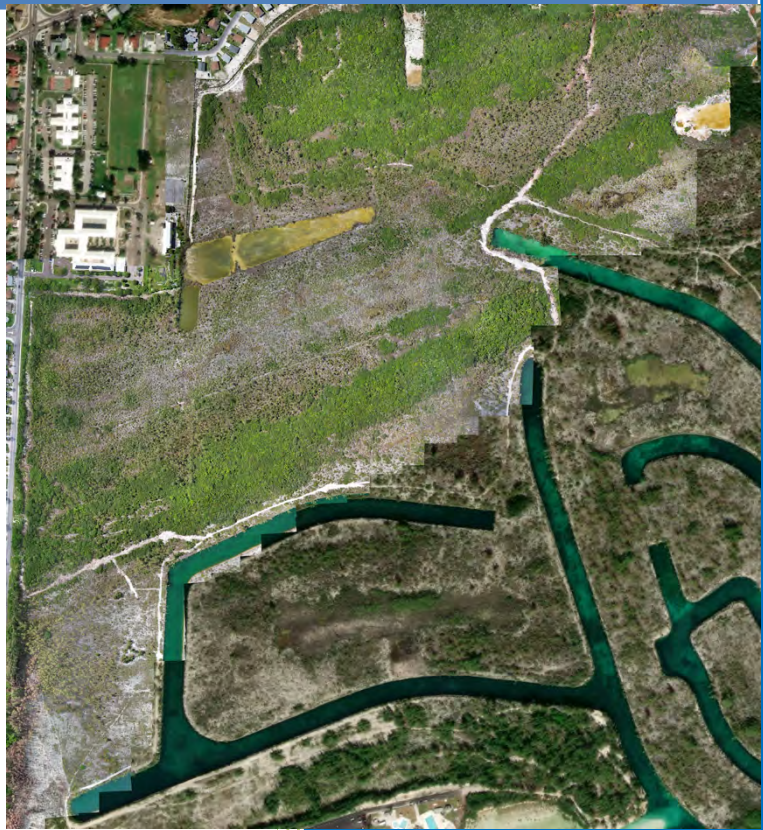




# Environmental Impact Assessment for CV Bethel Microgrid Project, New Providence



Prepared by SEV Consulting Group  
August 2024

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## **Executive Summary**

The objective of the Environmental Impact Assessment (EIA) for the CV Bethel microgrid project is three-fold:

1. To evaluate potential environmental impacts of the proposed project;
2. To suggest potential mitigation measures that can be implemented to reduce or eliminate any negative environmental impacts; and
3. To evaluate whether the proposed project can be implemented in a manner that is environmentally sustainable.

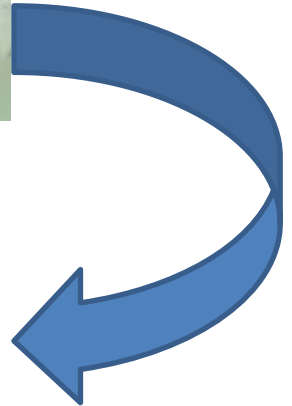
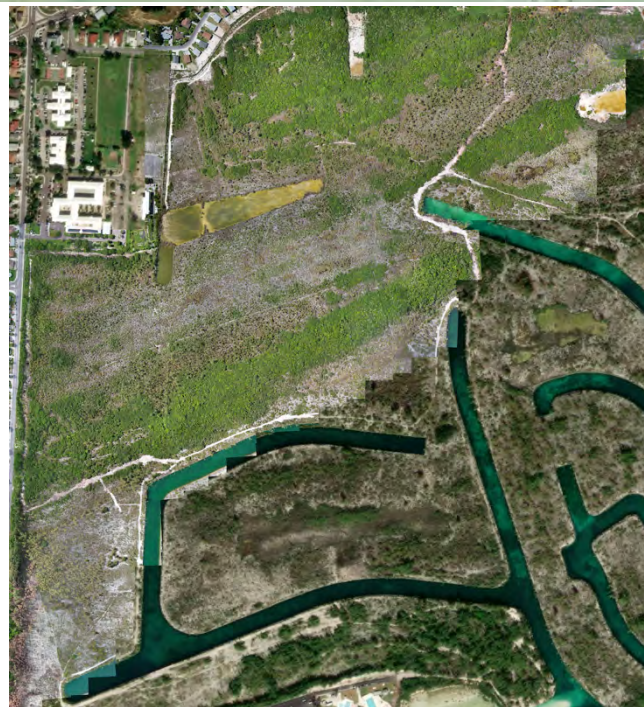
The CV Bethel microgrid project involves the construction of a 20-megawatt solar microgrid. The project is a design-build project being implemented by the Project Execution Unit at the Ministry of Finance.

The largest environmental impact from the project will be the clearing of vegetation for the solar panels and associated infrastructure.

Employment of appropriate design and planning methodologies can result in execution of the CV Bethel microgrid project in a more sustainable manner. Utilizing the recommended mitigation measures can minimize any negative environmental and socio-economic impacts.

The Ministry of Finance Project Execution Unit (PEU) has expressed its commitment to implementing the recommended mitigation measures to minimize negative environmental and socio-economic impacts from the project.

Map 1: Location of CV Bethel microgrid project, New Providence



## **1.0 Introduction and objectives**

### **1.1 Objective of the EIA**

The objective of the Environmental Impact Assessment (EIA) for the CV Bethel microgrid project is three-fold:

1. To evaluate potential environmental impacts of the proposed project;
2. To suggest potential mitigation measures that can be implemented to reduce or eliminate any negative environmental impacts; and
3. To evaluate whether the proposed project can be implemented in a manner that is environmentally sustainable.

### **1.2 Scope of the EIA**

The EIA involved field surveys and research focused on the project site and its environs. Surveys conducted included plant, animal and avifaunal surveys in the terrestrial environment. Collection of socio-economic data was done through census data provided by the Bahamas Department of Statistics.

## 2.0 Project description and alternatives

### 2.1 Description

The proposed CV Bethel microgrid project site is located in southeastern New Providence. The site is bounded by East Street to the west, Pinecrest Subdivision to the north and South Beach canals to the south and east. CV Bethel Senior High School is northwest of the site. A map showing the boundaries of the site is provided in Appendix 1.

Figure 2-1: Aerial image of CV Bethel microgrid site



The nearest public roads are Pine Crest Drive (150 feet or 46 metres from the northern boundary) and East Street-South (approximately 377 feet or 15 metres from the eastern boundary). Land use surrounding the site includes residential properties and a public school (C.V. Bethel). The nearest residential area is the recently established Pine Crest community, with residences at Pine Crest less than 20 feet (6 meters) from the northern boundary. Residential communities extend along East Street-South, the length of the western boundary.

The site consists of 112 acres of land with evidence of prior clearing and modification of the landscape and vegetative cover. Access to the site is restricted, with fencing along the northern boundary (surrounding CV Bethel Senior High School and much of Pinecrest Subdivision) and part of the western boundary (surrounding CV Bethel Senior High School). A series of canals along southern and eastern boundary also restricts access. There are a few trails and paths providing access to the interior of the site, but they are heavily vegetated, making moving into the site a very slow process.

The CV Bethel microgrid project is a design-build project that will involve the construction of a 20-MW solar microgrid to be integrated into the power grid for New Providence. The intent is to clear a minimum of 89% or 100 acres of the site. The site is low-lying and floods in many areas during heavy rains, so it will also need to be filled in and graded to elevate it sufficiently for installation of the solar panels.

**Figure 2-2: Photos of the current site**

**Western boundary adjacent to East Street.**



**Pine woodland area**



**Pine woodland near the canal**



**Areas of coppice cleared for topographic survey**



Examples of the solar panels that may be installed are provided in Figure 2-3. The site plan for the project will not be developed until the design-build phase once a contractor has been selected through the Government tender process.

**Figure 2-3: Examples of solar panels**





## **2.2 Description of alternative to the proposed project**

No alternatives were considered for the project as the Government of The Bahamas owns the property to be utilized for the project. The CV Bethel site is one of five (5) sites on New Providence to be utilized for construction of solar microgrids.

## **2.3 “No action” alternative**

With development, there is always an alternative of ‘no action’ which leaves the proposed site unchanged. If the project is not implemented, the site will remain the same as a semi-disturbed area with some ecological services, including habitat for birds.

### **3.0 Baseline description of New Providence**

New Providence is the most populated island in The Bahamas with 246,329 residents (Department of Statistics, 2010). It is 80 square miles with a population density of approximately 3,079 persons per square mile. On the island of New Providence, the city of Nassau is the capital of The Bahamas and home to Central Government with the Houses of Parliament in the Downtown area.

### **3.1 Physical aspects**

#### **3.1.1 Climate**

The climate of The Bahamas is tropical marine, wet and dry with winter incursions of modified polar air from the North American continent (Bahamas Department of Meteorology, 2021).

The Bahamas is located within the Atlantic Tropical Cyclone basin. This basin includes much of the North Atlantic, Caribbean Sea, and the Gulf of Mexico. On average, 6 to 8 tropical storms form within this basin each year. In 2016, The Bahamas was impacted by Hurricane Matthew with the islands of New Providence, Andros and Grand Bahama receiving severe damage in some coastal areas. In 2017, The Bahamas was impacted by Hurricane Irma. Significant damage occurred on the island of Great Inagua; Crooked Island was impacted as well. The Bahamas was not hit by any hurricanes in 2018.

In 2019, significant areas of the islands of Abaco and Grand Bahama were devastated by Hurricane Dorian. Estimated damage for these islands is US\$3.4 Billion (IDB, 2019). The Bahamas was not affected by any hurricanes in 2021 nor in 2022.

The formation of these storms and possible intensification into mature hurricanes takes place over warm tropical and subtropical waters. Eventual dissipation or modification typically occurs over the colder waters of the North Atlantic or when the storms move over land and away from the sustaining marine environment. The official hurricane season lasts from June 1<sup>st</sup> to December 1<sup>st</sup>.

#### **3.1.2 Topography**

Topographically, the islands of The Bahamas are typically flat with elevations of less than 32 feet (10 meters). A higher coastal ridge may occur, usually located along the exposed side of most islands. Islands of the southeast and central Bahamas are generally of higher elevation than in the northern Bahamas. The islands are usually long and narrow oriented from northwest to southeast with central ridges extending to a maximum height of 200 feet (60 meters).

New Providence is composed of a mixture of rocklands and ridges with coastal wetland areas. The project site is found in the South Beach area in southern New Providence and is comprised of wetland and coppice habitats. Much of southern New Providence has been developed for residential housing with some commercial businesses.

The land surface is a mix of areas of high elevation and flatland, with some lowland. Elevations range from 6.5 feet (3 meters) to 27 feet (8 meters). Two thirds of the site contain elevations that extend between 16 feet and 26 feet (5 to 8 meters), both areas in the northern and southern boundary. These areas are primarily Dry Broadleaf Evergreen Forest (Coppice), which transitions to Pine Woodland

(See Figure 3-5). The lowland area in between these two elevated areas has a range of 7 to 13 feet (2 to 4 meters) and is primarily Marshland.

A copy of the topographic survey for the site is provided in Appendix 2.

### 3.1.3 Geology

The Bahamas archipelago is situated in the western North Atlantic and is comprised of extensive carbonate islands and shallow banks. There are 29 large islands, over 600 small cays, and more than 2,000 rocks, all low-lying. The surface deposits of archipelago are of Late Quaternary limestones from a glacioeustatic sea-level high-stand position; a depositional record of platform flooding and carbonate sediment production. Simply put, alternating glacial expansions and retreats created vast changes in sea levels across geologic time, allowing for the formation of the islands. The islands are tectonically stable, consisting of carbonate sediments with interspersed paleosols (Mylroie, 2016).

With geologic origins that are biogenic and completely carbonate, The Bahamas differs from other islands in the region. The islands rest on shallow water banks which are primarily composed of calcium carbonate sediments. These limestone sediments were created from rapidly growing marine life which extracted calcium carbonate from seawater creating voluminous depositions of sand and mud. The Bahamas consists of eight carbonate banks with the north and central islands resting on two of these banks.

Oolitic sands have also contributed to the geologic development of the islands, specifically during the last ice age when sea levels were significantly lower. It was then that oolitic sand dunes hardened and when sea levels rose, the rock ridges formed by these dunes became islands along the edges of the shallow banks.

Another source of islands in the archipelago are limestone rocklands, which were formed from the seabed when sea levels were at their highest. As sea level declined, the exposed seabed underwent erosion and weathering. The resulting formation was rocklands. Rocklands make up the broader islands in the archipelago (such as Andros and Grand Bahama) and oolitic sand dunes are represented in thin long islands (including Long Island and Cat Island).

