei*	Bahamian Cicada
Nyphalidae	*Dryas iulia carteri*	Julia
Bulimulidae	*Drymaeus multilineatus*	Lined Tree Snail
Nyphalidae	*Euptoieta hegesia hegesia*	Mexican Fritillary (Butterfly)
Araneidae	*Gasteracantha cancriformis*	Crab Spider
Nyphalidae	*Heliconius charithonia ramsdeni*	Zebra Heliconian
Cepolidae	*Hemitrochus spp*	Sea Grape Snail
Nyphalidae	*Junonia evarete*	Caribbean Buckeye Butterfly
Tetragnathidae	*Leucauge argyra*	Long Jawed Orb Weaver
Araneidae	*Nephila clavipes*	Golden Silk Orb Weaver
Hesperidae	*Papilo andraemon*	Bahamian Swallowtail
Pieridae	*Phoebis sennae sennae*	Cloudless Sulphur
Vespidae	*Polistes major*	Paper Wasp
Hesperidae	*Polygonus leo histrio*	Hammock Skipper
Procyonidae	*Procyon lotor*	Raccoon

Ranidae	*Rana grylio*	Pig Frog
Rhinotermitidae	*Reticulitermes spp*	Subterranean Termite
Veronicellidae	*Sarasinula plebeian*	Caribbean Leatherleaf Slug
Formicidae	*Solenopsis Invicta*	Red Imported Fire Ant
Hesperidae	*Urbanus proteus domingo*	Long Tailed Skipper

Photo 10: *Nephila clavipes* (Golden Silk Orb Weaver)

6.1.2.4 Endemic Fauna

Endemic species and subspecies are fauna that exist only in The Bahamas. There was one (1) endemic fauna, *Cubophis vudii vudii* (Brown Racer) observed on the proposed project site.

Photo 11: *Cubophis vudii vudii* (Brown Racer)

6.1.2.5 Invasive Fauna

There was one (1) invasive fauna observed on the proposed project site, *Procyon lotor* (Raccoon). This species is recommended for eradication in The Bahamas Invasive Species Strategy 2013.

6.2 Physical Environment

6.2.1 Topography

Site topography can be described as flat within the interior and southern perimeter exclusive of the Eolian ridges on the northern (east-west ridge) and southern (north-south ridge) perimeters of the property boundary (See Photo 12). Low-lying areas within the interior and along the southern perimeter would have previously been a part of the swash system for Harold Pond (west of the project site) and contain an inland freshwater wetland with seasonal flooding. Additionally, Pit Caves and solution holes were also present within the interior of the proposed project site.

The property elevation is on average with the site being approximately thirty (30) feet Above Sea Level (ASL). Additionally, there is a network of historic wells located throughout the site that support its own unique mini-ecosystem terrestrial species and other wildlife located on The Project Site. These wells provide essential flood drainage for nearby residential neighbourhoods. Special efforts will be made to ensure construction will not negatively impact the surrounding vegetation.

Photo 12: Section of Eolian ridge on the northern perimeter of the proposed site

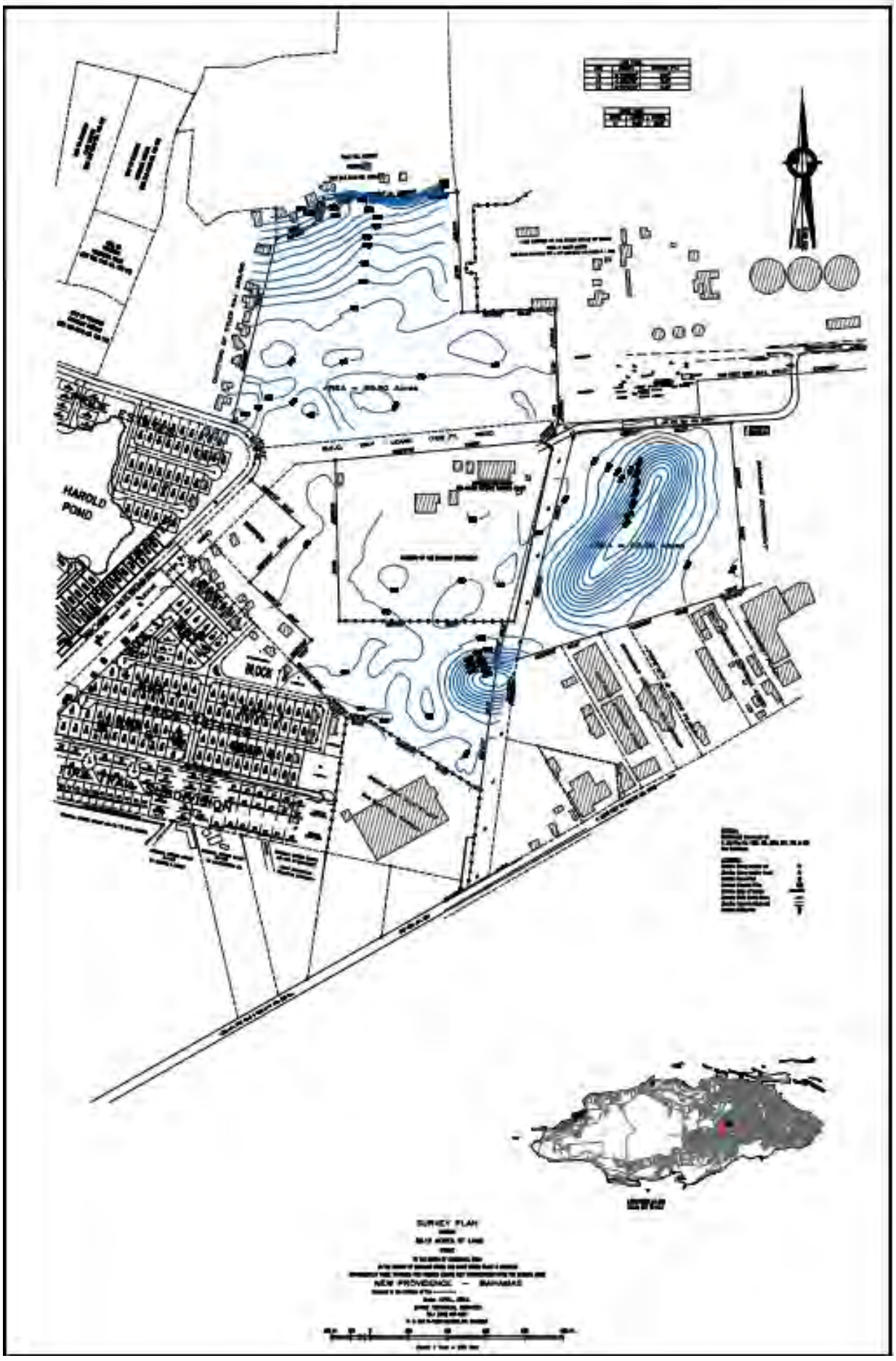

Figure 4: Topographic Map of The Project Site

6.2.2 Soil Quality

Given the topography of the proposed Project site, soil type can be described as limestone substrate. Quality of the soil was observed to be in good condition and depicted the typical parameters of a karst environment. In addition to this, soil quality parameters were observed to be within normal range.

6.2.3 Water Resources

Wellfields are located throughout the island of New Providence and was historically used to supply freshwater to residents (See Figure 5). Due to the high population density, New Providence's water supplied is heavily supplemented by ground water barged from North Andros and/or potable water generated by a Seawater RO Plant (US Army Corp of Engineers, 2004). Approximately, three quarters (3/4) of New Providence's potable water supply is derived from North Andros and RO (US Army Corp of Engineers, 2004).

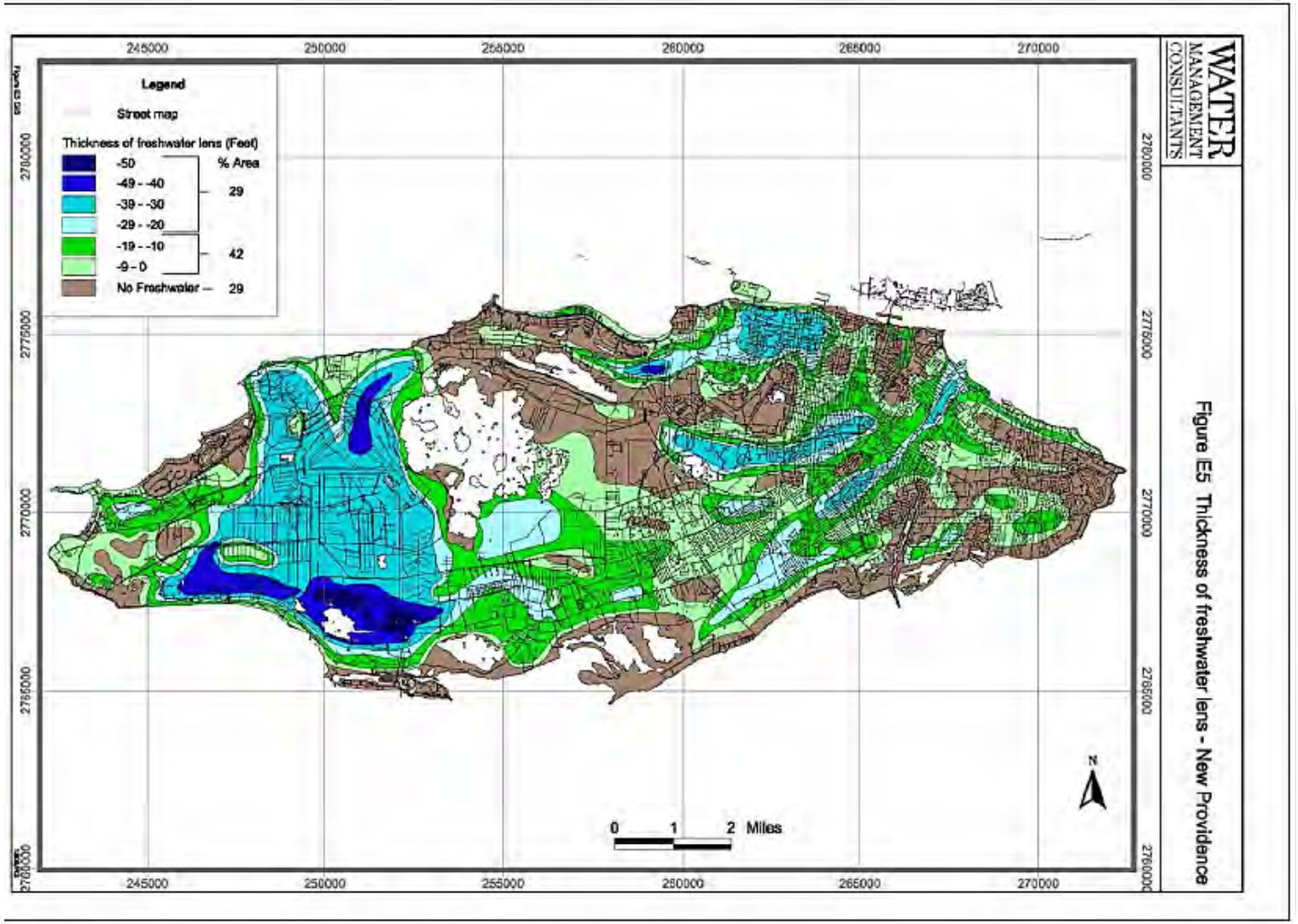

Figure 5: Map of the Freshwater Resources in New Providence

6.3 Socioeconomic Aspects

6.3.1 Land Used

The Project site is on public land, owned by the Government of The Bahamas, and approval to use the land has been granted to the MoF for the purposes of constructing a state-of-the-art solar microgrid.

The site is currently uninhabited but does contain historic WSC Wellfield trenches and a recently ruptured and repaired diesel fuel line. In addition to this, the Project site was also observed to be used as an illegal dumpsite as a number construction waste materials and derelict vehicles were seen throughout the proposed project site during preliminary assessments.

6.3.2 Economy of The Bahamas

According to the data provided by the World Bank in 2023, The Bahamas has a Growth Domestic Product (GDP) that is worth 14.3 billion US dollars and a growth rate of 3.08 percent (World Bank, 2023). New Providence represented 77 percent of the overall GDP of The Bahamas due its large population and number of commercial businesses (Guardian, 2024).