Soil composition in the archipelago consists of organic and inorganic materials and the young age of the soil is reflective of the geologic age (young) of the limestone. Soils layers are typically thin and usually arranged in one or two layers above bedrock. Three soil types are recognized throughout the islands: organic, red clay, and sedimentary soils.

The substrate throughout the site is Lucayan Limestone, with hard irregular rock at the surface and minor karst features including sinks, holes, pits, and cavities. Standing water was observed in small, pitted areas, mainly in areas where pine woodland transitions from high to lowland, as pine woodland transitions to marshland. No blue holes were observed on site.

### 3.1.4 Hydrology and hydrogeology

In The Bahamas, the physical geology, hydrogeology, and water resources are very directly linked as there are no true rivers in The Bahamas. The only natural means of recharge for the underlying freshwater resources is via rainfall. The groundwater resources of the Commonwealth of the Bahamas comprise the fresh, brackish, saline and hypersaline waters found in the subsurface and in the lakes and ponds that intercept the land surface. Most of the freshwater resources occur as three-dimensional lens-shaped bodies, which overlie brackish and saline water referred to as Ghyben-Hertzberg lenses (see Figure 3-1).

Figure 3-1: Ghyben-Hertzberg Lens

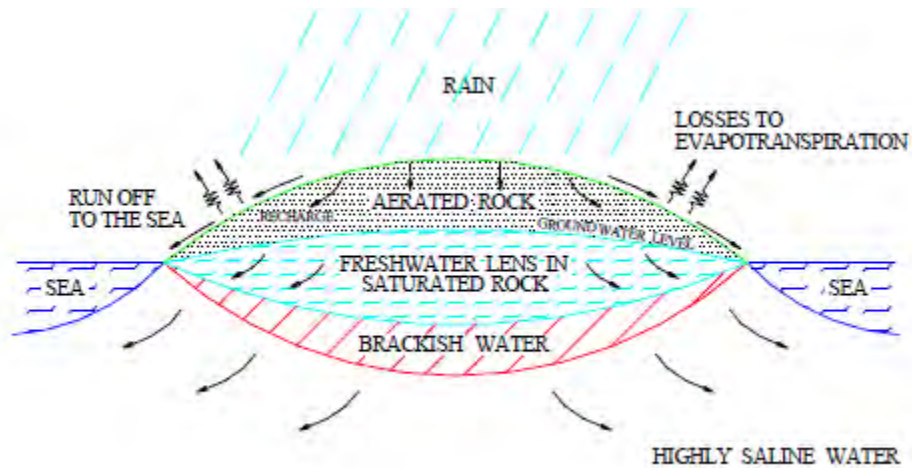
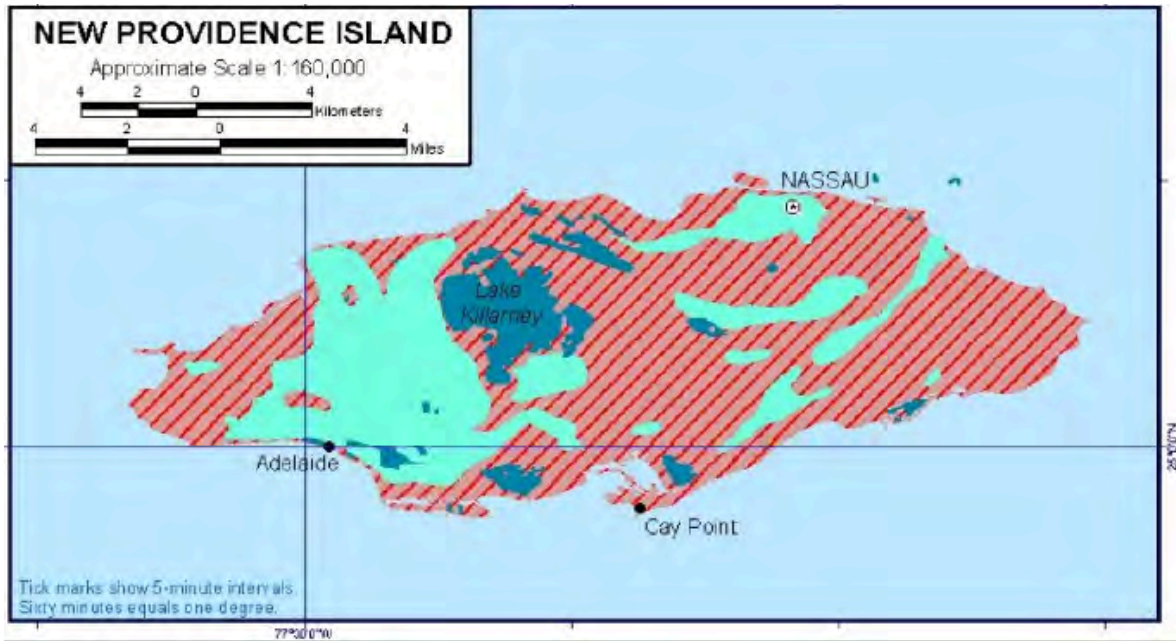


Figure 3-2 below shows areas throughout New Providence where the fresh water (< 1,500-mg/l chloride) is “locally plentiful” with the water table within 0 to 6 meters (0 to 20 feet) of the surface (USACE, 2004). Thickness of the water lenses in New Providence range from 20 to 50 feet (Cant, n.d.). The project site is located in an area that is characterized by surface water bodies rather than groundwater resources. Any water found here is likely brackish to hypersaline.

Fresh groundwater at the site would be considered scarce or lacking. Potable freshwater will be provided from municipal sources for project activities.

Figure 3-2: Diagram of New Providence Freshwater Lens



<b>Map Legend</b>	
Groundwater resources – Fresh water locally plentiful; unsuitable to large quantities of fresh water from shallow, freshwater lenses within poorly-stratified Pleistocene limestone aquifers. The water table is within 0 to 20 feet of the surface	
Ground water resources – Fresh water scarce or lacking; unsuitable quantities of fresh water from shallow poorly-stratified Pleistocene limestone aquifers.	
Surface water resources – Surface water features including ponds, lakes, creeks and blue holes; unsuitable to meager quantities of brackish to hypersaline water available.	

Source: USACE, 2004.

### Rainfall

Rainfall is unevenly distributed across The Bahamas. Figure 3-3 shows the distribution of rainfall for The Bahamas.

The north and north central Bahamas receive some 50 to 60 inches (1270 to 1524 millimeters) of rainfall annually while in the southeast Bahamas, the rainfall decreases to some 36 inches (914 millimeters) annually (USACE, 2004). There is a distinct dry season (November to April) and a pronounced wet season (May to October). The seasonal effects of tropical cyclones have a pronounced effect on annual rainfalls across The Bahamas. Additionally, winter storms flowing off

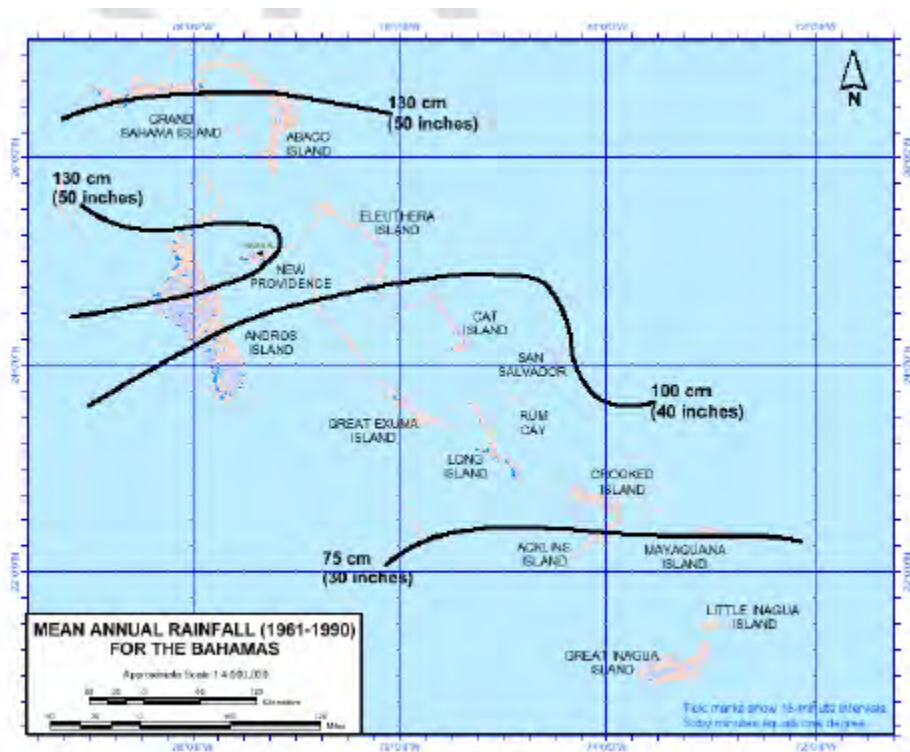
the North American continent also impact rainfall during the normally dry period. This effect however rarely extends into the central and southern Bahamas.

### Surface Water

“Inland water bodies are, in most instances, places where the water table is at or near the same level as the land surface. These bodies are usually saline or brackish in nature. In other cases, ponding of water can occur after a heavy rainfall where the surface rock is impervious enough to retard infiltration. These intermittent freshwater pools may persist for a few hours or for the full length of the wet season. The two most prominent types of surface water bodies in The Bahamas are blue holes and salt ponds.” (USACE Water Resources Assessment, 2004). No blue holes or salt ponds were observed on the project site.

There are man-made canals bordering the site. Within the site are areas which have been excavated and hold water at all times. These can be seen in the vegetative cover map (see Figure 3-4).

**Figure 3-3: Mean Annual Rainfall for The Bahamas**



Source: USACE, 2004.

### Climate and Sea Level Rise

Climate variability and change is expected to greatly influence the existing weather and environment of The Bahamas. Problems that may be exacerbated in response to climate variability and change are the frequency and intensity of hurricanes and the potential of rising sea levels. Changes in the position and the distribution of fresh, brackish and saline groundwater is anticipated due to any

rising sea level, combined with possible reductions in groundwater recharge from changes in rainfall distribution.

It appears that the sea has been rising at a rate in the order of 6 to 10 inches (152 to 254 mm) per 100 years in The Bahamas, not taking account of possible differences in the rates of uplift or subsidence at these sites. The observations are consistent with the model predictions, and it is generally agreed that the rate of sea level rise in the next century will be 2 to 5 times that in the last 100 years.

In The Bahamas, rising sea levels will lead to considerably less fresh groundwater resources, accelerated erosion of coastal shorelines, and the deeper penetration of storm surges inland.

### **3.1.5 Air quality**

There are no issues related to air quality impairment at the site presently. Air quality is not expected to be impaired by the activities associated with this project.

### **3.1.6 Noise pollution**

Noise pollution is not currently an issue at the project site. There may be elevated noise levels during construction on the site, but these are expected to be limited to daylight hours so as not to disturb neighbouring residents during sleeping hours.

## **3.2 Biological aspects**

### **3.2.1 Terrestrial habitats - Plants**

An assessment of the vegetative community at the proposed site was conducted to determine vegetation types, list species present, and identify protected species present, as listed under the Forestry (Declaration of Protected Trees) Order, 2021. Botanical surveys were conducted throughout the month of June 2024.

A map is provided in Figure 3-4, showing vegetative cover and areas that have been altered by human action. Large areas of the site have been significantly altered by land clearing and dredging.

Geographic waypoints were collected via handheld GPS. Diameter at breast height (DBH) tape was used to measure tree diameter and a laser rangefinder to measure tree height. Photographs were taken during data collection activities on site. Satellite imagery via Google Earth, drone imagery, and groundtruthing was used to characterize the site. ArcMap<sup>1</sup> was utilized to analyze and delineate land cover and acreages, and in preparing relevant GIS maps of the site.