The Blue Hills community is a residential and commercial subdivision that is considered to be one of the main commerce hubs for the island of New Providence due to the number businesses present within the area. These businesses help contribute to the increase of the country's GDP percentage as well as provide a number of resources for residents within the area. A list of businesses found within the Blue Hills community is outlined below.

Table 10: List of Businesses within the Blue Hills Community

Business Name	**Business Type**
Hill Top Conference Center	Conference Center
Super Value Warehouse	Warehouse
Six 'n' Four	Restaurant
Da Natural You Salon & Spa	Salon
The Link Services	Store front
Popeyes Louisiana Kitchen	Restaurant
Blue Hills Power Station	Power station
Quality Home Center	Store Front
CBS	Storefront
Super value	Grocery
Bamboo shack	Restaurant

Marco's pizza	Restaurant
Island luck	Web Café
Body Beautiful	Store front
Bahari	Store front
Alive	Telecommunications company
Dairy Queen	Restaurant
Starbucks	Restaurant
Lowe's	Pharmacy
Girls will be Girls	Store front
John Bull	Store front
Fine Threads	Store front
Wendy's	Restaurant
Domino's	Restaurant
Bahamas Telecommunications Co. (BTC)	Telecommunications company
Rubins	Store front
Clarks	Store front
KFC	Restaurant
Bristol Wins and Spirits	Alcohol wholesaler
YNG	Store front

According to the data of the World Bank in 2021, the tourism and financial sectors are the pillars of The Bahamas' national economy making up about 50% and 10% of GDP, respectively. From 2015 to 2019, the economy of The Bahamas grew slowly; however, Hurricane Dorian in 2019 resulted in a downturn in economic growth within the country.

Table 11: Main Indicators of The Bahamas in 2016-2020

Year	**2017**	**2018**	**2019**	**2020**	**2021**
GDP (US $100 million)	124.9	130.2	135.8	99.1	112.5
GDP growth rate (%)	3.1	3.0	1.2	-16.3	13.7
Per capita GDP (US$)	32720	33768	34863	28608	28239
Per capita GDP growth rate (%)	2.1	2.0	0.2	-17.1	-0.1

Hurricane Dorian was one of the biggest hurricanes to hit The Bahamas and caused an estimated amount of $3.4 billion dollars in damages (Zegarra et al. 2020). According to the IDB The Bahamas experienced a sharp decrease in GDP growth rate, with the islands directly hit by the hurricane, such as Abaco and Grand Bahama experiencing significant decreases in economic activity.

Despite the downturn in the Bahamian economy due Hurricane Dorian, the Bahamian domestic economy registered a growth of 13.7% in 2021 (Central Bank 2021 annual report).

These events illustrated that the development of modern and sustainable energy infrastructure is imperative. The Bahamas should be able to support its citizens with reliable and resilient renewable energy resources in the event natural disasters. The Project aims to strengthen the isolated and interconnected grid networks throughout New Providence to withstand the effects and impacts associated with extreme weather events. It will also create new employment and economic opportunities for Bahamian citizens that can contribute to the overall growth/increase of the country's GDP.

6.3.3 Population

The 2022 National Census indicates the population of The Bahamas has three hundred and ninety-nine thousand, three hundred and fourteen (399,314) people with New Providence containing two hundred and ninety-six thousand, five hundred and twenty-two (296,522) persons. New Providence is approximately eighty (80) square miles and the most densely populated island in The Bahamas (Dept of Statistics, 2010). Additionally, Blue Hills lies within the consistency of Bamboo town. According to the census of population and housing conducted in 2022, Bamboo town has a population of 13,965 of which 6,734 are males and 7,231 are females with approximately 3,679 households (Dept of Statistics, 2010).

Blue Hills consist of various communities such as:

- Pride estates #1
- Pride Estates #2
- Pride Estates #3
- Blue Hill Height
- Blue Hill Gardens

6.3.4 Cultural Heritage and Archaeological Features

No cultural heritage remains or archaeological features were found during the preliminary site assessment. It was determined that this may be due to the fact that the site was previously uninhabited. In addition to this, the presence of construction waste materials and derelict vehicles observed throughout the Project site determined that the

area was used as an illegal dumping site; thus, suggesting that any archaeological features or cultural remains may have been lost over time.

7.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Environmental impacts are changes in the natural environment caused by development that can have adverse effects on the surrounding community, air, freshwater environments, marine environments and terrestrial environments. Environmental impacts can be caused by direct and indirect actions and takes into consideration the footprint of impacts and known habitats on-site. Impacts detailed below are determined by activities associated with normal construction and operation, which can negatively affect the natural environment and/ or may entail an environmental component.

Long-term negative impacts to the natural resources in the area are not expected to occur as a result of the proposed construction work. Impacts to the environment are expected to be short term in nature. To ensure this, construction will be closely monitored to prevent encroachment, or contamination of terrestrial habitats.

Generally, the potential environmental issues associated with The Project include the following:

Table 12: Environmental Impacts on The Project site

Physical Impacts	Biological Impacts	Socio-Economic Impacts
• Air, dust and Noise Pollution • Erosion and Sedimentation • Flooding • Solid Waste Impacts • Sewage and Refuse Disposal. • Groundwater Quality Impacts	• Impacts on Wildlife • Impacts on Vegetation	• Safety for workers • Traffic Impacts • Community Impacts • Land use Impacts • Economic Impacts

7.1 Register of Significant Aspects and Impacts

Environmental impacts of The Project are impacts to the natural communities and wildlife in the area that can be reasonably inferred, considering the footprint of impacts and known habitats on-site. Other expected impacts are those related to normal construction and operation such as waste generation and disposal, fuelling, use of potentially hazardous materials as well as other accidents or malfunctions, which may entail an environmental component. The Register of Significant Aspects and Impacts (The Register) considers potential impacts that may be due to construction and operational activities. The Register will be used in the development of method statements to proactively manage and mitigate potential impacts pertaining to The Project. The Register evaluates the potential impacts identified in the Environmental Impact Assessment and assigns risk and magnitude scores. Risk Scores are measuring the likelihood of the impact occurring and is measured on a scale of 1-10 with 1 being unlikely to occur and 10 being highly likely to occur. Magnitude scores measure the scale of the impact if it occurs. Magnitude ranges are parameters are Low, Medium and High. Low Impact refers to short-term localized impact reversible in 1 year. Medium Impact refers to moderate term implications reversible in a 5-year period. High Impact refers to long term impacts that are not reversible within 5 to 10 years or are irreversible.

Table 13: Register of Significant Aspects and Impacts

Significant Aspect and Impact	**Activities**	**Potential Impact(s)**	**Mitigation**	**Risk Score**	**Magnitude Score**
Construction Phase					
Groundwater Quality	Construction	Introduction of hazardous substances into groundwater. Hazardous substances may include sediment, wastewater, concrete wash water, lubricants,	*Environmental monitoring reports will be submitted to the Department of Environmental Planning and Protection (DEPP). *No hazardous substances will be permitted to escape into the exposed groundwater at the work site. *Wash water from the concrete trucks will be contained to a designated wash station.	10	High

		fuels, drilling spoils and hydraulic fluids.	* All fuel/oil spills will be cleaned up. *Fuel Spill Prevention Plan will be outlined in the EMP.		
Groundwater Quality	Utility Installation	Erosion	*Limit trench size. *NO dewatering directly into exposed groundwater or native vegetation.	1	Medium
Flooding	Removal of vegetative areas and an increased in paved surfaces	Increase in standing water.	*Installation of a drainage system. *Construction of drainage retention ponds or swales designed to collect and drain water at a fast rate. *Buildings should also be elevated to reduce the risk of flooding in the event of extreme weather and flooding conditions. *Establishment of flood control ditches to allow to reduce the risk of rain-induced flooding. *Regular cleaning and maintenance of the drains. *Revegetation of areas to reduce erosion and slow the rate of stormwater runoff *Constructing sedimentation basins to temporarily store stormwater,	6	Medium

			*Permeable areas in the parking lot to reduce standing water and runoff.		
Erosion and Sedimentation	Land Clearing, Excavation, and Stockpile Erosion	Groundwater Contamination	*Stockpiles to be stored away from open trenches with exposed ground water. *Sediment and erosion control methods (such as silt fences) will be in place prior to and during construction.	5	Medium
Air Quality	Earthworks	Dust Accumulation	*Spraying water on the construction site and excavated areas. *Fencing/installing barriers to shield from dust and aggregates. *Do not accumulate and burn waste at the site. *All dump trucks will require tarpaulins when transporting material.	5	Medium
Noise and Light Pollution	Construction of Buildings and use of Heavy Machinery	Excessive Noise and Light Pollution	*Precaution will be taken while using the machines and equipment during construction. Avoid usage of machines/equipment with extra noise. *Work will be conducted during reasonable hours. *The contractor will inform the surrounding offices and community prior	5	Medium

			to operations that bear the risk of nuisance and accidents. *Light impacts will be managed by directing light away from residential and vegetative areas, tilting lights downwards, and using light shades where necessary.		
Solid Waste Management	Construction	Increase of solid waste and waste accumulation	*Refuse and wastes should be removed from the site regularly and disposed of at NPEP. *In case of hazardous waste, store in a safe place, in a lidded container and make provisions for management. *Excavated material will be reused in construction and/or made available for community projects. *All domestic and construction waste that cannot be recycled or reused on site should be stored in a lidded container in the laydown area. Waste should be removed from site by a licensed contractor, as necessary. *Waste bins should contain signs or showing symbols of items that can be disposed of.	10	High

Solid Waste	Land Clearing	Vegetative waste	*Recycling by creation of mulch or biochar.	10	Low
Sewage and refuse disposal	Installation of Sewage system	Water quality	*Any portable toilet(s) that are on-site should be secured to avoid vandalism or falling over. Toilets must be located more than 150ft from the edge of the exposed groundwater. *A licensed contractor will be responsible for servicing portable toilets.	5	Medium
Terrestrial Ecosystem and Biodiversity	Clearing and landscaping	Habitat loss – one hundred and eight (108) plant species Identified. One (1) major ecosystem identified.	*Only vegetation around footprint will be removed. *Various flora removed for construction will be replanted in the areas selected for restoration. *All Invasive species will be removed and eradicated. *Surrounding vegetation will be maintained. *Species native to The Bahamas will be used in landscaping. If flora must be imported, no prohibited species will be included in the landscaping.	6	High

			*Development of an Integrated Pest Management program that employs use of chemicals as a last resort. *Development of a Fire Control Plan. *Smoking only in designated areas. *Fuel storage only in designated and prepared areas. *No Hunting.		
Wildlife	Land clearing	Destruction of habitat and loss of species inhabiting the area	*Before commencement of works, areas designated for land clearing will be checked for wildlife. *Any wildlife encountered will be relocated to a similar habitat away from development. *Any invasive wildlife encountered will be eradicated.	10	Medium
Fuel handling and oil/fuel filled equipment	Construction	Spills and/or leaks of: Fuel, lubricating oil, and coolants associated with the operation of heavy machinery and drilling equipment during project work.	*Spills will immediately be contained, and the Environmental Manager (EM) contacted for major incidents. *Spill Kits will be placed on all operating machinery.	10	High

		Equipment oil and hazardous materials, which can result in soil, water contamination, and impact the receiving environment.	*All vehicles and equipment used on-site must be well maintained. Equipment repaired, if necessary, by the contractor prior to mobilizing to site. *Idling must be kept to a minimum. Any equipment not in use for extended periods of time must be switched off. *Refueling should be done on a concrete apron or prepared area and drip trays should be used to contain any spill. *Periodic inspections by the Environmental Manager (EM) will be conducted. Equipment deemed to be unacceptable by the EM will be sent off-site. *All fuel transfers should be done as far away as practical from drainage and water bodies (use 100ft distance from water as a guideline). *Individuals fueling equipment should be trained and must ensure that fuel containers are properly sealed when they are transported. *There is to be no smoking on site.		

Accident for transportation of dispose materials	Transportation and Disposal	Traffic Accidents	*The transportation of the waste and other materials should be in a safe manner considering road traffic regulations	3	Low
Safety for Workers	Construction	Accidents and Injuries	*The mandatory use of PPE (helmets, safety belts, masks, gloves, and boots) by workers depending on the nature of work. *All workers familiar with site emergency response plans and safety procedures. *All workers familiar with material handling procedures. *First responders identified and present on site.	5	Medium
OPERATIONAL PHASE					
Air and Noise Quality	Emissions from Heavy Equipment and Vehicles	Pollution	*Diesel and gasoline operating equipment must have preventive maintenance in compliance with applicable environmental regulations to prevent air pollution. *Gasoline operating equipment should have catalytic converters in good condition. Catalytic converters or filters for diesel equipment shall be incorporated, as required. *Refrigerants with a low environmental impact will be utilized	3	Medium

			*Air-filtration system will have regular inspections and maintenance *If equipment is maintained on site, any maintenance or testing programs will be done during daytime working hours in order to prevent any discomfort or nuisance to neighbouring communities. * All exhaust gas will be treated before being discharging it into the outdoor environment.		
Erosion and Sedimentation	Operation Activities	Groundwater contamination and Pollution.	*Implementation of erosion and sedimentation control plan. * Sediment and erosion control methods, such as the use of ground covering under each panel, will be installed prior to and during operation activities.	5	Medium
Light Impacts	Operation Activities	Pollution	*The design should avoid spills from outdoor lighting at night. *Avoid the use of ultraviolet light. * Light will be directed light away from residential and vegetative areas, tilted	2	Low

			downwards, and using light shades where necessary.		
Hazardous Waste and Solid Waste	Operation Activities	Pollution	*Implement an Operational Solid Waste Management Plan. *Implement a Hazardous Waste Management Plan.	8	Medium
Groundwater Quality	Landscaping activities	Runoff of pesticide and herbicide	*Implement an integrated Pesticide and Herbicide Management Plan. *Use native plant species in the landscape design.	5	Medium
Terrestrial Ecosystem	Operation Activities	Habitat Degradation- waste generated may be a hazard to wildlife and cause pollution.	*Implement a Wildlife Management Plan. *Implement an educational training programme for workers to follow as a way to manage wildlife. *Prohibit hunting within the area.	2	Medium
Traffic and Transport	Traffic Congestion and/or accidents	Traffic accidents	*Implement pedestrian routes that will: - Be clearly separated from vehicle routes by fencing and/or a kerb, or other suitable means. - Be clearly and suitably signed.	5	Low

			*Implement vehicle routes that will ensure that: - Are wide enough to safely accommodate the number of vehicles likely to use them at peak times. - Are free of obstructions and are clearly and suitably signed. - Eliminate or reduce the need for reversing. - Provision of suitable parking areas.		
Electromagnetic Field (EMF)	Operation Activities	Glare and Glint	*Solar panels should be oriented away from roadways and residential/commercial communities * Solar panels used will generate low levels of non-ionizing radiation or EMF * Exposure to EMF will be minimized through shielding, field cancelation, and increasing distance from the source of EMF to protect neighbouring communities. Power lines should be located away from sensitive areas and proper shielding devices should be used.	3	Low

7.2 Physical Environment Impacts and Mitigations

7.2.1 Air Quality Impacts

Land clearing, excavations and construction activities all have the potential to increase dust accumulation on site. Dust can cause eye irritation, respiratory issues and cause other hazards to human health. The surrounding environment will also be affected as dust can coat surrounding leaves and produce. To reduce the impact of dust on site, the following activities should be implemented:

- Clearing should only include the footprint needed for construction. 100% of the proposed project site will be cleared for construction activities.
- Water is to be used as a dust retardant as needed.
- Ground cover will be used to reduce dust emissions from exposed materials on site.
- Screening and fencing should be used to reduce wind, improve aesthetics, and mark the limit of works.
- The use of Proper Protective Equipment including dust masks and eyewear/safety glasses.
- Dump trucks moving loose material are to be covered with tarpaulins.

During the operational phase, equipment and operational activities on site has the potential to cause air pollution. All diesel and gasoline operating equipment should be regularly maintained. Gasoline operating equipment should have catalytic converters in good condition and the catalytic converters or filters for diesel equipment shall be incorporated, as required.

7.2.2 Light Impacts

The general rule shall be that construction operations be restricted to daylight hours. Any reason to work outside these hours to speed up the progress of works, local communities will be given advance notice. If construction is to occur during hours when enough daylight is not available, and lighting of the work area is required, the Contractor is expected to manage excess lighting and glare by:

- Strategic placement of lights only where necessary and away from residential communities and remaining greenspaces.
- Tilting lights downwards, and
- Using shielding to restrict the glare of lights.

During the operational phase lights will be utilized at night for the purpose of securing the site. The Project design should ensure that outdoor lighting is managed properly as to avoid disturbing adjacent residences and wildlife in the area. Management measures include methods mentioned above as well as:

- The design should avoid spills from outdoor lighting at night.
- Avoid the use of ultraviolet light.

7.2.3 Waste Impacts

Waste generated during the construction and operation phases can negatively impact the site, surrounding vegetation, and the neighbouring community. New Providence has an organized and managed waste management system at the New Providence Ecological Park (NPEP). The Project should seek to reduce the production of waste and recycle material as much as possible. This will help to reduce and/or eliminate any waste from entering the adjacent environment and residential communities. Waste bins should be provided and secured on site and emptied on at least a weekly basis. Waste bins should contain signs listing or showing symbols of items that can be disposed of.

7.2.3.1 Domestic Waste

Domestic waste, in particular material that take long to degrade, can have numerous negative impacts to wildlife and terrestrial ecosystems and are usually caused by improper waste management. Increased pollution in the terrestrial environment has the potential to degrade the habitats utilized by avifauna and other fauna species observed on site. During weather events, domestic waste can be transported beyond The Project site, which will negatively impact the surrounding residential communities. Accumulation of domestic waste also has the potential to reduced air quality, pollute exposed groundwater and lead to the introduction of pest on the site.

7.2.3.2 Construction Waste

Construction waste will accumulate due to the commencement of activities on site. The accumulation of construction waste can lead to stockpile erosion which can result in health and safety hazards for both humans and wildlife. In addition to this, the stockpile of construction waste can become an eyesore; therefore, construction waste should be properly managed and controlled during all construction activities for the duration of the project.

7.2.3.3 Vegetative Waste

Vegetative waste will be created during clearing and grubbing activities on site. Native vegetation that are removed will either be replanted or mulched and placed along untouched plants to provide nutrients as they decompose. Invasive species encountered should be sorted separately and should not be incinerated or used as mulch to prevent spread throughout the site. The entire tree and root system of the invasive species may be carefully cut and treated with herbicide then removed manually or by heavy equipment.

7.2.3.4 Hazardous Waste

There is the potential for hazardous waste impacts associated with construction activities. Hazardous materials such as concrete, paint, solvents and other chemicals may be high in pH and are considered harmful to the surrounding environment and neighbouring communities.

Protection of groundwater, and any other sensitive environments is of most importance; therefore, there shall be no contact with groundwater through spillage, hosing off surfaces, rain, cleaning of tools or concrete washout. A concrete and equipment washing site will be bunded, lined to contain any concrete and chemicals. All accepted washing locations must be cleaned up prior to demobilization. Any excess material shall be removed upon project completion, and transported NPEP to be disposed of.

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

To help mitigate the effects of hazardous waste several measures can be implemented:

- All equipment and hazardous material (such as used absorbent pads) will be stored in designated waste bin/locations to reduce the risk of spills and pollution events into the environment. Storage facilities should be free from obstruction, structural defects, covered storage to prevent the potential of mixing with water and only used to store hazardous waste.
- Appropriate signage should be used to depict hazards in the area as well as a "NO Smoking" sign.
- Temporary storage facilities will be inspected at least once a day by designated staff to check for leaky containers. Access should be limited to these designated persons.
- Hazardous Waste storage facilities at the site will have disposal containers that are covered, made of inflammable material, sealed to prevent leaking, and positioned on an impervious surface as far from any water as possible. Secondary containment for all disposal containers should be 110 per cent of the maximum volume of the container.
- Appropriate spill containment and clean-up equipment will be easily accessible near hazardous waste storage facilities.
- Disposal of all hazardous waste utilized or generated during construction will occur offsite by a licensed contractor at a licensed facility as per DEHS requirements. Hazardous waste should be collected as quickly as possible after being generated.

7.2.4 Noise Impacts

The Project construction activities will increase the level of noise that will affect nearby businesses and residences. The general rule shall be that construction operations be restricted to daylight hours between 0700 hrs. and 1900 hrs. Any reason to work outside these hours to speed up the progress of works, local communities will be given advance notice and specific requests will be reasonably accommodated. A batch plant will also be located on the site to reduce noise levels produced by movement of cement trucks.

Operational Phase

During the operational phase, an increase in noise produced by emergency sirens, machinery (i.e. generators and HVAC system) and increase in traffic can cause discomfort to neighbouring residents and businesses. To mitigate against noise pollution. To decrease noise pollution during the operational phase, if equipment (i.e., generators) are maintained on site, any maintenance or testing programs will be done during daytime working hours in order to prevent any discomfort or nuisance to neighbouring communities. Increase in noise caused by traffic increase will be discussed in section 7.4.3.

7.2.5 Sewerage and Waste Refuse

The improper disposal or treatment of human waste can result in a breathing ground for diseases and can negatively impact human health. During the construction phase, portable potties will be distributed throughout the site and will require weekly maintenance. Portable toilets should be serviced bi-weekly by a licensed company. To prevent leaching of wastewater into the groundwater or surface bodies, any portable toilet(s) that are on-site should be secured to avoid vandalism and to prevent them tipping in windy conditions. Toilets must be located more than 150ft from the any exposed groundwater.

7.2.6 Water Quality Impacts

Mitigating potential harmful effects to the groundwater quality is extremely important for the scope of construction; therefore, proper management should be implemented to prevent further contamination on site.

Construction Phase

Potential impacts to the groundwater quality during the construction phase include fuels spills, oils spills, leaching of wastewater, hazardous waste spills and utility installation. Introduction of fuel, oil and other wastewater into groundwater supply can cause contamination that can be considered harmful to the surrounding environment and neighboring community.

Fuel and Oil Spill

Fuel and oil spills can occur from improper handling and storage of fuel or oil on site, leaks from construction machinery, and improper fueling practices on site. This includes stationary machinery such as generators and tower lights or mobile machinery such as excavators and backhoe loaders. Introduction of fuel and oil into groundwater can cause contamination.

To help mitigate these concerns identifying the main source of potential releases during the construction phase is important. Fuelling sites/areas and the use heavy equipment vehicles on and around the site should be given special attention. The equipment will be stored on an asphalt surface or an area prepared with impermeable material. Oil spill kits will be kept onsite in or near machinery to clean up minor spills immediately. Oil rags

will be properly stored and disposed of at a licensed facility and a ticket produced as verification. A maintenance schedule and log will be used to ensure that equipment is maintained and ensure that any leaks that develop is fixed. Vehicles or holding tank that have leaks should be removed from site and fixed before a large volume release occurs into the environment. An area will be designated as the permanent maintenance location and will be prepared with an impermeable surface and an appropriate containment. Oil spill kits should be always kept nearby.

There should be no storage of large quantities of fuel on site. All refuelling activities should be done by trained workers and should be done as far away as practical from drainage and exposed groundwater (use 100ft distance from water as a guideline). A Fuel Spill Prevention Plan will we outlined in the EMP.

Utility Installation

As construction progresses the negative impact on groundwater quality increases from dewatering activities for utility trenching. Utility installation will require trenching efforts throughout the site. Excavations may encounter water which require pumping. If this occurs water must be expelled away from any from surrounding vegetation, and exposed groundwater.

Operational Phase

The operational phase presents the potential of runoff from pesticide and fertilizers, fuel spills from the parking lot, and hazardous waste polluting groundwater as well as standing surface water bodies. To reduce the need for pesticides and herbicides, native species will be used that are acclimated to the soil and climate conditions in The Bahamas. These plant species are more likely to become established and thrive on less water and chemical additives. An integrated Pest Management System should also be implanted for use of chemicals, preferably an organic pesticide, in limited quantities and as a last resort. The Integrated Pest Management System will be outlined in the EMP.