A walking releve was used in the identification of plant species throughout the site and four randomly selected 0.1-acre plots were established and georeferenced to establish variability of protected tree sizes, heights, and tree numbers across the site. Data collected for protected trees within the plots were tree diameter at breast height (DBH) in cm, number of trees, and tree height in meters. The data

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<sup>1</sup> ESRI imagery source: Maxar, Vivid Advanced. June 17, 2023. Release: Maps 2024.R

Figure 3-4: Vegetative cover map of CV Bethel microgrid site



# C.V. Bethel Site

## MICROGRID PROJECT

### MINISTRY OF FINANCE



### Vegetative Cover

Site Boundary

### Vegetative Cover

#### Habitat

- Evergreen Forest (Coppice)
- Evergreen Woodland (Pine Woodland)
- Shrubland (Scrub)
- Herbaceous (Marsh)
- Human Altered Layer

#### Site Information

Location: East of C.V. Bethel Senior High School and East Street South, New Providence

Total Size: 112 acres

Vegetative Cover: 99 acres  
 - Evergreen Forest (Coppice),  
 Evergreen Woodland (Pine Woodland),  
 Shrubland (Scrub), and  
 Herbaceous (Marsh)

Altered Landscape: 13 acres  
 (Excavated land, cleared landscape, trenches/canals,  
 paths/trails)

Coordinate System: WGS 1984 UTM Zone 18N  
 Projection: Transverse Mercator

Prepared by: SEV Consulting Group  
 Nassau, The Bahamas  
 August 2024

0 100 200 400 Meters 0 0.1 0.2 0.4 Miles

from each plot was averaged per plot and then expanded per acre using standardized forest calculations.

Plant taxonomy was based on Correll and Correll (1982)<sup>2</sup> and observations for protected species were based on species listed in the Forestry (Declaration of Protected Trees) Order, 2021<sup>3</sup>.

**Figure 3-5: Coppice (foreground) & Pine Woodland (background)**  
(Northern quadrant of the site, facing south)



The substrate throughout the site is Lucayan Limestone, with hard irregular rock at the surface and minor karst features including sinks, holes, pits, and cavities. Standing water was observed in small, pitted areas, mainly in areas where pine woodland transitions from high to lowland, as pine woodland transitions to marshland (See Figure 3-6). No blue holes were observed on site.

Approximately 11% of the site has been significantly altered by land clearing and excavation. The most significant altered area was previously dredged and covers approximately 4 acres in the western quadrant of the site (See Figure 3-7). The dredged area extends from the western boundary, directly behind the C. V. Bethel High School, and is approximately 963 feet (300 meters) by 241 feet (75 meters).

A similarly dredged, but smaller area, is located in the northern quadrant and is approximately 490 feet (150 meters) by 82 feet (25 meters). Other impacted areas are located along the northern boundary (approximately 4 acres), where land has been cleared. The clearing appears to be associated with the construction of the housing development at Pine Crest. No buildings or structures were observed within the site boundary.

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<sup>2</sup> Correll DS, Correll HB. (1982). *Flora of the Bahama Archipelago*. Vaduz: A.R. Gantner Verlag KG.

<sup>3</sup> Forestry (Declaration of Protected Trees) Order, 2021

The Sea Breeze Canal network borders the southern to southeastern boundary of the site. The nearest channel is less than 10 meters from the site (See Figure 3-8). Indiscriminate dumping was observed along the western boundary at East Street South and along the northern boundary. During the site visits, a few persons were observed accessing paths along the southern boundary.

**Figure 3-6: Marshland on site**  
(Western quadrant, facing east)



**Figure 3-7: Dredged area adjacent to CV Bethel School**



**Figure 3-8: Seabreeze Canal**



Numerous native and nonnative plant species were observed on site including herbaceous species, grasses, shrubs, trees and vines. These species include pine (*Pinus caribaea var. bahamensis*), Silver Thatch (*Coccothrinax argentea*), Pineland Snow Berry (*Chiococca parvifolia*), Love Vine (*Cassytha filiformis*), and Bahama Passion Flower (*Passiflora bahamensis*). A list of plant species observed on site is shown in Table 3-1.

**Table 3-1: Plant species observed on CV Bethel site**

	<b>Common Name</b>	<b>Scientific Name</b>
1	Australian Pine	<i>Casuarina equisetifolia</i>
2	Bahama Passion Flower	<i>Passiflora bahamensis</i>
3	Bahama Senna	<i>Cassia chapmanii</i>
4	Bahama Pigeon Plum	<i>Coccoloba tenuifolia</i>
5	Bahamian Buttercup	<i>Turnera ulmifolia</i>
6	Bahamian Pine	<i>Pinus caribaea var. bahamensis</i>
7	Bamboo	<i>Agave cacozeala</i>
8	Banara	<i>Banara minutiflora</i>
9	Bastard Stopper	<i>Petitia domingensis</i>
10	Bermuda Grass	<i>Cynodon dactylon</i>
11	Black-eyed Susan	<i>Abrus precatorius</i>
12	Blue Flower	<i>Stachytarpheta jamaicensis</i>
13	Blue Heart	<i>Buchnera floridana</i>
14	Brasiletto	<i>Caesalpinia versicaria</i>
15	Brazilian Pepper	Brazilian Pepper

	<b>Common Name</b>	<b>Scientific Name</b>
16	Broom Sedge	<i>Andropogon virginicus</i>
17	Bushy Beard Grass	<i>Andropogon glomeratus</i>
18	Butterfly Pea	<i>Centrosema angustifolium</i>
19	Capeweed	<i>Phyla nodiflora</i>
20	Capitate Spikerush	Capitate Spikerush
21	Caracoli	<i>Abarema glauca</i>
22	Carpet Grass	Carpet Grass
23	Cat Tail	<i>Typha domingensis</i>
24	Chaney Briar	<i>Smilax havanensis</i>
25	Cinnecord	<i>Vachellia choriophylla</i>
26	Climbing Hemp Weed	<i>Mikania scandens</i>
27	Cocoplum	<i>Chrysobalanus icaco</i>
28	Creeping Ox-Eye	<i>Sphagneticola trilobata</i>
29	Dark maidenhair fern	<i>Adiantum melanoleucum</i>
30	Dwarf Morning Glory	<i>Evolvulus alsinoides</i>
31	Dutchman's Pipe	<i>Aristolochia passiflorifolia</i>
32	Eastern Gamagrass	<i>Tripsacum dactyloides</i>
33	Egyptian Acacia	<i>Vachellia nilotica</i>
34	False boxwood	<i>Gyminda latifolia</i>
35	Field Marigold	<i>Thymophylla tenuiloba</i>
36	Five Finger	<i>Tabebuia bahamensis</i>
37	Flea Bane	<i>Erigeron quercifolius</i>
38	Gammalamme	<i>Bursera simaruba</i>
39	Goat Bush	<i>Tridax procumbens</i>
40	Golden Creeper	<i>Ernodea littoralis</i>
41	Golden Dew Drop	<i>Duranta repens</i>
42	Grass Leaved Golden Aster	<i>Pityopsis graminifolia</i>
43	Granny Bush	<i>Varronia bahamensis</i>
44	Gray Knickers	<i>Guilandina bonduc</i>
45	Guana Berry	<i>Byrsonima lucida</i>
46	Hoop Vine	<i>Trichostigma octandrum</i>
47	Iron Weed	<i>Vernonia blodgettii</i>
48	Joe Wood	<i>Jacquinia keyensis</i>
49	Jumbay	<i>Leucaena leucocephala</i>
50	Lance Leaf	<i>Sagittaria lancifolia</i>
51	Leafy Catesbya	<i>Catesbaea foliosa</i>
52	Lice Root	<i>Angadenia berteroi</i>

	<b>Common Name</b>	<b>Scientific Name</b>
53	Little Bell	<i>Ipomoea triloba</i>
54	Long Leaved Brake	<i>Pteris bahamensis</i>
55	Loose Panic Grass	<i>Urochloa adspersa</i>
56	Love Vine	<i>Cassytha filiformis</i>
57	Maidenhair Anemia	<i>Anemia adiantifolia</i>
58	Marsh Fern	<i>Blechnum serrulatum</i>
59	Marsh Pennywort	<i>Centella asiatica</i>
60	Marsh Pink	<i>Sabatia stellaris</i>
61	Morning Glory	<i>Ipomoea indica</i>
62	Natal Grass	<i>Melinis reopens</i>
63	Needle Bush	<i>Vachellia farnesiana</i>
64	No Known Common Name	<i>Caesalpinia reticulata</i>
65	No Known Common Name	<i>Cassia lineata</i>
66	No Known Common Name	<i>Cyperus croceus</i>
67	No Known Common Name	<i>Erithalis fruticosa</i>
68	No Known Common Name	<i>Ernodea serratifolia</i>
69	No Known Common Name	<i>Varronia bahamensis</i>
70	Pain-in-back	<i>Trema lamarckianum</i>
71	Panic Grass	<i>Megathyrsus maximus</i>
72	Para Grass	<i>Urochloa mutica</i>
73	Pigeon Plum	<i>Coccoloba diversifolia</i>
74	Pineland Snowberry	<i>Chiococca parvifolia</i>
75	Pencil Flower	<i>Stylosanthes hamata</i>
76	Pineyard Pink	<i>Bletia purpurea</i>
77	Piss-A-Bed	<i>Vallesia antillana</i>
78	Poison Wood	<i>Metopium toxiferum</i>
79	Pork and Dough Boy	<i>Vachellia acuífera</i>
80	Prickly Bush	<i>Oplonia spinosa</i>
81	Prickly Tree	<i>Terminalia molinetii</i>
82	Rams Horn	<i>Rauwolfia nitida</i>
83	Rock Bush	<i>Phyllanthus epiphyllanthus</i>
84	Sabal Palm	<i>Sabal palmetto</i>
85	Salt Marsh Agalinis	<i>Agalinis maritima</i>
86	Satin Leaf	<i>Chrysophyllum oliviforme</i>
87	Saw Grass	<i>Cladium jamaicense</i>
88	Sea Grape	<i>Coccoloba uvifera</i>
89	Sensitive Partridge Pea	<i>Cassia nictitans</i>

	<b>Common Name</b>	<b>Scientific Name</b>
90	Shaggy Crab Grass	<i>Digitaria villosa</i>
91	Silver Thatch, Silver Top	<i>Coccothrinax argentata</i>
92	Sleeping Morning	<i>Waltheria indica</i>
93	Slender Panic Grass	<i>Panicum tenerum</i>
94	Small leaved Blolly	<i>Guapira discolor</i>
95	Small passion flower	<i>Passiflora suberosa</i>
96	Snowberry	<i>Chiococca alba</i>
97	Southern Crab Grass	<i>Digitaria ciliaris</i>
98	Southern Grass Pink	<i>Calopogon tuberosus</i>
99	Southern Shield Fern	<i>Thelypteris augescens</i>
100	Spanish Stopper	<i>Eugenia foetida</i>
101	Sour Grass	<i>Digitaria insularis</i>
102	Spike Rush	<i>Eleocharis cellulosa</i>
103	Spreading witch-grass	<i>Panicum dichotomiflorum var. bartowense</i>
104	St. Andrews Cross	<i>Hypericum hypericoides</i>
105	Stinking Pea	<i>Senna chapmanii</i>
106	Stinking Pea Root	<i>Ateleia gummifera</i>
107	Strong Back	<i>Bouerreria ovata</i>
108	Sweet Acacia	<i>Vachellia farnesiana</i>
109	Velvet Berry	<i>Guettarda scabra</i>
110	West Indian Thyme	<i>Clinopodium brownei</i>
111	White Zapoteca	<i>Zapoteca formosa</i>
112	White-headed Rush	<i>Rhynchospora floridensis</i>
113	Wild Alamanda	<i>Pentalinon luteum</i>
114	Wild Apricot	<i>Passiflora pectinata</i>
115	Wild Bush Bean	<i>Macroptilium lathyroides</i>
116	Wild Lime	<i>Zanthoxylum fagara</i>
117	Wild Coffee	<i>Senna occidentalis</i>
118	Wild Potato	<i>Echites umbellatus</i>
119	Wild Tamarind	<i>Lysiloma latisiliquum</i>
120	Wild Yam	<i>Dioscorea microphylla</i>
121	Woman's Tongue	<i>Albizia lebbeck</i>
122	Yellow Top	<i>Flaveria linearis</i>

Vegetation covers approximately 99 acres of Dry Needle Leaf Evergreen Formation (Pine Woodland), Dry Broadleaf Evergreen Forest (Coppice), Scrubland (Wetland), Herbaceous (Marshland), and Human Altered (See Figure 3-4). Land has been cleared along most of the boundary of the site, leaving bare ground in some areas and mixed shrubs, grasses, and vines, typical of disturbed areas. Overall,

the vegetative cover at the site is relatively intact, except for the dredged areas and areas of cleared land.

The Pine Woodlands form an open canopy dominated by mature Bahamian Pine (*Pinus caribaea* var. *bahamensis*) trees ranging in height from 6.5 feet (3 meters) to 25 feet (7.6 meters) (See Figure 7). The understory is dominated by a variety species including Sabal Palm (*Sabal palmetto*), Silver Thatch (*Coccothrinax argentata*), Granny Bush (*Varronia bahamensis*), Golden Creeper (*Ernodea littoralis*), and *Metopium toxiferum* (Poisonwood).

**Figure 3-9: Path recently cleared in Pine Woodland**  
(Eastern quadrant, looking south)



Dry Broadleaf Evergreen Forest (Coppice) at the site is tall, dense and closed canopy. The community is restricted to elevated areas in the northern and southern boundary. The substrate is oolitic limestone with organic soil development in some areas and species observed include Gammalamme (*Bursera simaruba*) (See Figure 3-10).

The coppice communities are located in the higher elevations in the northern and southern quadrants of the site, with a distinct transition to pine woodland as elevations gradually decline. (See Figure 3-11). The highest concentration of sinkholes was observed in these areas of coppice, particularly on the south side of the site.

In lowland areas where seasonal surface water is present, thickets of Sabal Palm (*Sabal palmetto*) and Saw Grass (*Cladium jamaicense*) were observed. Sabal Palm and Saw Grass in these marshland areas range in height from 3.3 to 6.7 feet (1 to 2 meters). In the areas adjacent, other species, less than 3.3 feet (1 m) in height, include Granny Bush (*Varronia bahamensis*), Rock Bush (*Phyllanthus epiphyllanthus*), Golden Creeper (*Ernodea littoralis*), Salt Marsh Agalinis (*Agalinis maritima*) (See Figure 3-12).

**Figure 3-10: Gammalamme trunk & Wild Tamarind branches**



**Figure 3-11: Coppice & Pine Woodland**  
(Along North access point)



**Figure 3-12: Salt Marsh Agalinis**



Invasive species were observed on site, primarily as individual trees and shrubs, including Australian Pine (*Casuarina equisetifolia*), Brazilian Pepper (*Schinus terebinthifolia*), and Wild Coffee (*Senna occidentalis*). A large stand of Australian Pine was observed outside of the proposed site, along the southern boundary. Evidence of fire, both recent and not recent, was observed across the site in the pine woodland and coppice habitats.

### **Vegetative Communities**

Four vegetative communities were observed at the proposed site were Dry Needle Leaf Evergreen Formation (Pine Woodland), Dry Broadleaf Evergreen Forest (Coppice), Shrubland, Marshland, and Human Altered<sup>4</sup>. The site is predominantly Pine Woodland, Coppice, and Shrubland, with pockets of marshland throughout. Within the human altered layer, large areas have been cleared and dredged, for unknown purposes. Classification of all communities are listed in Table 3-2.

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<sup>4</sup> Areces-Mallea AE. et al.

**Table 3-2: Vegetative Communities Acreages at CV Bethel site**

<b>Vegetative communities</b>	<b>Approximate area (acres)</b>	<b>Vegetative formations</b>
<b>Evergreen Forest</b>	56 acres	I.A.3.N.a. Lowland tropical or subtropical seasonal evergreen forest
<b>Evergreen Woodland</b>	21 acres	II.A.3.N.d. Saturated tropical or subtropical needle-leaved evergreen woodland
<b>Shrubland</b>	20 acres	III.A.1.N.f. Seasonally flooded tropical or subtropical broad-leaved evergreen shrub land
<b>Herbaceous</b>	3 acres	V.A.1.N.g. Cladium mariscus ssp. jamaicense Seasonally Flooded Herbaceous Alliance
<b>Human Altered Layer</b>	12 acres	N/A
<b>Total</b>	112 acres	

**Evergreen Forest**

Class: I. Closed Tree Canopy

Subclass: I.A. Evergreen Forest

Group: I.A.3. Tropical and sub-tropical seasonal evergreen forest

Subgroup: I.A.3.N. Natural/Semi-natural

Formation:

**I.A.3.N.a. Lowland tropical or subtropical seasonal evergreen forest- Coppice**



## **Evergreen Woodland**

Class: II. Open Tree Canopy (Woodland)

Subclass: II.A. Evergreen woodland

Group: II.A.3. Tropical or subtropical needle-leaved (or needle-stemmed) evergreen woodland

Subgroup: II.A.3.N Natural/Semi-natural

Formation:

**II.A.3.N.d. *Pinus caribaea* var. *bahamensis* Woodland Alliance (*Pinus caribaea bahamensis* saturated woodlands)** – Pine rockland with palmetto under story



## **Shrubland**

Class: III. Shrubland (Scrub)

Subclass: III.A. Evergreen Shrubland (Scrub)

Group: III.A.1. Tropical and subtropical broad-leaved evergreen shrubland

Subgroup: III.A.1.N. Natural/Semi-natural

Formation:

**III.A.1.N.f. Seasonally flooded evergreen shrubland** – Palm dominated wetland



## **Herbaceous**

Class: V. Herbaceous

Subclass: V.A. Perennial Graminoid Vegetation (Grasslands)

Group: V.A.1. Tropical Or Subtropical Grassland

Subgroup: V.A.1.N. Natural/Semi-Natural

Formation:

**V.A.1.N.G. Seasonally Flooded Tropical Or Subtropical Grassland** – Marsh dominated by *Cladium jamaicense*



## **Human Altered Layer (Disturbed Area)**

Non-agricultural Disturbed Areas

Human Altered Layer (Disturbed Area)

Extensive alteration of the land surface has taken place due to land clearing and excavation activities that have occurred at the proposed site.







**Protected Trees**

The Bahamian archipelago has 89 endemic seed plant species. The Forestry (Declaration of Protected Trees) Order, 2021, ensures the protection of endemic, endangered, or threatened species, under Part I of the Order. Other protected plant species of cultural, historic, and economic importance are protected under Part II of the Order.



A total of ten (10) species listed in the Forestry (Declaration of Protected Trees) Order were observed at the CV Bethel site: four (4) from Part I and six (6) from Part II. The species, approximate range of height, and images are provided in Tables 3-3 and 3-4.





**Table 3-3: Protected trees observed – Part I of Forestry Order**

Botanical Name	Common name	Height range or area size (approx.)	Tree (T)/ Shrub (S)/ Herb (H)	Images
<i>Agave cacozele</i>	Century Plant, Agave	1.6 to 5 feet (0.5 to 1.5 m)	S	
<i>Ernodea serratifolia</i>	No Known Common Name	1.6 to 5 feet (0.5 to 1.5 m)	S	
<i>Passiflora bahamensis</i>	Bahama Passion Flower	Area: approximately 0.1 acre	H	

<i>Varronia bahamensis</i>	Granny Bush	1.5 to 3.5 feet (0.5 to 1 meter)	S	
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**Table 3-4: Protected trees observed – Part II of Forestry Order**

<b>Botanical Name</b>	<b>Common name</b>	<b>Height range or area size (approx.)</b>	<b>Tree (T)/ Shrub (S)/ Herb (H)</b>	<b>Images</b>
<i>Bursera simaruba</i>	Gammalamme	5 to 32 feet (1.5 to 10 meters)	T	
<i>Coccothrinax argentata</i>	Silver Thatch, Silver Top	3 to 25 feet (0.91 to 8 meters )	T	

<p><i>Lysiloma latisiliquum</i></p>	<p>Wild Tamarind</p>	<p>6 to 32 feet (1.8 to 10 meters)</p>	<p>T</p>	
<p><i>Pinus caribaea var. bahamensis</i></p>	<p>Bahamian Pine</p>	<p>3 to 30 feet (0.91 to 9 meters)</p>	<p>T</p>	
<p><i>Sabal palmetto</i></p>	<p>Sabal Palm</p>	<p>3.3 to 20 feet (1 to 6 meters)</p>	<p>T</p>	
<p><i>Turnera ulmifolia</i></p>	<p>Bahamian Buttercup</p>		<p>H</p>	

### 3.2.2 Terrestrial habitats - Birds

The birds observed during the surveys are described based on their range of occurrence, and their conservation or management status. Range is described as:

- Permanent Resident Breeding (**PRB**) for birds that remain in The Bahamas throughout the year and reproduce;
- Resident Non-Breeding (**RNB**) birds occur within The Bahamas throughout the year with the exception of their breeding period;
- Summer Resident Breeding (**SRB**) birds only occur in The Bahamas during their breeding season which is during the summer (from April to October);
- Winter Resident (**WR**) birds occur in The Bahamas throughout the winter months from October to May and leave to breed in North America;
- Endemic birds (**E**) occur only within The Bahamas or Caribbean; and
- Migrant species (**MI**) pass through The Bahamas during migration, but do not stay for extended periods.

Conservation status is based on the International Union for the Conservation of Nature (IUCN) classifications and specific regulations of the species in the Laws of the Bahamas. IUCN classifications include:

- Species of Least Concern (**LC**) for whom no conservation intervention or management is required and the species is not expected to decline or be lost in the foreseeable future;
- Near Threatened (**NT**) species whose populations may decline drastically without significant protection or constant management;
- Vulnerable (**VU**) species are likely to become endangered if the risks facing the species in the wild are not addressed; and
- Unassessed (**UA**) species have not received a formal evaluation from the IUCN and are generally not considered species of conservation concern.

Through the terrestrial survey, the bird species observed are outlined in Table 3-5. Bird observations were conducted between June 11<sup>th</sup> and June 28<sup>th</sup> 2024 in the mornings and afternoons for 16 hours of active avian survey over 13.88 miles of transects. A total of nineteen (19) species were observed during the survey period at the project site.

Eighteen (18) of the recorded species are permanent resident species which breed in the islands of The Bahamas and are of low conservation concern. It should be noted that some species population numbers, while currently considered stable, are trending downwards due to large areas of vegetation being cleared for development. One (1) summer resident breeding was observed – the Gray Kingbird.

All bird species observed on the project site are protected under the Wild Birds Protection Act (Statute Law of The Bahamas, Chapter 249). In addition to local laws, all migratory birds are protected under international treaties and conventions, such as the Migratory Bird Treaty Act of the United States.

The White-crowned Pigeon and the Eurasian-collared Dove were seen in high numbers on the project site. There were no nests found along the transects that were surveyed. The vegetation was very dense, making it sometimes difficult to see through the coppice.

With the canal system nearby, shorebirds and seabirds are attracted to the project site in search of food. The Osprey, a seabird, was seen perched upon an old Caribbean Pine tree; it was likely resting or hunting for fish. The Belted Kingfisher was not seen during the survey periods, but sightings of this species have been documented; they have been observed hunting along the water's edge. There are many food sources on the property for bird species, including nectar from flowering plants, fruit pulp, seeds, insects and marine species, like fish and crabs. There is also many areas to shelter on the project site in the form of trees.

The Yellow-crowned Night Heron is also considered a permanent resident breeder throughout the islands of the Bahamas; this species was not seen during the survey periods. However, there have been documented sightings of Yellow-crowned Night Herons hunting for crabs within the project site prior to this survey.

The Gray Kingbird only migrates to The Bahamas during the summer months. They travel to The Bahamas to breed, and they must raise their chicks so that the chicks will be able to leave with them at the end of summer. The Gray Kingbirds are known to harass native bird species, especially if a nest with young chicks is nearby; this species can compete with native birds for resources. With competition for resources, it is important that removal of the native vegetation be minimized when development is being planned. The Gray Kingbird was observed feeding on dragonflies and there are numerous dragonflies on the project site.

A pair of Mangrove Cuckoos were seen during the survey periods. This species prefers the thickness of the coppice. The Mangrove Cuckoo is a secretive bird, and this is a rare sighting. They are known to be throughout the islands of The Bahamas. Their population size is trending downwards due to the clearing of the native trees. However, the population size is large overall, so they are considered of least concern for conservation at present.

The Killdeer is a species found around disturbed areas and open fields. This species was seen during every survey of the project site. The coppice and the canal system along with the crabs and other organisms seen on the property are essential and helpful for the survival of this bird species.

The Thick-billed Vireo was observed feeding on organisms in the coppice; it was also seen eating native fruits, including guana berry and darling plum.

The Green Heron was observed perched in trees as well as on the forest floor near a body of water with tadpoles in it. Green Herons are known to eat aquatic organisms and terrestrial organisms such as lizards and rodents.

It is important to note that during migration season, more species may utilize the project site as a place of rest and to feed on native trees and organisms. Rest and food provide migratory species with the energy they need to continue their journey.