To prevent hydrocarbon fuels leaching into the groundwater system, the drainage system will consist of drain basins with oil interceptors. Drainage basins should be connected to a deep well. Standard operating procedures are to be developed in the Operational Management Plan and enforced to reduce the chance of spills.

7.2.7 Erosion and Sedimentation Impacts

The Project is expected to have excavation activities for land clearing and site grading to accommodate the construction of the 92-acre utility scale solar microgrid foundation. This has the potential to cause erosion and sedimentation as majority of the vegetative features in the affected area that function as a sponge for run-off and rain catchment will now be removed. Erosion and sedimentation can be harmful to the environment, as it can cause groundwater pollution, and negatively impact surrounding vegetation and wildlife. Clearing will only be done for the footprint of works, therefore, erosion impacts associated with The Project is expected to be of medium risk overall.

Additionally, the implementation of an effective erosion and sediment control plan during both the construction and operational phase of the Project will help mitigate against erosion impacts. It may include the use of silt curtains for the exclusion of sediment into any retained vegetation, trenches or exposed water during times of clearing and grubbing during construction activities and the use of ground covering beneath each solar panel to prevent any sediment run-off into the surrounding water resources.

7.2.8 Flooding Impacts

The risk of flooding is of great concern as The Project site contains historic wellfields that function as a natural drainage from surrounding communities. Several activities during the construction phase also have the potential to create flooding, including dewatering of trenches for utilities, clearing of land and the removal of any ground material. These activities have the potential to cause a reduction in the absorption, evaporation, and infiltration rates of water into the soil. This will result in the increase in standing water around the site and increase the risk of flooding during significant rains, and extreme weather conditions including effects from climate change and hurricane season.

As The Project nears completion the increase in impervious surfaces for buildings, roads, roofs and gutters, can result in an increase in the amount of water entering the proposed drainage system. To help mitigate the effects of flooding several measures can be implemented:

- The development of an adequate drainage system that can manage flood water from rainfall or the weather changes.
- Buildings should also be elevated to reduce the risk of flooding in the event of extreme weather and flooding conditions.
- Establishment of flood control ditches to allow to reduce the risk of rain-induced flooding.
- Revegetation of areas to reduce erosion and slow the rate of stormwater runoff.
- Constructing sedimentation basins to temporarily store stormwater.

7.3 Biological Environment Impacts

Potential impacts to the natural environment include habitat loss as a result of land clearing; the introduction of invasive species through imported flora; and the use of chemicals such as pesticides and herbicides.

7.3.1 Native Vegetation

Native vegetation inclusive of protected species is pivotal to maintaining and preserving biodiversity. The construction activities that have the potential to impact native vegetation include land clearing and landscaping activities.

7.3.1.1 Land Clearing

Construction activities and development will result in the loss of existing natural vegetation including protected species. Land clearing places strenuous pressures on the

environment and can result in habitat loss and habitat fragmentation of native vegetation. The construction of the solar microgrid is expected to impact a total of ninety-three acres (92 ac) of vegetation at each site.

To reduce the effects of terrestrial habitat loss, various flora removed for construction will be replanted in the areas selected for restoration. In addition to this, shrubs will be used throughout the landscape to mitigate for the loss of any terrestrial species during the construction phase of the Project. Native vegetation, especially protected botanical species with a high relocation survivability rate would be relocated to either a holding site for future use in reforestation projects or replanted in national parks, schools, and other public-owned spaces.

The Project site has two (2) inland seasonal wetlands present on the site. Protection and preservation of this important interior wetland system is paramount, and all efforts should be made to preserve these spaces as best as possible. To protect the wetland system, establishment of a twenty-foot (20 ft.) buffer zone between the wetlands and construction will be established to reduce the risk of runoff into the sensitive ecosystem. Silt-fencing should be employed around the wetlands to slow contamination or pollution by surface run-off or wind-blown debris.

7.3.1.2 Landscaping

Landscaping impacts is expected to be minimal as there will be little to no vegetation replanted on the site. Landscaping may be limited to grasses and a few botanical species for decorative purposes. If native species are used, they should be sourced locally as much as reasonably possible to help maintain the native genetic plant diversity. The design of the landscape is expected to have minimal impact and based upon xeriscape principles which will reduce and help eliminate the need for irrigation maintenance. If flora must be imported, no prohibited species will be included in the landscaping.

7.3.2 Impacts on Wildlife

Wildlife on site can be impacted due to land clearing activities. Land clearing can cause a decrease in native wildlife due to habitat loss and habitat fragmentation. This can cause an increased risk of predation due to the lack of shelter and reduced food availability. The proper management of wildlife, specifically nesting birds is extremely important.

Fauna that has adapted to or have become accustomed to Human-Altered Environments such as *Mimus polyglottos polyglottos* (Northern Mockingbird) will return after the construction phase. However, species such as *Myiarchus sagrae lucaysiensis* (La Sagra's Flycatcher) that preferred native forested habitats may seek those habitats elsewhere.

During construction, if wildlife is encountered (e.g., nesting birds, or injured fauna, juvenile animals), construction should be halted immediately and that information should be passed on to the Environmental Manager and/or Environmental Monitor. Animals will be relocated to nearby suitable habitat not impacted by development.

Additional mitigation measures that should be implemented to ensure management of wildlife present at the site include:

- All site inductions will include guidance on how to deal with wildlife encounters, including any species at risk that may be present, and arrangements for dealing with injured or orphaned wildlife. This guidance should be summarized in a handout suitable for quick reference by on- site staff and be available in areas that all employees on site will have access to.
- Prior to clearing vegetation, the environmental manager or wildlife specialist will schedule inspections for wildlife, installation of protective fencing, pre-stressing, and onsite briefings for Contractors.
- Where possible bees should be removed manually using a professional beekeeper to smoke, vacuum and trap the hive.
- A strategic trapping and culling initiative should be employed to control the invasive fauna population without impacting the native fauna.
- Areas of retained vegetation should be identified and clearly marked with fencing and signage.
- A site map should identify areas prone to wildlife appearance and areas that should be avoided, if possible, to prevent disturbing of habitat.
- Clearing of pathways for greenspaces are to be cleared manually and not by heavy equipment.

During the operational phase, an Employee Wildlife Management education training programme should be designed and implemented. This programme should include prohibiting hunting and harassment of wildlife within The Project vicinity and protocol in the event of wildlife encounter.

7.4 Social and Economic Impacts

7.4.1 Land Use Impacts

The Project will require modification/removal of the natural terrestrial ecosystem. To mitigate against loss of the natural environment, construction activities will be limited to the footprint of works. Green spaces immediately surrounding the infrastructure will be retained.

7.4.2 Economic Impacts

Overall, The Project is expected to have a positive impact on the economy through job generation, capital investment and local sourcing of some material.

7.4.2.1 Job Generation

Development of The Project will create new job positions for Bahamians both during the construction and operational phases. Jobs will be generated through:

1. Employment of Bahamian contractors during the operational and construction phase.

2. Jobs managing and operating the microgrid infrastructure.

The approximate number of workers scheduled to work during the construction phase of The Project is To Be Determined (TBD). In terms of labour, in addition to Bahamian workers, there are also the labour workers from Haiti, the Dominican Republic and other surrounding countries. It is expected that approximately that eighty percent (80%) of The Project workforce will be Bahamian.

During the operational phase, The Project is expected to house X staff members.

7.4.2.2 Material Source

The complete development of the Solar Microgrid Project will require significant capital investment. It is estimated that approximately 17-20 million US dollars is to be invested in the project.

Importing material and machinery can also impact the construction timeline as procurement and delivery of materials can be prolonged due to many factors including severe weather and schedule delays.

7.4.3 Traffic Impacts

The proposed project site is located approximately one thousand two hundred and eighty-four feet (1,284 ft) west of Baillou Hill Road, four hundred and eight feet (408 ft) north of Carmichael Road, and one hundred and eighty feet (180 ft) south of Primiers Avenue. During construction there will be an increase in traffic (mainly large trucks) to and from the site. There is only one entry and exit point and there will be an increase in traffic at the main thoroughfare (Carmicheal Road). The increase in vehicular traffic, movement of heavy machinery and change in traffic patterns due to road closures (if necessary) can cause impacts to the safety of road users (vehicular and pedestrian) and cause discomfort to the community due to increased noise, and increased emissions.

To mitigate the traffic impacts, the following strategies should be employed:

- Notice should be given to the community of the commencement of work and possible traffic inconveniences.
- Signage will need to be placed at the site entrance/exit and the main thoroughfare.
- Heavy machinery should have a banksman to assist in manoeuvring on and off site.
- Flagmen should be placed strategically at the site's entrance, exit, and onto the main thoroughfares to direct activities. A traffic study will be conducted to gather accurate information about the movement and behaviour of traffic within the vicinity of the development. This information will be used to assess the potential impact of The Project on the surrounding road network and predict traffic movement, volume and flow during operation of The Project. Traffic measures to increase traffic flow, reduce noise pollution and overall improve movement as outlined in this study would be taken into consideration. The traffic study will be added to the EIA prior to commencement of activities.

7.4.4 Community Impacts

The Project is anticipated to result in impacts to the surrounding community. Impacts associated with glare and generation of electromagnetic fields has the potential to create resistance from surrounding communities. Given the proximity of The Project to the surrounding Blue Hills community, impacts from waste generated by potential squatters have the potential to negatively impact surrounding communities. Any structures or waste generated by squatters should be removed prior to the commencement of works to prevent the contamination of exiting water resources or soil on The Project site and surrounding communities.

In addition to this, any existing contaminated water on site should be pumped into a deep well or a licenced contractor should be contacted to properly disposed of it. Any contaminated soil on site should be removed and not reused during construction activities. All contaminated debris and soil should be disposed of at the New Providence Ecological Park (NPEP) and proper PPE such as gloves, mask and eye protection should be worn during this process and all efforts should be made to avoid direct contact as to avoid infection.

Daily monitoring of The Project will be done by an Environmental Management Team who will track all environmental inspections and potential hazards. They will ensure that environmental measures are implemented prior to commencement of works and enforce all hold points. They have the authority to stop works because of environmental issues.

7.4.4.1 Electromagnetic Fields

The electrical equipment used in constructing the solar microgrid has the potential to emits electric and magnetic fields (EMF). This is caused by the movement of electric charges which produces an electric and magnetic field surrounding the charge. Exposure to electromagnetic field can cause health problems if exposure is persistent and/or the electrical field is of high strength. Health problems can include headaches, sleep disturbance, dizziness and fatigue. The magnitude of the effects is dependent on both the field strength and the exposure time.

Impacts to the general public caused by exposure to EMFs is expected to be overall low. The solar panels used will generate low levels of non-ionizing radiation or EMF. Exposure to EMF will also be minimized to protect the neighbouring communities. Ways to minimize exposure to EMFs include shielding, field cancelation, and increasing distance from the source of EMF.

The Project will ensure that majority of the solar grid will be located farthest away from general public as possible. The microgrid will also be contain behind a fenced perimeter to ensure a barrier is located between the microgrid and the general public. Persons outside the fenced perimeter of a solar microgrid facility will not be exposed to a significant amount of EMFs. Therefore, communities around solar microgrid are not expected to incur adverse health issues from EMFs.

7.4.4.2 Glare and Glint

Due to proximity of commercial and residential communities on the southern border of The Project Site, and the proximity of main throughfares on the southern (Baillou Road) and western end (Carmicheal Road) of The Project Site, glare produce by operation of a solar microgrid poses a potentially nuisance and hazard to drivers and nearby residents.

To mitigate the effects of glare and glint, solar panels should have proper placement and orientation. Solar panels should be oriented away from roadways and residential/commercial communities. If solar panels must be pointed in these direction to maximize output, modern solar panels that can absorb sunlight should be used to minimizing reflection and glare.