**Table 3-5: Bird species observed on CV Bethel site**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Classification<sup>5</sup></b>
American Kestrel	<i>Falco sparverius</i>	PRB, LC
Bahama Woodstar	<i>Nesophlox evelynae</i>	PRB, LC
Common Ground Dove	<i>Columbina passerina</i>	PRB, LC
Eurasian-collared Dove	<i>Streptopelia decaocto</i>	PRB, LC
Gray Kingbird	<i>Tyrannus dominicensis</i>	SRB, LC
Green Heron	<i>Butorides virescens</i>	PRB, LC
Laughing Gull	<i>Larus atricilla</i>	PRB, LC
Least Grebe	<i>Tachybaptus dominicus</i>	PRB, LC
Killdeer	<i>Charadrius vociferus</i>	PRB, LC
Mangrove Cuckoo	<i>Coccyzus minor</i>	PRB, LC
Mourning Dove	<i>Zenaida macroura</i>	PRB, LC
Northern Mockingbird	<i>Mimus polyglottos</i>	PRB, LC
Osprey	<i>Pandion haliaetus</i>	PRB, LC
Red-legged Thrush	<i>Turdus plumbeus</i>	PRB, LC
Rock Pigeon	<i>Columba livia</i>	PRB, LC
Smooth-billed Ani	<i>Crotophaga ani</i>	PRB, LC
Thick-billed Vireo	<i>Vireo crassirostris</i>	PRB, LC
Tricolored Heron	<i>Egretta tricolor</i>	PRB, LC
White-crowned Pigeon	<i>Patagioenas leucocephala</i>	PRB, LC

<sup>5</sup> PRB – Permanent Resident Breeding; LC – Least Concern; SRB – Summer Resident Breeding; RNB – Resident Non-Breeding

**Figure 3-13: Photos of bird species observed**



**Northern Mockingbird**



**Smooth-billed Ani**



**Mangrove Cuckoo**



**Common Ground Dove**



**Tricolored Heron**



**Gray Kingbird**



**American Kestrel**



**Killdeer**

### 3.2.3 Terrestrial habitats – other animals

A survey of other animals was completed for the site in addition to the avifaunal survey. All species observed during the survey are outlined in Table 3-6.

**Table 3-6: Animal species observed on CV Bethel site**

<b>Common Name</b>	<b>Scientific Name</b>
American Bird Grasshopper	<i>Schistocera americana</i>
Dominican Spider	<i>Leucauge licina</i>
Gold Rim Swallowtail	<i>Battus polydamas lucayus</i>
Mexican Fritillary	<i>Euptoieta hegsia</i>
Ox Beetle (female)	<i>Strategus anachoreta</i>
Sea Grape or Variegated Bush shell	<i>Hemitrochus spp.</i>
Urbane Digger Bee	<i>Anthophora urbana</i>
White Peacock	<i>Anartia jatrophae</i>

**Figure 3-14: Photos of other animal species observed**



**Urbane Digger Bee**



**Dominican Spider**



**Ox Beetle (female)**



**White Peacock**



**American Bird Grasshopper**



**Mexican Fritillary**



**Sea Grape or Variegated Bush Shell**

### **3.2.4 National parks and protected areas**

The closest protected area to the project site is the Harold and Wilson Pond National Park which is 5.1 km (3.2 miles) away. Established in 2002 by the Government of The Bahamas and managed by

the Bahamas National Trust, this national park is 250 acres of freshwater wetlands. It is vital habitat for birdlife on New Providence.

The Bonefish Pond National Park is 8.5 km (5.3 miles) away. This protected area is 1,235 acres of coastal wetlands. It was established by the Government of The Bahamas in 2002 and is managed by the Bahamas National Trust. This national park is important for the protection of the diversity of birds and marine species in the country.

These protected areas are not expected to be impacted by the CV Bethel microgrid project.

### **3.3 Socioeconomic aspects**

#### **3.3.1 Communities, demography and economy**

The CV Bethel microgrid project site is located in the South Beach area which has a population of 12,292 individuals, making it one of the moderately populated areas on the island. With a land area of 2.72 square miles, the population density stands at approximately 4,526.93 persons per square mile (Bahamas National Statistical Institute, 2023).

The population of The Bahamas is approximately 362,000, with an average of 65.3 persons per square mile. Over 70% of the population reside on the 80 square mile island of New Providence. This equates to 3,079 persons per square mile, making New Providence the most densely populated island in the archipelago (Department of Statistics, 2012).

The total number of occupied households in The Bahamas is 102,862, with an average household size of 3.4. New Providence has approximately 70,000 occupied households and the average household size is 3.5. The South Beach area comprises 3,443 households, resulting in an average household size of approximately 3.57 persons per household. This figure is indicative of family-oriented living conditions, reflecting the social structure typical of suburban areas in New Providence (Bahamas National Statistical Institute, 2023).

The housing stock in South Beach includes a mix of single-family homes and multifamily units. The average household size of 3.57 indicates a community with a significant presence of family units, which aligns with the suburban nature of the area (Bahamas National Statistical Institute, 2023). The South Beach area benefits from a range of community services and infrastructure, including schools, healthcare facilities, and recreational spaces. These amenities are essential for supporting the local population and fostering a sense of community.

South Beach displays a balanced demographic with a relatively uniform distribution across various age groups and genders. The area's socioeconomic conditions are influenced by factors such as employment opportunities, educational attainment, and access to public services. These aspects collectively contribute to the overall quality of life and community well-being.

Tourism is the number one industry in The Bahamas, accounting for 20% of the labour force, and contributing 60% of the GDP. Financial services sector is the second major industry in The Bahamas and includes commercial and private banking institutions.

The Bahamas Government, commercial industries and businesses throughout New Providence serve as major employers. The key employment sectors include tourism (hotel, cruise, and related tour operations), transportation (by air, land, and sea), vendor/supplier products and services, banking, medical, education, and the civil service.

The economy of The Bahamas has been in perpetual rebound mode in recent years due to several catastrophic events. In October 2016, Hurricane Matthew swept through The Bahamas, followed in September 2019 by the most destructive extreme weather event in modern Bahamian history, Hurricane Dorian. Estimated damages and losses attributed to Dorian totaled in excess of \$3.4 billion dollars, representing one third of the country's GDP (IDB, 2019). Since the devastation of Hurricane Dorian, over 3,000 persons have relocated to New Providence, significantly impacting demographics on the island (Dept of Statistics, 2019). The COVID-19 pandemic also had significant negative impacts on the economy.

Enrollment in school is mandatory in The Bahamas for youth between the age of 5 and 16. Approximately 75,120 students are enrolled at the preschool school to secondary school levels and between 8,000 - 9,000 enrolled at the tertiary level. CV Bethel Senior High School is adjacent to the project site.

Educational, medical, financial services, utilities, retail outlets, and numerous other services are easily accessible on New Providence. New Providence has a network of roads that allow access across most of the island. East Street, which runs along the western boundary of the site is the main thoroughfare connecting transportation routes in the South Beach area of New Providence to other routes in the southern part of the island.

The nearest hospital, Princess Margaret Hospital is about 7.6 km (4.7 mi) from the project site and the nearest public clinic is about 150 metres (164 yards) away – South Beach Clinic.

### **3.3.2 Transportation and other services**

Infrastructure and services on the island of New Providence include:

- Roads – constructed by the Ministry of Public Works
- Potable water - provided by the Water & Sewerage Corporation or private wells
- Telecommunications - provided by the Bahamas Telecommunications Corporation
- Cable television and Internet - provided by Cable Bahamas
- Electricity - provided by Bahamas Power and Light
- Medical clinics - managed and operated by the Department of Public Health
- Hospitals – the main hospitals on New Providence are Princess Margaret Hospital managed by the Public Hospitals Authority and Doctors Hospital, a private facility

- Docks/ports – these are managed by the Port Department and include the cruise ship port in Downtown Nassau
- International airport – The Lynden Pindling International Airport is located in western New Providence.

Power generation for the CV Bethel microgrid Project will be via solar panels. Potable water provision and wastewater treatment will be via Water and Sewerage Corporation.

### **3.4 Cultural aspects**

No historical or archaeological resources were observed at the project site.

### **3.5 Legal and regulatory**

Relevant laws and regulations that will need to be considered for the project include:

#### ***Conservation and Protection of the Physical Landscape of The Bahamas Act 1997***

This Act prohibits all significant excavation, landfill operation, quarry mining or mining of physical natural resources (such as sand) without permission of the Director of Physical Planning. The Act also gives the Director the authority to request an Environmental Impact Assessment (EIA) for any excavation or land reclamation activities.

#### ***Environmental Health Services Act 1987***

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

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

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

#### ***Environmental Impact Assessment Regulations 2020***

These regulations were developed under the Environmental Planning and Protection Act 2019. They provide guidance on the EIA process for The Bahamas including the Certificate of Environmental Clearance (CEC) application and review process and what information should be included in an EIA and an EMP.

#### ***Environmental Planning and Protection Act 2019***

This Act provides a legal framework for the protection, enhancement and conservation of the environment. It also provides for the prevention and mitigation of pollution in order to maintain the quality of the environment. It established the Department of Environmental Planning and Protection to regulate and oversee the review of Environmental Impact Assessments and Environmental Management Plans.

### ***Forestry Act 2010***

This Act provides for the:

- Setting of royalty fees, permits, leases, and licence fees for utilization of forest produce and non-timber forest produce from the forest estate;
- Management, conservation, control and development of forests, and the promotion and regulation of forest industries;
- Promotion of the conservation and management of wildlife and wildlife habitat in forest reserves, protected forests and conservation forests; and
- Protection of trees that are rare and of historical significance.

### ***Health and Safety At Work Act 2002***

The Act provides for:

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

### ***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;
- Efficient and orderly provision of infrastructure and services to the built environment;
- Planning processes that are fair by making them open, accessible, timely and efficient;
- Recognition of the decision-making authority and accountability of the Government in land use planning; and
- Planning for the development and maintenance of safe and viable communities.

The Act provides for regulating activities such as quarrying, mining, road construction and subdivision development.

### ***Water and Sewerage Corporation Act 1976***

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

### ***Wild Animals (Protection) Act 1968***

This Act prevents the taking, capture or export of any wild animal without the permission of the Minister of Agriculture & Fisheries. These animals include wild horses, the hutia and iguanas.

### ***Wild Birds Protection Act 1952***

This Act provides for the protection of wild birds. The Act lists several species including the White-crowned Pigeon, Whistling Duck and Yellow-crowned Night Heron.

### **3.6 Government agencies**

Government agencies that will be involved with aspects of approval and permitting of this component of the project include:

#### ***Department of Environmental Planning and Protection (DEPP)***

Formerly the BEST Commission, the Department of Environmental Planning and Protection (DEPP) is responsible for developing the Government of The Bahamas' (GOB) environmental and natural resource management policies. As mandated under the 2019 Environmental Planning and Protection Act and 2020 EIA Regulations, DEPP is responsible for the administration of the EIA process, overseeing the technical review of EIAs, coordinating the public review of EIAs, and various national plans for natural resource management.

DEPP is responsible for various environmental matters, including biodiversity, climate change, wetlands, land degradation, and persistent organic pollutants. In this role, DEPP has established committees, drawing on appropriate staff from different government agencies, for promoting actions to implement the specific requirements of the various multilateral environmental conventions of which The Bahamas is a Party.

#### ***Department of Environmental Health Services (DEHS)***

Under the *Environmental Health Act* of 1987, and the Environmental Health Regulations, the DEHS mandate is to promote and protect public health and ensure conservation and maintenance of the environment. One role of the DEHS is to regulate, monitor, and control actual and likely contamination and pollution of the environment and establish minimum standards required for a clean, healthy, and pleasing environment.

For proposed projects, the DEHS evaluates the effectiveness of pollution control measures and initiatives to protect the health and safety of workers, and the natural environment. DEHS also issues the necessary effluent discharge and emissions permits.

#### ***Department of Labour***

The Department of Labour oversees labour relations and occupational health and safety. The Department is the lead agency for regulating occupational health and safety under the *Health and Safety at Work Act* (2002). Through its Inspection Unit, the Department also conducts inspections to ensure adequate worker safety and compliance with regulations.

#### ***Department of Physical Planning***

The Department authorizes activities such as dredging, filling, harvesting or removal of protected trees, and any work that will affect coastlines. It also administers the new Planning and Subdivision

Act of 2010, which includes ensuring the preparation of land use plans and other physical planning activities.

***Ministry of the Environment and Natural Resources***

The Ministry of the Environment and Natural Resources oversees conservation of wild animals, birds, and plants, as well as forests. It administers the Wild Birds and Wild Animals Protection Acts.

***Ministry of Public Works***

The Ministry oversees and maintains physical infrastructure in the country. It is entrusted with the administration of the Building Control Act (BCA) and Regulations.