7.4.5 Workers Health and Safety

The safety of workers on site is high priority for The Project. The aim is to ensure that the Contractor, Sub-contractors, their staff, and all visitor know and follow all rules and regulations of the site to prevent and limit any accidents and incidents from occurring. All workers on site should have induction training which outlines the health, safety and environmental rules and regulations for the site. Mandatory use of PPE such as hardhats, eye protection, masks, gloves, safety vest and boots should be worn by workers at all times. All personnel on site should be familiar with material handling procedures, emergency response plans and safety procedures. First Aid kits and First Aid responders should be identified and present on site.

During the operational phase there are potential occupational health and safety hazards associated with working near electrical systems and being exposed to high voltage lines and to electromagnetic fields (EMF). An Occupational Health and Safety Plan should be created that outline safe protocols and practices to be adopted to ensure incidents and accidents are prevented. This safety plan should include safety measures placement of safety warning signs at relevant places, trainings and induction for operation staff and use of suitable PPE.

8.0 ENVIRONMENTAL MANAGEMENT PLAN

8.1 Purpose of the EMP

The Environmental Management Plan (EMP) is a written document that provides a guideline for the practices to use to avoid potential environmental impacts. It details the mitigation measures to minimize/eliminate potential negative environmental impacts of the proposed project; and to ensure The Project utilizes best management practices for all activities and project components.

8.2 Outline of the EMP

I. Executive Summary
II. Introduction

III. Project Description
IV. Laws, Regulations and Requirements
V. Government Departments
VI. Environmental Management Framework
VII. Environmental Management Tools
VIII. Register of Significant Aspects and Impacts
IX. Environmental Impacts
X. Management Plans and Mitigation Strategies
XI. Emergency Response Plan
XII. Public Consultation
XIII. Monitoring and Reporting
XIV. Conclusion

8.3 Summary of Management Plans

Below includes brief descriptions of the management plans the Contractor must implement and adhere to in order to avoid unnecessary disturbance or damage to the environment. Full management plans will be outlined in The Blue Hills Solar Microgrid EMP.

8.3.1 Flood Control Plan

With the changes to the environment due to construction, the natural flow of water will be affected. Also, The Project site was observed to have historic wells that function as a natural drainage from surrounding communities; therefore, flood control management is a high priority for the construction and operational phases. The goal of this Flood Control Plan in to outline measures to reduce the risk of flooding on site during the construction and operation phases. The activities that have the potential for flooding include earthworks and utility installation during construction, and storm water runoff as well as direct runoff from precipitation during operation. Extreme weather events such as hurricanes also pose a risk of flooding. Some of the mitigation measure that will be implemented include, use of porous pavement material and the installation of gutters and drainage basins.

8.3.2 Erosion and Sediment Control Plan

Protecting groundwater and other environmentally sensitive areas is of significant importance during construction of The Project. The goal of this plan is to ensure that the groundwater and the retained vegetation surrounding the site are free from the risk of nonpoint source pollutants. The main construction activities that pose the greatest risk to groundwater contamination are, land clearing, transport, deposit of fill material on site, stockpile erosion, base formation, and dewatering. Some of the mitigation measures include defining the site boundaries using measures such as silt fencing and ground covering; creating a buffer zone between the retained vegetation and the construction site; and implementing dust control measures.

8.3.3 Traffic Management Plan

Development of The Project will result in an increase in commercial traffic (mainly large trucks) to and from the site. The goal of the Traffic Management Plan is to minimize impacts on the public road system and establish protocols for vehicle and pedestrian movement within the site boundary. Some of the mitigation measure to be implemented include identifying clear control parameters on site such as flagman and signage and establishing/maintaining routes for personnel and vehicles.

8.3.4 Waste Management Plan

Implementation of a Waste Management Plan will ensure the protection of human health, environmental health, and groundwater supply. The goal of this plan is to ensure that the site employs waste reduction and recycling practices to reduce or reuse where possible and recycle where feasible. The plan should be communicated to all people entering the site as it requires the full cooperation of all employees and visitors. All waste material should be properly stored, then sorted/separated, and considered for reuse or recycling before being removed and disposed of at the New Providence Ecological Park (NPEP). This plan will outline how non-hazardous waste such as wood, glass, plastic, paper, food, etc.; and hazardous waste such as adhesive, aerosol cans, paint and paint thinners, solvents, concrete, asphalt, lightbulbs, batteries, and insulation should be managed and disposed of.

8.3.5 Noise and Light Control Plan.

Noise and light disturbances should be managed to reduce the impacts to the surrounding communities and wildlife. The goal of this plan is to provide measures to mitigate against noise and light pollution. Some of these measures include restricting working hour to hours between 0700 hrs. and 1900 hrs., maintaining equipment in good working order, implementing a speed limit to slow vehicles, strategic placement of lights away from residential areas, tilting lights downwards, and using shielding to restrict the glare of lights.

8.3.6 Air Pollution Control Plan

Air pollution due to construction activities need to be managed to reduce the impacts to workers on site, the surrounding communities and wildlife. The goal of this plan is to provide measures to mitigate against dust and air pollution. Some of these mitigations measured include; using water to spray earthworks, roads and other surfaces as necessary to reduce dust generation; maintaining all construction equipment to reduce exhaust emissions; and visually monitor levels of dust deposition and air quality on site.

8.3.7 Sewage Management Plan

Ensuring the protection of human health and ground water supply is of great concern on this project site. The improper disposal or treatment of human waste can result in a breathing ground for diseases and can contaminate groundwater. The purpose of this plan is to clearly define the controls that will be used to manage wastewater generated on The Project site. Mitigation measures include proper placement and maintenance of portable toilets and proper storage and treatment of sewage during the operational

phase. All sewage generated will be treated according to standards provided by DEHS and WSC and be positioned away from any sensitive environments.

8.3.8 Terrestrial Ecosystem Management Plans

Terrestrial Management Plans will be implemented to protect the natural environment during construction activities. Terrestrial Management Plans listed in Table 14 below will outline the impacts and appropriate mitigation measures to be used to protect ecosystems within and surrounding The Project site.

Table 14:Summary of the Terrestrial Management Plans

Management Plan	Impact	Mitigation
Vegetation Management Plan Purpose: Details measures to reduce the effects of vegetation and habitat loss for areas within and surrounding The Project site.	• Terrestrial habitat loss. • Loss of protected and endemic species.	• Removal restricted to the base footprint. • Installation of fencing to protect from encroachment, illegal dumping, and damage from machinery. • Site walkover prior to commencement of work. • Habitat restoration - Reuse of protected trees during restoration. • Removal of invasive species.
Hunting Management Plan Purpose: Protect the native fauna populations in the area against hunting activities.	• Disruption and reduction of wildlife populations.	• No hunting permitted during construction and operation.
Pesticide and Herbicide Management Plan	• Contaminate surrounding soil,	• Planting native species.

Purpose: Outline measures for proper handling of pesticides and herbicides.	groundwater and vegetation. • May unintentionally kill and infect wildlife in the area.	• Use chemicals as a last resort.
Fire Management Plan Purpose: Coordinate the response of the workers in the event of a fire, and detail steps to prevent, contain and control fires during the construction and operation phase.	• Endanger the lives of workers. • Can cause severe structural damage; destruction of machinery, equipment or materials; and cause untimely delay in project completion. • Destroy food source and shelter for wildlife.	• Proper fuel handling and storage. • Establishment of fire breaks. • No smoking on site • The presence and maintenance of all 'classes' of fire extinguishers. • Regular training and fire drills for staff. • Proper storage and handling of combustible material. • Good housekeeping.
Pest Control Management Plan Purpose: Outline measures to prevent the introduction of new pests.	• Destruction of habitat. • Depletion of natural resources. • Depletion of native plants that provide food and shelter to native wildlife. • Spread diseases which can affect human health.	• Regular inspection of areas where infestation is likely to occur. • Inspection of incoming materials and goods. • Frequent cleaning of facilities, especially spaces where food is stored and prepared. • Installation and regular removal of traps by a licensed pest control company.

		• Ensure the removal or maintenance of areas with stagnant water to reduce mosquito numbers. • Use pesticide as a last course of action.
Wildlife Management Plan Purpose: Detail measures for preventing harm wildlife present on site. Outline what steps should be taken by staff should they encounter any wildlife on site.	• Disruption, injuring or killing wildlife as a result of construction activity. • Reduction in wildlife population.	• Construction should be halted immediately when a nest or wildlife is discovered. • Inform the Environmental Monitor/Manager. • Consult with wildlife specialist such as Animal Control, and Ardastra Gardens & Wildlife Conservation Centre for assistance when necessary. • Remove any invasive fauna when encountered through strategic trapping or culling.

8.3.9 Water Quality Management Plans

Protecting groundwater and other environmentally sensitive areas is of significant importance during operation of The Project. Runoff of pesticide and herbicide, fuels from equipment, and hazardous waste polluting have the potential to contaminate groundwater. Mitigation measures include:

- Implementing an integrated Pesticide and Herbicide Management Plan where pesticides are used as a last resort.
- Using native plant species in the landscape design.

- Implementation of a fuel spill prevention plan.

9.0 STAKEHOLDER CONSULTATIONS

Public consultation with relevant stakeholders is crucial for the successful development of the Blue Hills Solar Microgrid Project. It helps decision-makers understand community perspectives, values, interests, issues, and concerns, and ensures these are considered in the project planning process.

The Ministry Finance (MoF) should organize a public consultation to present the project's purpose, objectives, scope, baseline data, monitoring program, and potential impacts along with proposed mitigation measures. The meeting should be held in a public venue at a designated time and include stakeholders such as local residents, businesses, tourists, relevant government agencies, non-governmental organizations, and any other interested parties.

Once the meeting logistics are finalized, the public should be informed of the details. Announcements should be made through various media channels, including newspapers, television, radio, and social media, at least 14 days before the meeting. During the consultation, minutes should be recorded, and an email address should be provided for stakeholders to submit their comments, questions, and concerns. The project team should address these inputs and integrate responses into the final draft of the Environmental Impact Assessment (EIA).

9.1 Objective

The objective of the plan is to outline the purpose and goals of the project, define the scope of work, provide environmental baseline data, detail the monitoring program, and assess potential impacts along with their mitigation strategies. The aim of the plan is to address any questions and concerns stakeholders may have, as well as to gather and evaluate suggestions to incorporate them into the project design where feasible.

9.2 Institutional Arrangement for Plan Implementation

The Ministry of Finance as the Executing Agency (EA) is responsible for leading and implementing the Project Consultation Plan.

9.3 Public Consultation Progress

The consultation process should ensure that all affected and interested parties likely to be directly or indirectly affected by The Project's activities are invited to participate.

The consultation process shall consider at least the following elements:

- Relevant stakeholders.
- Relevant documents to disclose and availability of information.

- Public consultation plan and template format.
- Event disclosure.
- Public consultation report template.
- Public consultation budget.

Below is a detailed description of each stage of the consultation process.

9.3.1 Relevant Stakeholders

Relevant stakeholders include all organizations and persons directly and/or indirectly affected by The Project. These persons will be affected most by development and therefore their input and concerns are important.

Table 15 below shows at minimum the relevant stakeholders that should be invited to participate. Note that any other stakeholders not mentioned in that may provide decision makers with broad, representative and meaningful input are welcome to join the meeting.

Table 15: Relevant Stakeholders

Type	**Stakeholder**	**Relationship with the Program/Project**
Investors and Financial Institutions:	Ministry of Finance	Executing Agency
Government and Regulatory Bodies	Department of Environmental Planning and Protection Ministry of Energy and Transport	Interested party
Utility Companies and Technology Providers	Bahamas Power and Lighting	Interested party
Local Communities and Residents:	Population of the communities reached by the Project and community in general.	Interested party
Local Communities and Residents:	Beneficiary Population of the Program: area residents	Affected party

Environmental Organization	Program Executing Unit (PEU)	Executing Agency

9.3.2 Documents Disclosure and Location of Available Information

Below are the documents that should be available to the public for at least 14 days prior to the consultation events. Both digital and hardcopies of the below document should be available for the public and other relevant stakeholders.

- Environmental and Social Assessment, including the Environmental and Social Management Plan (first draft, Fit for Disclosure)
- Summary information on the Project (description, works, etc.)