***Water and Sewerage Corporation (WSC)***

The WSC, with its Water Resources Management Unit (WRMU), has responsibility for optimal development of the country's water resources and the control of water quality. It shares (with DEHS) the responsibility for monitoring water quality. WSC issues water supply franchises to developers in areas where the supply of water is impractical for the GOB or its agencies to undertake.

**3.7 Non-governmental organizations**

Non-governmental organizations (NGOs) that are active in New Providence include:

***Bahamas National Trust (BNT)***

The BNT was established by an Act of Parliament in 1959, which makes it unique in the NGO community. It represents a unique collaboration of governmental, private sector and scientific interests dedicated to the conservation of the natural and historic resources of The Bahamas for the enjoyment and benefit of the Bahamian people. The major mandate of the Trust is management of the National Parks System of The Bahamas.

***Bahamas Reef Environment Educational Foundation (BREEF)***

The Bahamas Reef Environment Educational Foundation (BREEF) is concerned primarily with coral reef education and fund-raising for the protection of marine resources of The Bahamas through education. Its mission is to strengthen the symbiosis between the Bahamian people and the reefs, which protect, nourish, and enrich us, by focusing Bahamian and allied minds on this relationship. The Foundation's raison d'être is the restoration of the reefs of The Bahamas to their former glory and abundance.

#### 4.0 Environmental and social impacts

The severity of an environmental impact is a measure of the magnitude of impact an event has on the environment or communities. Severity is measured by such factors as toxicity to humans, the negative effect on flora and fauna, impact on wildlife habitat, the reduction of natural resources, contamination of air and water, the potential for reversible versus irreversible environmental damage, and short-term versus long-term recovery of the environment. Other factors such as noise, heat, odour, and visuals are also used to determine severity.

Severity is given a numerical rating of 1 for low impact, 3 for medium impact and 5 for high impact:

1. Low Impact (score 1) - There is little or no impact on the environment.
2. Medium Impact (score 3) - There is impact on the environment that falls within regulatory guidelines. The impact is considered short-term and reversible.
3. High Impact (score 5) - There is high and lasting impact on the environment.

Table 4-1 below summarizes the environmental impacts that can result from the CV Bethel microgrid project.

The most significant environmental impacts from the CV Bethel microgrid project will be land clearing for construction. While the project is not expected to have an adverse impact on marine resources, mitigation measures are recommended in chapter 5.0 related to sediment control during dock construction.

**Table 4-1: Summary of Environmental Impacts**

	<b>Severity of Impact</b>	<b>Environmental Impacts</b>
Materials	1	Construction materials can potentially be toxic or hazardous to the environment and human health if not managed properly, particularly in the marine environment.
Air quality and dust	3	Illegal construction activities, such as burning of waste, can negatively impact air quality. Poorly maintained construction equipment can also impair air quality, such as diesel fumes emissions. Construction activities can generate significant quantities of dust that impair air quality and negatively impact human health if proper management techniques are not employed.
Waste management	3	Improperly managed waste can negatively impact the environment and human health, through attracting pests which are disease vectors, introducing toxic/hazardous substances into the air, soil or groundwater and posing safety hazards to small children.

	<b>Severity of Impact</b>	<b>Environmental Impacts</b>
Landscape and visual	5	Construction will result in removal of trees and plants during land clearing. If construction waste is not disposed of in a timely manner, this can impair visual aspects of the site for long periods of time.
Water resources	1	Groundwater resources can be polluted by fuel or chemical spills at the project site. Over-extraction of groundwater resources can result in salt-water intrusion, thus destroying these resources.
Ecology	5	Overall ecology of the area can be impaired by construction activities if proper mitigation measures are not put in place. The clearing of vegetation for the project will negatively impact plant and animal species as well as habitats for birds and other animals that utilize the site for food and shelter.
Avifauna	5	The noise levels generated by the project have the potential to deter birds from utilizing the site and adjacent areas during construction activities. Clearing of vegetation, particularly trees being used for feeding and roosting, will negatively impact bird species.
Noise and vibration	3	Construction activities can raise noise to levels that disturb bird and animal species at the project site and in its vicinity where these species nest or find shelter. Prolonged, elevated noise levels from construction activities can also negatively impact human health. Prolonged exposure to noise levels above 70dB may cause hearing damage. Loud noises above 120 dB can cause immediate damage (CDC, 2019).
Traffic and transport	3	Traffic and transport during construction can introduce invasive species to a project site and result in spills/accidents at the site if proper care and precaution are not taken inclusive of safe handling of equipment and vehicles. Disruption to traffic flow can create nuisances for neighbouring residents and businesses.

	<b>Severity of Impact</b>	<b>Environmental Impacts</b>
Contaminated land	5	During construction, there is the potential to contaminate lands from improper disposal of hazardous materials.
Occupational health and safety	3	Workers can be put at risk during construction through failure to wear protective personal equipment (PPE), improper handling of equipment and materials, and not adhering to standard safety procedures. These failures can result in loss of life or permanent physical damage.
Impacts on neighbouring businesses	3	Construction activities can impact neighbouring businesses through disruption of traffic, increased noise levels, impairment of air quality, and contamination of land and water resources. Depending on the severity of impacts, such as noise, air pollution and groundwater pollution, they can impair health in the long-term.

## 5.0 Proposed mitigation measures

Table 5-1 below summarizes the mitigation measures that are recommended to minimize or eliminate any negative environmental impacts from the project.

**Table 5-1: Summary of Environmental Mitigation Measures**

	<b>Mitigation Measures</b>
Materials	<p>Any toxic or hazardous chemicals to be utilized on site can be done so according to Material Safety Data Sheet (MSDS) guidance and safety protocols can be established by project management.</p> <p>Construction materials containing hazardous substances, such as paint, will be safely removed and properly disposed of to prevent any risks to human health.</p> <p>Fuel will be dispensed on impervious surfaces with clean up and disposal equipment available in the event of a spill.</p>
Air quality and dust	<p>Impairment to air quality can be reduced when no illegal construction activities occur during this project.</p> <p>Construction equipment will be properly maintained to ensure they do not impair air quality. Construction methodologies and best practices will be employed to minimize generation of quantities of dust that can impair air quality including watering of the site on a regular basis.</p>
Waste management	<p>All waste will be properly disposed of according to regulations and standards of the Department of Environmental Health Services (DEHS) and the Water and Sewerage Corporation (WSC).</p> <p>Solid waste will be stored in a designated area and picked up regularly for proper disposal at a licensed landfill.</p> <p>Waste management will need to include proper disposal of any hazardous waste from construction activities.</p>
Landscape and visual	<p>Construction activities will be organized to be completed in shortest timeframe possible to reduce any landscape or visual impacts.</p> <p>An effort will be made to minimize clearing of land to the footprint of solar panels and any planned new buildings.</p> <p>Where clearing cannot be avoided, native, endemic and protected plant species will be replanted at ratios as determined by the Forestry Unit either on the site or another site designated by the Unit. This ratio can be 2:1 or 3:1, depending on the species.</p>

	<b>Mitigation Measures</b>
	<p>Landscaping of the site will utilize native, endemic and protected plants and trees. No invasive plant species will be utilized in landscaping.</p> <p>Construction waste will be properly disposed of in a timely manner.</p>
Water resources	<p>Chemical and fuel management of the site will ensure that groundwater and surface water resources are not negatively impacted. Spill response protocols will be established for effectively dealing with spills in the event of an accident to minimize any pollution of water resources.</p> <p>Hazardous waste from construction will be properly disposed of.</p> <p>Potable or fresh water will be provided by tie-in to the Water and Sewerage Corporation municipal distribution mains, so there will not need to be extraction of groundwater resources.</p>
Ecology	<p>Any protected tree species removed during clearing must only be done so with permission of the Forestry Unit in accordance with their guidance.</p> <p>Efforts will be made to maintain native trees and plants, especially where they are clustered so that they can continue to function as wildlife corridors. If they cannot be maintained, landscaping of the project will be designed to create wildlife corridors across the project site.</p> <p>An effort will be made to minimize clearing of land to the footprint of solar panels and any planned new buildings.</p> <p>Where clearing cannot be avoided, native, endemic and protected plant species will be replanted at ratios as determined by the Forestry Unit either on the site or another site designated by the Unit. This ratio can be 2:1 or 3:1, depending on the species.</p> <p>No invasive plant species will be introduced to the project site. Any invasive species found on the site will be removed.</p>
Avifauna	<p>While noise levels during construction may deter birds from the area, it is expected that once the project is complete, the birds will return. There are vegetated areas neighbouring the project site that can be utilized by birds during active construction.</p> <p>Every effort will be made to maintain native, endemic and protected trees on the project site to be utilized by birds when construction is not occurring. Protected trees will be marked prior to construction so they can be retained, where feasible.</p>

	<b>Mitigation Measures</b>
	Staff will be advised on the importance of not interfering with or harming bird species which are all protected under Bahamian law. This will include not harming or interfering with bird nests.
Noise and vibration	<p>Construction activities will be for a limited time period to minimize disturbance to birds and other animals at the project site and areas nearby. Once construction is completed in as short a timeframe as possible, the animals should return to habitats nearby which they normally utilize. They are not likely to return to the project site if there is significant clearing of vegetation.</p> <p>Construction workers will wear appropriate PPE (i.e. earplugs or ear muffs).</p> <p>Nearby residents are not expected to be exposed to high noise levels as there will be no work occurring during the evening and night.</p> <p>Nearby businesses will need to be advised on times when elevated noise levels are expected so they can plan accordingly.</p>
Traffic and transport	<p>All workers utilizing vehicles and equipment will have adequate training and skills in their proper and safe handling. Equipment to be utilized for this project moving from other sites will be inspected and cleaned, as necessary, to ensure they do not introduce invasive plant material, such as seeds.</p> <p>Flagmen will be utilized to safely direct traffic if there is a need to move heavy equipment or construction materials on East Street. Such movements should be avoided during peak traffic hours, i.e. 7:30 am – 9:00 am and 3:00 pm to 5:00 pm.</p>
Contaminated land	<p>Any toxic or hazardous chemicals to be utilized on site will be done so according to Material Safety Data Sheet guidance and safety protocols as established by project management. Staff will be trained in spill response measures to effectively handle such incidents.</p> <p>Hazardous waste will be safely handled and properly disposed of.</p>
Occupational health and safety	Workers will be provided with appropriate protective personal equipment (PPE) for their assigned tasks. All workers will receive training in proper handling of equipment and materials as a part of their orientation before being admitted to the site during construction and before starting work on site. There will be regular reinforcement of

	<b>Mitigation Measures</b>
	<p>occupational health and safety procedures during weekly meetings. Information on health and safety procedures (e.g. Material Safety Data Sheets) will be accessible to staff during working hours. At least one staff member will be assigned to ensuring health and safety procedures are being followed during construction activities.</p>
<p>Impacts on neighbouring businesses</p>	<p>Regular communication with neighbouring businesses and communities will occur so they are informed of any potential disruptions to traffic and can plan accordingly.</p> <p>They will also be advised when noise levels may be elevated so they can choose to leave the area or wear appropriate protective equipment, such as noise-cancelling headphones.</p> <p>The site will be managed following best management practices to reduce or eliminate impacts related to noise, air pollution as well as land, marine and groundwater contamination, so there are no long-term negative impacts on human health.</p> <p>A mechanism for neighbouring businesses to contact project management will be established to ensure communication is facilitated.</p>

## **6.0 Public consultation**

Section to be completed once consultation as determined by DEPP has been concluded.

## **7.0 Conclusions**

Employment of appropriate design and planning methodologies can result in execution of the CV Bethel microgrid project in a more sustainable manner. Utilizing the recommended mitigation measures can minimize any negative environmental and socio-economic impacts.

The Ministry of Finance Project Execution Unit (PEU) has expressed its commitment to implementing the recommended mitigation measures to minimize negative environmental and socio-economic impacts from the project.