9.3.3 Public Consultation Plan and Template Format

1. Schedule and Confirm the Public Meeting:
    a. Set a date for the public meeting in consultation with relevant personnel from the Ministry of Finance and other key stakeholders involved in the Blue Hills Solar Microgrid Project.
2. Venue Reservation:
    a. Reserve and pay for the chosen venue no less than two (2) weeks prior to the public meeting date.
    b. Ensure the venue can accommodate at least 100 attendees and is equipped with necessary facilities, including a functional sound system and Wi-Fi.
    c. If the venue does not provide seating, arrange for the rental of chairs for a minimum of 100 persons.
3. Travel Arrangements:
    a. Finalize and pay for transportation (car rental and/or boat rental) and airline reservations for all attendees at least one (1) week before the public meeting.
4. Publicity and Communication:
    a. Draft a newspaper advertisement to inform the community about the public meeting. The ad should include:
    b. The date, time, and location of the meeting.
    c. A brief overview of the topics to be discussed regarding the Blue Hills Solar Microgrid Project.
    d. A Zoom link for virtual attendance, ensuring that remote participants can join the meeting.
    e. Information on where to access both the online version and hard copies of the Environmental Impact Assessment (EIA) for the project.

f. Contact details for inquiries, including an email address for the Director of the Department of Environmental Planning and Protection (DEPP) and a representative from the Ministry of Health.
g. Publish the ad twice per week for fourteen (14) business days leading up to the meeting date.
h. Place the advertisement in two different newspapers (e.g., The Tribune and The Guardian) to maximize reach.

9.3.4 Monitoring and Evaluation

The following methods outlined below will allow the Ministry of Finance (MoF) and other executing agencies will ensure that stakeholder engagement for the Blue Hills Solar Microgrid Project is effectively tracked, evaluated, and integrated into the project planning and implementation process.

9.3.4.1 Methods for Tracking Engagement Activities and Outcomes

Record Keeping: The Ministry of Finance (MoF) and other executing agencies will maintain detailed records of all engagement activities, including public meetings, workshops, surveys, and focus groups. Documentation will include attendance, key discussion points, and feedback received.

Feedback Tracking Systems: MoF and the executing agencies will implement a centralized system to collect and track stakeholder feedback from various channels such as surveys, email, and social media. All comments and concerns will be logged and categorized for comprehensive analysis.

Engagement Reports: Regular reports summarizing engagement activities, stakeholder feedback, and responses will be generated by MoF and the executing agencies. These reports will be updated periodically to reflect ongoing engagement efforts and outcomes.

9.3.4.2 Criteria for Evaluating The Effectiveness of Engagement Efforts

Stakeholder Participation: MoF and executing agencies will measure the level of participation and diversity of stakeholders engaged in the consultation process. This will include assessing whether key stakeholder groups, including local residents, businesses, and government agencies, were adequately represented.

Feedback Quality: The quality and relevance of the feedback received will be evaluated by MoF and the executing agencies. They will determine if stakeholder concerns and suggestions are substantive and address significant aspects of the project.

Response and Integration: MoF and executing agencies will review how effectively stakeholder feedback has been integrated into the project planning and decision-making processes. This includes assessing whether adjustments were made in response to stakeholder input and how these changes were communicated.

Community Sentiment: MoF and the executing agencies will monitor community sentiment and overall support for the project through surveys, social media sentiment

analysis, and feedback from public meetings. They will evaluate if engagement efforts have positively impacted public perception.

9.3.4.3 Process for Incorporating Stakeholder Feedback into the Project

Feedback Analysis: MoF and the executing agencies will systematically analyse stakeholder feedback to identify common themes, concerns, and suggestions. They will prioritize issues based on their significance and feasibility of addressing them.

Decision-Making Integration: Relevant feedback will be incorporated into project planning and decision-making processes by MoF and the executing agencies. Changes or adjustments based on stakeholder input will be documented and justified.

Communication of Changes: MoF and the executing agencies will clearly communicate how stakeholder feedback has influenced project decisions. Stakeholders will be updated on the changes made and how their input contributed to these adjustments.

Ongoing Engagement: MoF and the executing agencies will continue to engage with stakeholders throughout the project lifecycle to address any new concerns and provide updates on how feedback is being integrated. The engagement process will remain dynamic and responsive.

10.0 GRIEVANCE MECHANISM

A Grievance Mechanism (GM) is necessary to give stakeholders an opportunity to express their views, values, interests, issues, and concerns about the proposed development and receive a response and consideration about their concerns from the Project Execution Unit (PEU) and the Ministry of Finance. The GM is developed for The Project to manage feedback/claims.

Principles of the GM are as follows:

- Comply with all National Legislation and International Standards.
- Should be accessible to all.
- Should respect all local customs and culture in The Project areas.
- Should be fair, and uphold integrity, confidentiality, and anonymity.
- Will be non-discriminant against persons submitting a claim (complainant).
- Should foster constructive communication between the communities and the administration.
- Should provide clear procedures on addressing sexual assault/harassment or any gender-based violence related incidents, offering protection to the survivor throughout the whole resolution process.

10.1 Objective

The purpose of a GM is to create a management process that provides opportunities for stakeholders, such as the local community, government institutions, and business

owners, to express their views and concerns. It also allows the PEU and other relevant parties (such as Contractors) to consider and respond to the stakeholders' concerns and include them in The Project's design processes and during active works. The objectives of this mechanism are:

- Ensure transparency between The Project and the relevant stakeholders.
- Take into account the level of risk and possible negative impacts on the affected areas.
- Ensure that all complaints are kept confidential.
- Give stakeholders a free and accessible way to voice their concerns and suggestions. The process should be clear and simple to ensure everyone is able to understand and participate.
- Allow the community and other stakeholders to raise concerns, suggestions and complaints anonymously. This ensures that any personal data (name, address) of the complainant are not recorded.
- Define a methodology for receiving, documenting, evaluating, tracking, and resolving concerns, suggestions, and complaints in a timely manner.

The following are the key issues regarded by the grievance mechanism but are not to them:

Environmental Coverage:

- Environmental Risks and Impacts
- Biodiversity Impacts
- Critical Habitats
- Natural Habitats
- Protected Areas
- Sustainability of Land and Water
- Pollution Prevention
- Resource Efficiency
- Climate Change
- Waste Management
- Emissions

Social Coverage

- Vulnerable Groups and Discrimination
- Gender-based Violence, sexual assault/harassment, and Discrimination
- Land and Natural Resource Access
- Loss of Access to Assets or Resources or Restrictions on Land Use
- Cultural Resources

Working

- Community Health and Safety

- Safe Working Conditions
- Child Labor and Forced Labor
- Labor Management Relationships
- Building Safety
- Traffic and Road Safety
- Security Personnel

10.2 Grievance Mechanism Process

The GM process is intended to be used by any person or organization wishing to voice their concerns, views, and suggestions about The Project's planned activities.

10.2.1 Receive Complaints

For the reception of any grievance, a specific email and mailbox will be enabled and provided. Information on where to send grievances should be shared with the public through different channels. Some channels include:

- **Media Ads:** television, radio, and newspaper.
- **Social Media:** Including but not limited to WhatsApp, Twitter, Instagram, and Facebook.
- **Signs at the work site:** At least one sign at the entrance of the site will include information about the onsite Contractor and PEU inclusive of a telephone number and email address for contacting them. Contact information will also be provided for the Ministry of Finance (MoF), Department of Environmental Planning and Protection (DEPP), and Ministry of Works.
- **Public Meetings:** In these meetings, the Contractor and proprietor contact details for receiving complaints (telephone, email and/or website) will be shared.
- **Other** (to be agreed upon by the local community).

Grievances can be submitted via the following channels:

- By phone: X
- Institutionnel email : X
- During the public consultation public meeting.

All complaints and claims received will be recorded and documented. The record will include a summary of the complaint or claim, the date it was received, and a reference to any supporting documentation (for example, images).

10.2.2 Evaluate Complaints

Once received, grievances will be evaluated to determine their seriousness and assigned a responsible person. If the claim is in reference to construction activities, the PEU will respond to the grievance.

Complaints received will be categorized according to the following:

- **NOT ADMISSIBLE:** These are complaints or claims that are not directly related to the work, its Contractors, and the actions of The Project. This may also include complaints related to labour issues.
- **LOW IMPORTANCE:** These are complaints or claims that require explanations, additional information, or clarification on project activities to the complainant. This category may also include complaints that have been previously evaluated and received a definitive response from The Project.
- **MEDIUM IMPORTANCE:** These may include grievances related to health, the environment, transportation, and Contractors and Sub-contractors.
- **HIGH IMPORTANCE:** These include grievances related to the safety of personnel, health and safety of construction workers or environmental accidents such as fuel spills or fire.

All grievances should be evaluated within one (1) week of the reception date. Should additional information be required, the complainant will be contacted. Once the complaint is completed and reviewed, project staff will proceed to register/document the complaint.

10.2.3 Management of Claims

All grievances should be addressed in a timely manner. All concerns and complaints should be addressed and communicated to the interested party within the following deadlines (Note: deadlines can be adjusted by the PEU):

- Low importance complaints - within maximum period of 30 calendar days
- Medium-importance complaints - within 15 calendar days, and
- High importance complaints- within a maximum period of 7 calendar days.

The management of claims is the responsibility of the PEU. Personnel within the PEU may seek participation from other departments or outside parties (i.e., Contractor, technical specialist) according to the complaint/claim.

10.2.4 Conflict Resolution

In the case where the grievance cannot be resolved, either due to the complaint being rejected, an agreement between parties cannot be reached, or a complainant wishes to challenge/appeal the decision; the PEU may seek the participation or input from independent third parties or hold mediation /meetings/discussion forums in efforts to resolve the matter.

10.2.5 Monitoring

Upon resolution of a grievance, the PEU and any other personnel managing the claim will communicate with the complainant to ensure that management of the grievance was reasonably conducted. They are also responsible for communicating the progress of the complaint process, and ensuring the complainant's participation is included in the process.

A follow-up form will be completed after resolution of each complaint or grievance to confirm that the resolution measures are being implemented.

Post monitoring will be conducted to ensure that all complaint resolution measures are being implemented effectively.

10.2.6 Reports

All grievances will be systematically documented by the PEU. The Grievance report should detail all the actions and processes that were conducted to resolve the complaints submitted in relation to the Project. It should include:

- Date on which the complaint was registered.
- Person responsible for the complaint.
- Information on the remedies proposed/communicated by the complainant (if applicable).
- Date on which the complaint was closed; and
- The date of the response was sent to the complainant.

10.2.7 Post Grievance Monitoring

Post Grievance Monitoring will be conducted to ensure that all resolutions are implemented and are effective. The GM should be designed to be adaptive and able to be modified to allow for improvement and to be updated as needed.

It is recommended that post monitoring should be for an estimated time of six (6) months from the resolution to the claim.

11.0 REFERENCES

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White, Anthony W. A Birders Guide to the Bahama Islands (including Turks and Caicos). American Birding Association, Inc. Colorado, USA.1998.

Zegarra, Maria Alejandra; Schmid, Juan Pedro; Palomino, Luis; Seminario, Bruno. Impact of Hurricane Dorian in The Bahamas: A View from the Sky Jan 2020. http://dx.doi.org/10.18235/0002163

APPENDICES

Appendix A: Project Conceptual Plans

Appendix B: Wellfield Report

Appendix C: JSS Consulting Personnel Curriculum Vitae

JANEEN MARLO **BULLARD**

#25 Turnquest Alley · Nassau, Bahamas (242) 357-9262 (C)
Email : Jmbullard109@gmail.com

EXPERIENCE

2011 – PRESENT

ENVIRONMENTAL SPECIALIST, PRINCIPAL OF JSS CONSULTING LTD

- On The Bahamas Department of Planning and Protection approved Environmental Consultant list (2019-present).

PROJECTS

- Disney Lighthouse Point Cruise Port Development, Eleuthera, Bahamas Environmental Management (EM)
- Adelaide Creek Development Project; Nassau, The Bahamas
- Environmental Impact Assessment (EIA), Environmental & Social Baseline Assessment (ESBA), Environmental & Social Management Plan (ESMP), and Marine Assessment of the Exuma International Airport Infrastructure Project, Exuma, The Bahamas
- North Eleuthera International Airport Infrastructure Project ESBA & ESMP
- Community Based Conch Management in the Family Islands, Conch Farm Feasibility Study and Environmental Baseline Assessment (EBA)
- Rose Island Development; Rose Island, The Bahamas Marine Assessment for EIA
- Paradise Island, Royal Caribbean, The Bahamas, Marine Assessment for EIA
- Coco Cay Island Development, Coco Cay, The Bahamas Environmental Management (EM), Botanical, Marine and Avian Assessment EIA, EBA), Environmental Management Services (EMS) and EMP
- Ocean Cay, Bimini, The Bahamas; EMS, Coral Relocation Monitoring, Public Outreach, Rapid Ecological Assessment (REA)
- Big Pond National Park Development, EMP & EMS Conducts Residential and Commercial house plans.
- The Harbor View Marina Project, Nassau, The Bahamas EBA, EMP
- The Staniard Creek Bridge and Causeway Replacement Central Andros, The
- Bahamas, EMP
- Briland Residence and Marina, Harbour Island, The Bahamas, and Marine Assessment for EIA
- South Andros and Cat Island Water Improvement Project, EMP, EMS
- Barbuda Airport, Antigua and Barbuda, Herpetological Assessments for EIA
- North Windermere Island, Eleuthera, The Bahamas; Marine Assessment for EIA
- The Pointe Marina Development: Nassau, The Bahamas; EMP, EMS
- The Big Pond Park Development Project, New Providence, The Bahamas EMS
- Orchid Bay; Abaco, The Bahamas; Marine Assessment for EIA
- Airport Gateway Project, New Providence, The Bahamas; EMS

- White Bay Cay, Exuma Cays, The Bahamas; Marine Assessment

- Stocking Island, Exuma Cays, The Bahamas; Botanical, Avian and Marine Assessment for EIA
- February Point, Exuma, The Bahamas; Avian and Marine Assessments for EIA
- Deep Water Cay, Grand Bahama, The Bahamas; Wetland Assessment
- Matt Lowe Cay, Abaco Cays, The Bahamas; Avian Assessment for EIA
- Governor's Harbour Amy Base, Eleuthera, The Bahamas; Avian for EIA
- Abaco Forestry, Abaco, The Bahamas; Botanical Assessment for EIA
- The Pointe, New Providence, The Bahamas; Marine Assessment for EIA
- Norman's Cay, Exuma Cays, The Bahamas; Botanical and Avian Assessment for EIA
- Ocean Cay, Bimini, The Bahamas, Avian Assessment for EIA & EMS
- LNG Pipeline, New Providence, The Bahamas; Marine Assessment for EIA
- White Bay Cay, Exuma, The Bahamas; Marine Assessment for EIA
- Old Fort Bay Town Center, New Providence, The Bahamas; Avian Assessment, EIA and EMP
- Bimini Bay, Bimini, The Bahamas, Marine Assessment for EIA
- Hurricane Hole Marina, Paradise Island, The Bahamas; Marine and Stakeholder Assessment, EBA, oral relocation and monitoring & EMS
- Sandals, Exuma, The Bahamas, Avian Assessment for EIA
- Finley Cay, New Providence, The Bahamas; Marine Assessment EIA
- Elbow Cay, Abaco, The Bahamas, Marine Assessment for EIA
- Hermitage, Exuma, The Bahamas; Botanical and Avian Assessment for EIA
- Governor's Harbour Army Base, Eleuthera, The Bahamas; Avian Assessment for EIA
- Bahamar Back of House, New Providence, The Bahamas; Botanical Assessment and Protected Trees Survey
- Witches Point, Abaco, The Bahamas, Marine Assessment for EIA
- Buttonwood Reserve, Eleuthera, The Bahamas, Botanical assessment for EIA
- Master Harbor, Exuma, The Bahamas, Botanical Assessment for EIA
- Hog Cay, Exuma, The Bahamas; Botanical and Avian Assessment for EIA
- Exuma Highway, Exuma, The Bahamas; Botanical Assessment for Highway Feasibility Study
- University of the Bahamas, New Providence, The Bahamas, Avian Assessment for EIA
- Caribbean Global Timber, Abaco and Andros, The Bahamas, EIA

PROJECT COORDINATOR,

- Cane Toad Eradication, Lyford Cay, Nassau, The Bahamas
- Cane Toad Eradication, Marsh Harbour Abaco, The Bahamas

2006 – 2011

PARKS PLANNER AND COMMUNITY LIASION OFFICER, BAHAMAS NATIONAL TRUST, NASSAU, BAHAMAS DUTIES

- Develop proposals to government for the establishment of new National Parks.
- Grant writing
- Develop General Management Plans for existing National Parks.
- Work with surrounding communities to gain support for the importance of establishing new National Parks.

- Project Management for the establishment of the Leon Levy Native Plant Preserve, Eleuthera, The Bahamas.
- Manage all daily details and education of staff for educational programs.
- Organize all special events for the Education Department.
- Liaise with corporate sponsors to further fund educational programs.
- Develop marine education lesson plans and activities (on and off site) for grade levels K-12 and college students.
- Attendance and professional presentations at events both locally and abroad.
- Development of the National High School Marine Science Curriculum.

2001 – 2004

RESEARCH ASSISTANT, TUSKEGEE UNIVERSITY, TUSKEGEE, ATLANTA

- Developed and maintained research projects in conjunction with Tuskegee University and NASA.
- Aided in the daily maintenance and running of a greenhouse.
- Organized and taught Environmental and General Biology courses.

1999 – 2001

MARINE MAMMAL TRAINER, DOLPHIN ENCOUNTERS, BLUE LAGOON, NASSAU, BAHAMAS

- Trained Atlantic Bottlenose Dolphins in educational and interactive programs.
- Assisted in developing marine conservation and educational programs.

EDUCATION

2004

MS.: BIOLOGY (CONCENTRATION IN PLANT AND SOIL SCIENCE), TUSKEGEE UNIVERSITY

Thesis:

- The Effects of Superoptimal Co2 on the Growth, Yield, Gas Exchange, Stomatal Conductance and Starch of Sweet Potato and Peanut.

1999

BS: MARINE BIOLOGY, TUSKEGEE UNIVERSITY

AUTHOR

- Conch Farming Feasibility Study (Present)
- The Bahamas Sixth National Report on Biological Biodiversity to The Convention on Biological Diversity (2019)
- Co-Author of the "Andros Sustainable Development Masterplan" (2014)
- Author of the "Critical Situation Analysis of Invasive Alien Species for The Bahamas" (2013)

PROFESSIONAL TRAINING

- 2019 IDB Principles of the Review of Environmental Impact Assessments
- 2019 The Perry Institute of Marine Science, AGRRA Benthic Survey Techniques
- 2018 Georgia Tech Professional Education Center – OSAHA Approved Trainer
- 2017 Conservation Training Introduction to Resilience for Development
- 2017 Inter-American Development Bank Project Management Techniques for Development Professionals
- 2015 IICA, Efficient use of Rainwater and Runoff in Agricultural Activities, Chitre, Panama
- 2015 IICA, Agro-Eco Tourism Training Workshop
- 2014 Commercial Training Center of Department of Commerce, Hainan Province, China Climate Change on Tropical Island and Economic Development for Developing Countries
- 2013 The Nature Conservancy, Coral Reef Restoration
- 2013 The Nature Conservancy, AGRRA Coral Surveys
- 2010 The Bahamas National Trust, Business Writing 2010 The Bahamas National Trust, Public Presentation
- 2009 The Nature Conservancy, Invasive Species Management
- 2009 College of The Bahamas, Mangrove Forest Ecology, Management and Restoration
- 2008 International Fund for Animal Welfare, Certificate of Completion for Whale Watch Guide Training
- 2006 National Association of Interpretation, Certified Interpretive Guide 2006 Tuskegee University, 1st Place Graduate Oral Presentation Sigma Xi
- 2005 Tuskegee University, Certificate of Effective Leadership
- 1995 Auburn University, NAUI Scuba Certified

PROFESSIONAL AFFLIATIONS

- SEEDS-Ecological Society of America
- Sigma Xi Scientific Research Society
- Beta Kappa Chi Honor Society National Association for Interpretation
- National Marine Educators Association Name of Organization

PRESENTATION AND INVITIED LECTURES

- Policies, Strategies and Best Practices for Managing Invasive Alien Species (IAS) in the Insular Caribbean March 31st – April 4th, 2014, Trinidad. Port of Spain, Trinidad & Tobago. The Cane Toad Invasion: Its Origin, Status and The Bahamas' Response to prevent spread.
- Policies, Strategies and Best Practices for Managing Invasive Alien Species (IAS) in the Insular Caribbean March 31st – April 4th, 2014, Trinidad. Port of Spain, Trinidad & Tobago.
- Developing a National IAS Strategy focused on IAS prevention – a case study of The Bahamas' 2003 -2013 experience.
- Bahamas Natural History Conference 2016 The Cane Toad Invasion: Its Origin, Status and The Bahamas' Response to prevent spread.
- Bahamas Natural History Conference 2018 Citizen Science and Community Involvement can help! Invasive Cane Toads (*Rhinella marina*) control in The Bahamas continues.

REFERENCES

- Available Upon Request

STARR CARTWRIGHT-FRANCOIS

#52 Boatswain Hill East · (242) 820-8476 (H) (242) 426-1653 (C)
Email : starr.francois24@gmail.com

EXPERIENCE

MAY 2016 – JULY 2016
CASHIER, SUPERVALUE

JULY 2016 – NOVEMBER 2018
DESK CLERK, TITAN ENTERPRISES

- Responsible for the filing of all documents, monthly and yearly reports of inventory stock, and cash transactions for customers.

NOVEMBER 2018 – DECEMBER 2018
HR ONBOARDING COORDINATOR (TEMP), BAHA MAR

- Responsible for transferring KYC documents on file onto an online system for the company.

MAY 2019 – JULY 2019
FUND ADMINSTRATOR/RECEPTIONIST (TEMP), INVESTAR SECURITIES LTD.

- Responsible for administrating and setting up investment accounts for customers as well as inform customers about investment opportunities.

NOVEMBER 2020 – MARCH 2021
DESK CLERK, TITAN ENTERPRISES

- Responsible for the filing of all documents, monthly and yearly reports of inventory stock, and cash transactions for customers.

APRIL 2022 – CURRENT
ENVIRONMENTAL SPECIALIST, JSS CONSULTING

- Responsible for preparing, constructing, and reviewing environmental reports, management plans and impact assessment, conduct field assessments, and environmental monitoring of site projects.

EDUCATION

APRIL 2020
BSC.: SMALL ISLAND SUSTAINABILITY: ENVIRONMENTAL AND ECOSYSTEMS MANAGEMENT- MARINE SC. (W/ DISTINCTION), UNIVERSITY OF THE BAHAMAS

Relevant Courses:

- Conservation Studies

- Small Island Economies Sustainability
- Marine Biology & Marine Ecology
- Introduction to Marine and Coastal Zone Management
- Ichthyology and Fisheries Management
- Valuation of Natural Resource Economics
- Environmental Impact Studies

JUNE 2015
HIGH SCHOOL DIPLOMA (W/ HONORS), MT. CARMEL PREPRATORY ACADEMY

SKILLS

- Research skills
- Skilled in underwater and surface drone usage
- CPR Certified
- Open Water Dive Certified
- Environmental Monitoring
- Proficient in Microsoft Office
- Communication skills
- Rapid Ecological Assessment and Surveying skills
- Proficient in QuickBooks

PROFESSIONAL DEVELOPMENT & ACHIEVEMENTS

MARCH 2017
FIELD EXPEDITION, UNIVERSITY OF THE BAHAMAS
- Surveyed the coastline of the island of Exuma.
- Conducted a study on how negative anthropogenic activities impact coastal zones.
- Developed potential ideas on how to prevent such impacts within a written report.