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## Appendix 1: Boundary map of the CV Bethel microgrid project site



# C.V. Bethel Site

## MICROGRID PROJECT

### MINISTRY OF FINANCE



### Site Boundary Map

### Legend

 Site Boundary

#### Site Information

Location: East of C.V. Bethel Senior High School  
and East Street South, New Providence

Total Size: 112 acres

Vegetative Cover: 99 acres  
(Pine Woodland Forest and  
Dry Broadleaf Evergreen Forest)

Altered Landscape: 13 acres  
(Excavated land, cleared landscape, trenches/canals,  
paths/trails)

Coordinate System: WGS 1984 UTM Zone 18N  
Projection: Transverse Mercator

Prepared by: SEV Consulting Group  
Nassau, The Bahamas  
July 2024

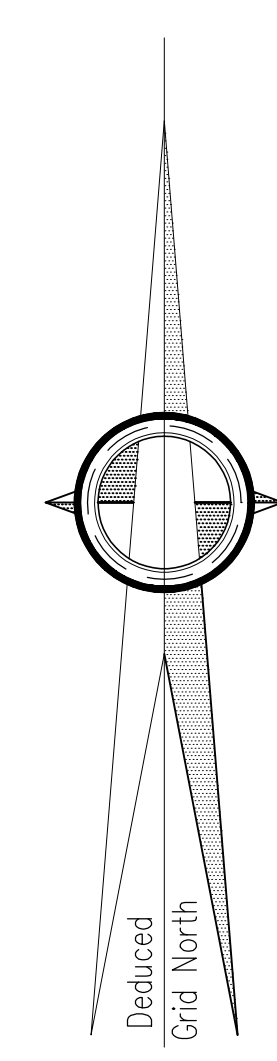
0 100 200 400 Meters

0 0.075 0.15 0.3 Miles

**Appendix 2: Topographic survey of the CV Bethel microgrid project site**



**LOCATION PLAN**  
SCALE: NOT TO SCALE



LINE TABLE		
LINE	AZIMUTH	DISTANCE (FT.)
L1	N 176°04'12"	15.96'
L2	N 30°36'52"	41.87'
L3	N 31°38'41"	55.14'
L4	N 49°27'06"	101.35'
L5	N 58°39'28"	46.63'
L6	N 61°50'49"	70.69'
L7	N 64°50'41"	70.11'
L8	N 69°17'13"	46.04'
L9	N 74°29'06"	112.17'
L10	N 78°59'57"	70.19'
L11	N 83°55'50"	46.75'
L12	N 86°34'18"	46.79'
L13	N 89°14'09"	40.91'
L14	N 00°00'00"	37.98'
L15	N 99°07'21"	40.51'
L16	N 180°00'00"	20.08'
L17	N 85°14'29"	49.56'

- LEGEND:**
- Denotes Survey marker
  - △ Denotes Survey traverse nail
  - Denotes Fence Post
  - x— Denotes Chain linked fence
  - ⊕ Denotes Utility Poles
  - ⊗ Denotes Test Wells (drilled)

**NOTES:**  
Reference(s) were made to:  
1. D.L.S. Plan No. 985, New Providence

**TOPOGRAPHICAL SURVEY PLAN**

SHOWING  
A PARCEL OF LAND  
CONTAINING AN AREA OF 112 ACRES  
SITUATE  
ON THE EASTERN SIDE OF STREET SOUTH AND IMMEDIATELY SOUTH OF PINECREST SUBDIVISION  
IN THE WENTON OF C.V. BETHEL HIGH SCHOOL AND THE SOUTH BEACH POLICE STATION  
**NEW PROVIDENCE — BAHAMAS**

Surveyed at the instance of  
Date: FEBRUARY 2024.  
200 Ft. 100 0 200 400 600 800 1000 Ft.  
Scale: 1 inch = 200 feet

## Appendix 3: Personnel involved in EIA

### Stacey Helena Moultrie

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<b>Proposed Position:</b>	Consultant
<b>Date of Birth:</b>	1 September 1971
<b>Nationality:</b>	Bahamian
<b>Certifications and Membership in Professional Societies:</b>	GHG Inventory Expert, UNFCCC Roster of Experts Chartered Institution of Water and Environmental Management (CIWEM), United Kingdom Chartered Scientist, Science Council, United Kingdom Member, American Planning Association (APA) Lifetime Member, Delta Epsilon Iota Academic Honor Society

#### Education

2016	University of Florida (USA), Master of Urban Planning – Sustainability
1998	Dalhousie University (Canada), Master of Marine Management
1995	University of the West Indies (Mona Campus, Jamaica), B.Sc. ( <i>Upper Second Class Honours</i> ) Zoology – Marine Science & Fisheries

#### Certificates

2020	IDB INDES (USA), Behavioral Economics for Better Public Policies
2020	SCRUMstudy (USA), Scrum Master Certified (SMC) in Project Management
2020	SCRUMstudy (USA), Scrum Fundamentals Certified (SFC) in Project Management
2020	GHG Management Institute (USA), Proficiency Certificate in UNFCCC Online IPCC Guidelines
2007	Conservation Strategy Fund, Stanford University (USA), Economic Tools for Conservation

#### Countries of Work Experience

The Bahamas

Regional projects involving Antigua and Barbuda, Bahamas, Barbados, Belize, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Saint Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, and Venezuela.

#### Languages

	<i>Speaking</i>	<i>Reading</i>	<i>Writing</i>
English	Excellent	Excellent	Excellent

## Key Qualifications

Mrs. Moultrie is an environmental planner. Her employment history in the environmental arena spans more than 25 years, including 18 months with the Department of Environmental Health Services and 7 years with the BEST Commission. Her experience involves work in project management, international negotiations, tourism, development of environmental education materials, environmental policy development, project proposal development for international funding, assessing environmental impacts of development projects, and environmental management and planning. Her role at the BEST Commission included advising the Government of The Bahamas on the environmental impacts of large private development projects, Government-led development projects, and policy decisions. She negotiated on behalf of the Bahamas Government in the following fora – Convention on Biological Diversity, Cartagena Protocol on Biosafety, Stockholm Convention on Persistent Organic Pollutants, United Nations Framework Convention on Climate Change, Rotterdam Convention on Prior Informed Consent and United Nations Convention on Desertification and Drought. She also provided policy guidance to the Ministry of Foreign Affairs on the Law of the Sea Convention and its various protocols.

Born and raised in The Bahamas with considerable work experience in the environmental sector, Mrs. Moultrie is well versed in the regulatory and policy aspects of natural resource management.

## Employment Record

<b>From 2007</b>	<b>To Present</b>
<b>Employer</b>	SEV Consulting Group (Nassau, The Bahamas)
<b>Position Held and</b>	Environmental Planner
<b>Description of Duties</b>	Mrs. Moultrie is responsible for business development, project management, staff management, and client service delivery in the areas of environmental policy, planning and management as well as EIA and EMP development, coordination of internationally funded projects and development of environmental education, awareness and training materials.
<b>From 2019</b>	<b>To Present</b>
<b>Employer</b>	The Islands Laboratory, University College London (London, United Kingdom)
<b>Position Held and</b>	Researcher
<b>Description of Duties</b>	Mrs. Moultrie is a researcher with the Islands Laboratory which focuses on innovative solutions to tackle climate change and assess scenarios for disaster risk reduction and resilience for islands globally. Her research focuses on sustainability indicators, resilience, resource nexus and energy reform.

<b>From 2000</b>	<b>To 2007</b>
<b>Employer</b>	Bahamas Environment, Science and Technology (BEST) Commission (Nassau, The Bahamas)
<b>Position Held and Description of Duties</b>	Senior Environmental Officer Mrs. Moultrie was responsible for project management, staff management and advice to the Government of The Bahamas in the areas of biodiversity conservation, environmental impacts from development, mitigation for development activities, policy development, international negotiations, drafting environmental legislation, developing national strategies for environmental issues (included development of National Environmental Policy and National Environmental Management and Action Plan) and securing international funding for environmental projects. She was also responsible for management of environmental aspects of development of the islands of New Providence, Exuma, Eleuthera, Abaco, Long Island and Paradise Island.

## **Work Experience in Environmental Planning and Management**

### **Degree of Integrated Water Resources Management Implementation (SDG 6) in The Bahamas – The Bahamas, October 2020 – November 2020 (National Consultant)**

Funded by the Economic Commission for Latin America and the Caribbean (ECLAC), the project involved an analysis of institutional arrangements for integrated water resources management (IWRM) in The Bahamas and the country's progress in implementation of SDG 6 of the 2030 Agenda. Mrs. Moultrie served as the national consultant for The Bahamas. The consultancy also involved analysis of the effectiveness of national cross-sector coordination mechanisms, identification of gaps, the identification of successful mechanisms and development of lessons learned or identification of success factors that could be replicated in other countries. Tasks included consultation with several Government and non-Government agencies, including the Water and Sewerage Corporation (WSC). The final deliverable was a national report submitted to ECLAC to form a part of the Caribbean regional report.

### **Department of Environmental Planning and Protection, Preparation of the Third National Communication (TNC) and First Biennial Update Report (BUR1), September 2020 – Present (National Consultant, joint consultancy with the Islands Laboratory at University College London)**

Funded by the Global Environment Facility (GEF) and the Bahamas Government, the project will involve development of the TNC and BUR1 reports to the UNFCCC Secretariat. SEV in cooperation with UCL Islands Laboratory will develop chapters on National Circumstances, Integration of Climate Change into National Development Priorities, Education, Training and Public Awareness, Information and Networking, and Capacity-Building. The work will entail data collection, data analysis, stakeholder consultations and training workshops on policy development and climate change integration into development planning.

**Bahamas Power and Light, Environmental Impact Assessment and Environmental Management Plan – New Providence, The Bahamas, March 2020 – Present (Consultant)**

Project involves construction of a power plant in New Providence. Mrs. Moultrie is responsible for development of an EIA and EMP for the project inclusive of coordinating all field teams, data collection, preparation of reports and liaising with BEST Commission and other Government agencies as necessary prior to construction works commencing.

**Central Bank of The Bahamas, Environmental Impact Assessment and Environmental Management Plan – New Providence, The Bahamas, February 2020 – May 2021 (Consultant)**

Project involved demolition of several buildings in New Providence. Mrs. Moultrie was responsible for development of an EIA and EMP for the project inclusive of coordinating all field teams, data collection, preparation of reports and liaising with BEST Commission and other Government agencies as necessary prior to construction works commencing. She also served as Lead Environmental Monitor for the project through completion of demolition activities.

**Nassau Cruise Port, Environmental Management Plan and Environmental Monitoring – New Providence, The Bahamas, January 2020 – Present (Consultant)**

Project involves construction of cruise port facilities in New Providence. Mrs. Moultrie is responsible for development of an EMP for the project inclusive of development of detailed mitigation measures, a hurricane preparedness plan and an environmental, health and safety training manual for construction staff. She is also Lead Environmental Monitor on the project responsible for managing on-site monitors and liaising with DEPP.

**Bill Simmons Construction, Environmental Monitor – New Providence, The Bahamas, December 2018 – June 2019 (Consultant)**

Project involved provision of potable water infrastructure and road reinstatement for western New Providence. Mrs. Moultrie was responsible for development of environmental checklist and biweekly environmental inspections to ensure compliance with Ministry of Works and Water and Sewerage Corporation standards. She also provided environmental, health and safety training for all construction staff prior to construction works commencing.

**Shell Bahamas LNG Project, Environmental Permitting and Environmental Impact Assessment – New Providence, The Bahamas, December 2018 – May 2021 (Consultant)**

Project involved development of an LNG pipeline and power plant by Shell in cooperation with Bahamas Power and Light (BPL). Mrs. Moultrie was responsible for providing guidance on environmental, health and safety legislation, regulations and standards the project will need to adhere to as well as assisting with liaising with the Department of Environmental Planning and Protection (DEPP). Mrs. Moultrie's responsibilities also involved field work and chapter creation for developing an EIA for the project.

**By The Ocean Development, Environmental Impact Assessment – Eleuthera, The Bahamas, April 2018 – December 2018 (Team Leader)**

Project involved development of an EIA hotel and luxury home development with an organic farm component. Preparing the EIA involved terrestrial and hydrological surveys to assess the impacts of

the development. The EIA also recommends mitigation measures to be undertaken to eliminate or minimize negative environmental impacts. Mrs. Moultrie was responsible for preparing of the EIA, coordinating the team of consultants, and liaising with Government agencies during the EIA review to obtain no-objection for the development to proceed.

**Caribbean Community Climate Change Centre, Capacity Building of National Designated Authority (NDA) and Preparation of Country Strategic Framework – The Bahamas, February 2018 – December 2018 (National Consultant, team member with Acclimatise)**

Funded by the Green Climate Fund (GCF), Caribbean Community Climate Change Centre (CCCCC) and the Bahamas Government, the project sought to strengthen the capacities of the Ministry of Environment and Housing as the National Designated Authority for the GCF, develop operational guidelines for engagement of the NDA with the GCF, and prepare a Country Strategic Framework for The Bahamas (including a portfolio of climate change projects). Mrs. Moultrie is responsible for stakeholder engagement and assisting with development of project reports and the Country Strategic Framework along with communication materials about the GCF.