FEBRUARY 2018
FIELD EXPEDITION, UNIVERSITY OF THE BAHAMAS
- Assisted Dr. Craig Dahlgren with surveying and collecting data at various sponge beds in Red Bay and Mangrove Cay to assess the current health of sponge populations in Andros, Bahamas

APRIL 2018
FIELD EXPEDITION, UNIVERSITY OF THE BAHAMAS
- Traveled to Mangrove Cay, Andros to survey and analyze the role of marine organisms in rocky intertidal, coral reefs, wetland, and seagrass ecosystems.
- Analyzed the biotic and abiotic factors of each ecosystem surveyed to determine marine organisms' adaptations.
- Determined the effects of human impacts on these environments within in a written report.

JUNE 2018 – NOVEMBER 2018
BEACH SANCTUARY INTERN, BAHA MAR
Interned under the Chief Scientist at the time (Mrs. Vanessa Haley - Benjamin) where I created:
- Sustainable goals (based on the SDG's set by the United Nations) for the company to implement as a part of their green initiative program.

- Assisted in developing short-term and long-term goals that meet LEED Certification requirements for the company to implement and become certified.

FEBRUARY 2019

FIELD EXPEDITION, UNIVERSITY OF THE BAHAMAS

- Traveled to San Salvador, Bahamas to conduct a rapid-ecological survey of coral reef, mangrove wetland, rocky intertidal, and seagrass ecosystems.
- Determine the ecological roles of marine organisms in each environment surveyed.
- Assessed how the impacts of negative anthropogenic activities have affected the health of these ecosystems within a written report.

MARCH 2020

BAHAMAS NATURAL HISTORY CONFERENCE POSTER ACCEPTANCE

- Submitted an abstract on my final thesis paper titled "A Study on the Effects of Changes in Water Quality on the Diversity of Marine Sponges"; however, due to the Pandemic I was unable to present my research at the 2020 conference.

OCTOBER 2022

ENVIRONMENTALIST, BIMINI BAY ASSESSMENT- JSS CONSULTING

- Worked in a team to conduct a marine benthic survey of the area and surrounding coastline.
- Conducted fish surveys.
- Conducted marine surveys that took note of abundance and health for coral, sponges and seagrass beds.
- Composed a report outlining results.

OCTOBER 2022

ENVIRONMENTALIST, JUNKANOO BEACH ASSESSMENT- JSS CONSULTING

- Worked in a team to conduct a marine benthic survey of the area.
- Conducted fish surveys.
- Composed a report outlining results.

December 2022

ENVIRONMENTALIST, THE SALINAS (LONG ISLAND) ASSESSMENT- JSS CONSULTING

- Worked in a team to conduct a marine benthic survey of the area and surrounding coastline.
- Conducted fish surveys.
- Conducted marine surveys that took note of abundance and health for coral, sponges and seagrass beds.
- Composed a report outlining results.

January 2023

ENVIRONMENTALIST, COTTON BAY (ELEUTHERA) ASSESSMENT- JSS CONSULTING

- Worked in a team to conduct a marine benthic survey of the area and surrounding coastline.
- Conducted fish surveys.
- Conducted marine surveys that took note of abundance and health for coral, sponges and seagrass beds.
- Collected and analyzed water quality data.
- Composed a report outlining results.

February 2023

ENVIRONMENTALIST, DISCOVERY BAY (GRAND BAHAMA) ASSESSMENT- JSS CONSULTING

- Worked in a team to conduct a marine benthic survey of the area and surrounding coastline.
- Conducted fish surveys.
- Conducted marine surveys that took note of abundance and health for coral, sponges and seagrass beds.
- Collected and analyzed water quality data.
- Composed a report outlining results.

March 2023

ENVIRONMENTALIST, ROYAL BEACH CLUB (PARADISE ISLAND) ASSESSMENT- JSS CONSULTING

- Worked in a team to conduct a marine benthic survey of the area and surrounding coastline.
- Conducted fish surveys.
- Conducted marine surveys that took note of abundance and health for coral, sponges and seagrass beds.
- Collected and analyzed water quality data.
- Composed a report outlining results.

April 2023

ENVIRONMENTAL MONITOR, SIMMS POINT DEMOLITION (LYFORD CAY)- JSS CONSULTING

- Ensured company's compliance with the project's EMP.
- Monitored air, water and noise pollution.
- Ensured the use of PPE's on site.
- Monitored and ensured the proper waste management of demolition debris.
- Composed daily and monthly reports.

June 2023

ENVIRONMENTAL MONITOR, HIDEAWAY BAY CONSTRUCTION (COCO CAY)- JSS CONSULTING

- Ensured company's compliance with the project's EMP.
- Monitored air, water and noise pollution.
- Ensured the use of PPE's on site.
- Monitored and ensured the proper waste management of construction debris.
- Composed weekly and monthly reports.

March 2024

ENVIRONMENTALIST, PARADISE YACHT CLUB CORAL ASSESSMENT- JSS CONSULTING

- Worked in a team to conduct a marine benthic survey of the area and surrounding coastline.
- Conducted fish surveys.
- Conducted marine surveys that took note of abundance, health and size of coral species
- Collected and analyzed water quality data.
- Composed a report outlining results.

April 2024

ENVIRONMENTALIST, ROMANZA TOWNHOUSES (TURKS AND CAICOS) MARINE ASSESSMENT- JSS CONSULTING

- Worked in a team to conduct a marine benthic survey of the area and surrounding coastline.
- Conducted fish surveys.
- Conducted marine surveys that took note of abundance and health for coral, sponges and seagrass beds.
- Collected and analyzed water quality data.
- Composed a report outlining results.

April 2024

ENVIRONMENTALIST, GALLIPOLI CANAL (TURKS AND CAICOS) MAIRNE ASSESSMENT- JSS CONSULTING

- Worked in a team to conduct a marine benthic survey of the area and surrounding coastline.
- Conducted fish surveys.
- Conducted marine surveys that took note of abundance and health for coral, sponges and seagrass beds.
- Collected and analyzed water quality data.
- Composed a report outlining results.

April 2024

ENVIRONMENTAL MONITOR, ROYAL BEACH CLUB DEMOLITION (PARADISE ISLAND)- JSS CONSULTING (ON-GOING)

- Ensured company's compliance with the project's EMP.
- Monitored air, water and noise pollution.
- Ensured the use of PPE's on site.
- Monitored and ensured the proper waste management of demolition debris.
- Monitored and ensured the proper management of the relocated terrestrial species was conducted.
- Composed weekly and monthly reports.

CERTIFICATIONS

OCTOBER 2020

UNCC

- Integrating Climate Risk Information into NAPs: Producing Climate Information for NAPs
- Integrating Climate Risk Information into NAPs: Using Climate Information for NAPs

August 2022

THE NATURE CONSERVANCY & REEF RESILIENCE NETWORK

- Global Mangrove Watch

February 2024

PADI

- Open Water Dive Certification

June 2024

THE BAHAMAS RED CROSS SOCEITY

- CPR and First Aid Certification

REFERENCES

- Available Upon Request

KRISTOFF **FRANCOIS**

Farrington Rd · 1-242-828-8705
Kfrancois93@gmail.com · Kristoff Francois (Linked-In)

An experienced environmentalist with over seven (7) years of fieldwork in botany, ornithology, and herpetology. With an unmatched passion for conservation.

EXPERIENCE

2022 – CURRENT
BOTANICAL & AVIAN FIELD TECHNICIAN, JSS CONSULTING

- Conduct Botanical and Avian assessments of areas that are proposed for development.
- Create and publish comprehensive reports of areas assessed.

2014 – 2022
PARK WARDEN, BAHAMAS NATIONAL TRUST

- Serve as a successful park manager, enforcer, and maintenance officer.
- Aided in the creation of a SOP document for Primeval Forest National Park.
- Created a Tour Manual for Primeval Forest National Park.
- Aided with countless scientific research projects and other initiatives.
- Trained and supervised new park attendants and wardens.
- Served as intern at the Leon Levy Native Plant Preserve.
- Served as a core team member for the Southwestern team during the annual Christmas Bird Count.
- Created an SOP and Tour Manual for Primeval Forest National Park.
- Aided with countless scientific research projects and other initiatives.

2012 – 2013
LABOURER, CARIBBEAN LANDSCAPE LTD

- Assisted with detailed landscape and maintenance work.
- Proficient in tools of the trade i.e., **chainsaw** etc.

EDUCATION

JANUARY 6TH 2021- CURRENT
B.S. BIOLOGY WITH CHEMISTRY, THE UNIVERSITY OF THE BAHAMAS

- Currently in my second year with an accumulative G.P.A. of 2.98.

JUNE 2010
HIGH SCHOOL DIPLOMA, C R WALKER SENIOR HIGH SCHOOL

- Graduated with a 3.00 accumulative G.P.A with five BGCSEs with a grade score of C or above including Mathematics and Language Arts.

SKILLS

- Interpersonal Communication Skills
- General Management
- Problem solving
- Adaptability
- Time Management

CERTIFICATIONS

- B-Class Boat Captain's License.
- Marine Protected Areas Law Enforcement Training (Fisheries)
- Demarcation Buoy Construction
- Prescribed Burning Certification (Forestry)
- Bahamas Forestry Inventory Certification (Forestry)
- Highly Effective Teams Certification (The Nature Conservancy)
- Competent Communicator Award (Toastmaster's International)
- Terrestrial Habitat and Plant Taxonomy Training (Leon Levy Native Plant Preserve)

REFERENCES

- Available Upon Request

SHAWNA SMITH

DETAILS

Contact
Email: shawnasmithfield@outlook.com
Cell phone Number: (242)-421-2645

Nationality
Bahamian

Date of birth: 1st May 2002
Nassau, The Bahamas

PROFILE

Hardworking and enthusiastic University graduate with a B.S. in Biology with a minor in chemistry. Dedicated, hardworking, and committed to becoming a dependable and valuable team member. Seeking to use my wealth of experience in the Environmental Meld and to effectively serve your company in any position.

EMPLOYMENT HISTORY

Intern at The Bahamas National Trust, Lindy Knowles, Nassau

- Gained experience with google earth, benthic analysis software, audacity audio software which analyses and identifies various bird calls and songs. As well basic drone operational skills.
- Gained experience with bird identification, plant identification, and fish identification

Intern at the Royal Bahamas Police Force Forensic lab, Ministry of National Security , Nassau

AUGUST 2023 - AUGUST 2023

- Worked in the toxicology, chemistry, and Firearms departments of the Forensic Lab, where I gained a wealth of knowledge and skills
- Gained approximately 409 hours of lab experience and worked with sophisticated eRuipment such as ELISA

Intern at BRON , Mark Daniels and Agnessa Ludny , Nassau

JULY 2023 - JULY 2024

- Worked in the environmental department and taught the process of writing environmental management plans and environmental impact assessments
- Gained experience as an environmental monitor and the skill to assess a site for any environmental infraction outlined by the Department of Environmental Planning and Protection (DEPP) and write a written report on a weekly basis

Intern at The Leon Levy Plant Preserve , Ethan Freid , Eleuthera

MAY – 2022 JULY – 2022

- Worked under a renowned botanist, Ethan Freid, and learned to identify native, endemic, and invasive plant species found on the various islands of The Bahamas
- **Gained experience in terrestrial surveying and flora identification of plants and trees protected under the Protected Tree and Plant Act.**

EDUCATION

Bsc in Biology with a minor in chemisty , The University of The Bahamas, Nassau

MAY 2024

SKILLS

Communication

Effective Time Aanagement

Ability to Work in a Team

People Skills

Ability to Work Under Pressure

Fast Learner

Great Organiational Skills

EXTRA-CURRICULAR ACTIVITIES AND ACCOMPLISHMENTS

FEMSTEM Bahamas , Mrs. Tyronda Glinton , Nassau

JUNE 2019 - CURRENT

FEMSTEM Bahamas is a non-profit organization in The Bahamas that seeks to lessen the gap between the number of opportunities offered to men in STEM compared to women in STEM. During my time in FEMSTEM Bahamas, I assisted in any capacity I could. Either that may be a host for a program, an after-school facilitator, a podcast host, etc.

National Youth Award - Youth In The Environment

OCTOBER 2021

Nominated for a national youth award in the category youth in the enviroment.

COURSES

Certificate in Backyard Farming , BASMI

FEBRUARY 2021 - MAY 2021