**Caribbean Development Bank, Water Supply Improvement Project – The Bahamas, December 2016 – April 2018 (Socio-Environmental and Climate Specialist)**

Funded by the Caribbean Development Bank (CDB) and the Bahamas Government, the project sought to improve existing and develop new infrastructure for water supply on six islands in The Bahamas. Mrs. Moultrie was responsible for developing ESMPs for five of the islands and monitoring compliance with the ESMPs during construction. A key component of the project was ensuring infrastructure is resilient to climate change.

**Inter-American Development Bank, Environmental and Social Analysis and Management Plan – The Bahamas, July 2016 – September 2016 (Socio-Environmental and Climate Specialist)**

Funded by the Inter-American Development Bank (IDB) and the Bahamas Government, the Skills for Current and Future Jobs in The Bahamas project involved finding a location for the Department of Labour. Mrs. Moultrie was responsible for advising on the environmental and social impacts of three scenarios – repair of Clarence A. Bain building, demolition of the building and construction of a new building at the same site, and rental of space in an existing building. She developed an Environmental and Social Analysis (ESA) of related demolition, construction and operation activities for the various scenarios. She also developed an Environmental and Social Management Plan (ESMP) to guide demolition, construction and operation, depending on the scenario selected.

**Inter-American Development Bank, Feasibility Studies for a Climate Risk-resilient Coastal Zone Management Investment Program in The Bahamas – Preparation of a National ICZM Policy Framework, February 2016 – October 2016 (SEV Team Leader)**

Funded by the Inter-American Development Bank, the project sought to prepare a national integrated coastal zone management (ICZM) policy framework for The Bahamas, support the Government of The Bahamas in communicating with the public on relevant issues and enhance knowledge and capacities in innovative aspects of ICZM for the Government and other key stakeholders. SEV Consulting Group, along with Caribbean Coastal Services, was selected to support the project through development of technical briefs on thematic areas including policy, governance and planning, environment and climate

change adaptation as well as develop a draft ICZM National Policy Framework. Mrs. Moultrie was responsible for ensuring all SEV team members completed their tasks in a timely manner and served as liaison with other consulting teams on the project as well as Government and IDB staff. She led all tasks related to policy development, including drafting of the ICZM Policy Framework and participation as a presenter in the training workshop, and assisted with other tasks.

**Cotton Bay Development Golf Course, Eleuthera – Environmental Impact Assessment Addendum and Environmental Management Plan, July 2015 – September 2016 (Project Lead)**

Project involved development of an EIA Addendum for the golf course component under Phase 2. Preparing the Addendum involved terrestrial and hydrological surveys to assess the impacts of the golf course construction. The Addendum also recommends mitigation measures to be undertaken to eliminate or minimize negative environmental impacts. Subsequent to the approval of the EIA Addendum, an EMP was developed to guide construction and operation.

**Inter-American Development Bank, Ecosystem-based Development for Andros Island, The Bahamas – Outreach and Capacity-Building, July 2015 – March 2017 (Team Leader)**

Funded by the Inter-American Development Bank and Office of the Prime Minister, the project sought to complete an analysis of ecosystem services and future development scenarios as well as development of a master plan for the island of Andros. SEV was selected to support the project through development of outreach and capacity building activities including development of a communications strategy, facilitation of public consultations, assessment of technical capacity of decision-making agencies and delivery of a training workshop on several topics including ecosystem services and economic valuation. Mrs. Moultrie was responsible for ensuring all team members completed their tasks in a timely manner and served as liaison with other consulting teams on the project as well as the IDB staff. She led the tasks on stakeholder consultations and training workshop.

## **Publications**

- Wells-Moultrie, S. (2020). Assessing sustainability in small island developing states: A comparative analysis of sustainability assessment tools and their applicability to small island developing states. Chapter 10. In *Tourism Development, Governance and Sustainability in The Bahamas*. Abingdon, Oxon; New York, N.Y: Routledge.
- Silver, J.M. et al. (2019). Advancing Coastal Risk Reduction Science and Implementation by Accounting for Climate, Ecosystems, and People. In *Frontiers in Marine Science*, 6(556).
- Arkema, K. et al. (2019). Integrating fisheries management into sustainable development planning. In *Ecology and Society*, 24(2):1.
- Wells-Moultrie, S. (2016). *Assessing Sustainability in Small Island Developing States” A comparative analysis of sustainability assessment tools and their applicability to Small Island Developing States*. Gainesville: University of Florida.
- Moultrie, Stacey. (2013). *Bahamas Invasive Species Field Guide: Identification of Plant and Animal Invasives*. Nassau: Department of Marine Resources.
- Moultrie, Stacey. (2013). *The Bahamas National Invasive Species Strategy 2013*. Nassau: Department of Marine Resources.

- Sherman, K., Dahlgren, C., Moultrie, S., and Arnett, F. (2013). *Building a Sustainable National Marine Protected Area Network: Controlling Lionfish Populations in Marine Protected Areas*. PSBP Conference Paper.
- Moultrie, Stacey. (2012). *Everyman's Guide to Protected Areas*. Nassau: HD Wells.
- Moultrie, Stacey. (2012). *Master Plan for The Bahamas National Protected Area System*. Nassau: The Nature Conservancy.
- The Nature Conservancy (2010). *Land and Sea Use Plan for the island of Andros*. Nassau: The Nature Conservancy.
- The Nature Conservancy (2009). *Master Plan Summary for The Bahamas National Protected Area System*. Nassau: The Nature Conservancy.
- Moultrie, S. (2009). *Sustainable Financing for Protected Areas*. In The Bahamas Investor, Nassau, The Bahamas.
- The BEST Commission. (2007). *National Environmental Policy and National Environmental Management and Action Plan*. Nassau, The Bahamas: The BEST Commission.
- Wells-Moultrie, Stacey. (2006). *The Evolution of Environmental Management in The Bahamas - 1994-2005*. In The Bahamas Journal of Science, Nassau, The Bahamas.
- The BEST Commission. (2003). *National Invasive Species Strategy for The Bahamas*, Nassau: The BEST Commission.
- The BEST Commission. (2002). *Bahamas Environmental Handbook*. Nassau, The Bahamas: Media Enterprises.
- Wells, Stacey. (1998). *A Marine Environmental Policy Proposal for The Bahamas*, Halifax, Canada: Dalhousie University.

## Sharrah Moss-Hackett

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**Profession:** Environmental Planning Specialist  
**Date of Birth:** 31 August 1979  
**Nationality:** Bahamian

### Education

2013 Miami University (USA), Master of Environmental Science – Environmental Management  
2001 University of Arkansas (USA), Bachelor of Science – Environmental Soil and Water Science

### Countries of Work Experience

The Bahamas

Regional projects involving Grenada, Saint Lucia, St. Kitts and Nevis, and St. Vincent and the Grenadines.

### Languages

<i>Speaking</i>	<i>Reading</i>	<i>Writing</i>	
English	Excellent	Excellent	Excellent

### Key Qualifications

Mrs. Moss-Hackett specializes in stakeholder engagement, project management, geographic information systems and mapping, and technical support for environmental impact assessments. Her professional history in the environmental field spans 16 years, having held positions with the BEST Commission, The Bahamas National Trust and The Nature Conservancy. Her work experiences include coordinating multilateral funded projects, engaging local communities in conservation, documenting land and sea use throughout The Bahamas. She has worked throughout The Bahamas and in the region. She has spent her entire professional career in The Bahamas, working for government and non-profit entities. Mrs. Moss-Hackett was born and raised on the island of New Providence.

### Employment Record

**From 2016**

**Employer**

**Position Held and**

**Description of Duties**

**To 2019, 2021 - Present**

SEV Consulting Group (Nassau, The Bahamas)

Environmental consultant (Project Management, stakeholder engagement and GIS) Mrs. Moss-Hackett serves as a project coordinator for environmental projects, analyses GIS for planning purposes, conducts terrestrial and marine surveys, engages local communities, and develops materials for public awareness and education.

**From 2014  
Employer**

**November 2016**

Ministry of Environment and Housing, Government of The Bahamas ‘  
(Nassau, The Bahamas)

**Position Held and  
Description of  
Duties**

Project Coordinator, Feasibility Studies for a Climate Risk Resilient Coastal Zone Management Program. Mrs. Moss- Hackett was responsible for the launch and successful execution of the ICZM Program. Her duties included the technical review of project documents and reports, preparation, execution, and management of contract and contractors, coordination of the technical advisory committee, liaison between the Ministry of Environment and Housing and the Inter-American Development Bank (IDB), and management of the financial recording and reporting to the IDB and the Ministry of Environment and Housing. Additionally, Mrs. Moss-Hackett worked with the Technical Advisory committee to identify potential priority sites for future ICZM projects and communicate member feedback to consultants and the IDB.

**From 2009  
Employer**

**June 2011**

The Nature Conservancy (Northern Caribbean Program, Nassau, The Bahamas)

**Position Held and  
Description of  
Duties**

Conservation Planner

Mrs. Moss-Hackett was responsible for supporting the management of the TNC GIS database for The Bahamas and the execution of the GEF-funded Integrated Watershed and Coastal Areas Management project. She engaged key stakeholders on Andros Island, promoted the GEF-funded IWCAM project to the public, and visited every community on Andros. Mrs. Moss-Hackett also managed contracts for experts conducting assessments of existing land (and sea) use and evaluating the economic impact of natural resources on the economy of Andros. She coordinated and facilitated over 30 stakeholder consultations (public meetings) numerous interviews, surveys, and field research team activities. Mrs. Moss-Hackett was responsible for submitting all financial and project reports to the GEF.

**From 2005**  
**Employer**  
**Position Held and**  
**Description of**  
**Duties**

**To 2006**  
Bahamas National Trust (Nassau, The Bahamas)  
Community Liaison and Planning Officer  
Mrs. Moss-Hackett planned and facilitated workshops designed to engage stakeholders in management planning for protected areas, developed the first draft of the San Salvador National Park proposal based on stakeholder input and worked with a variety of local and international experts to establish resource management goals. She was also responsible for making presentations about conservation and important species to schools and community groups, and assisted in the development and revision of management planning documents for National Parks.

**From 2004**  
**Employer**  
**Position Held and**  
**Description of**  
**Duties**

**To 2005**  
Exuma Resource Centre (Exuma, The Bahamas)  
Community Education and Outreach Officer  
Mrs. Moss-Hackett provided guidance for the Exuma Foundation on the development of its newly established Environmental Education Program. She assisted teachers with incorporating the newly developed science curriculum into teaching plans, planned and conducted environmental activities for students and the public, and provided support and executed presentations, about the Bahamian environment, to the public.

**From 2002  
Employer**

**To 2004**

Bahamas Environment, Science and Technology (BEST) Commission  
(Nassau, The Bahamas)

**Position Held and  
Description of  
Duties**

Technical Officer

Mrs. Moss-Hackett was responsible for the technical review of Environmental Impact Assessments for major developments across The Bahamas and on liquefied natural gas projects. Additionally, she was responsible for the organization and implementation of the contamination assessment for all corridors near Service Stations within The New Providence Road Improvement Project (NPRIP). Mrs. Moss-Hackett assisted with the development and implementation of National Programs related to International Environmental Agreements and Conventions.

## Work Experience

- **FACTOR, UNFCCC TNC/BUR Vulnerability and Adaptation Chapter, 2021 – Present (Stakeholder Engagement Specialist)** – Mrs. Moss-Hackett serves as the stakeholder engagement specialist on the SEV-Factor team responsible for development of the Vulnerability and Adaptation chapter of the UNFCCC Third National Communication/Biennial Update Report. She is responsible for coordinating stakeholder engagement activities, including validation workshops with national stakeholders.
- **Bahamas Power and Light, Environmental Impact Assessment and Environmental Management Plan – New Providence, The Bahamas, March 2020 – March 2022 (Consultant)**  
Project involves construction of a power plant in New Providence. Mrs. Moss-Hackett is responsible for contributing to the development of an EIA and EMP for the project inclusive of terrestrial and socioeconomic data collection, preparation of reports and liaising with DEPP and other Government agencies as necessary.
- **Central Bank of The Bahamas, Environmental Impact Assessment and Environmental Management Plan – New Providence, The Bahamas, February 2020 – May 2021 (Consultant)**  
Project involved demolition of several buildings in New Providence. Mrs. Moss-Hackett was responsible for protected tree surveys and socioeconomic data collection for the development of an EIA and EMP for the project.
- **Shell Bahamas LNG Project, Environmental Permitting and Environmental Impact Assessment, December 2018 - May 2021 (Stakeholder Engagement Specialist)** - Project involved development of an LNG pipeline and power plant by Shell in cooperation with Bahamas Power and Light (BPL). Mrs. Moss-Hackett was responsible for socioeconomic data collection inclusive of stakeholder survey development and execution as well as related chapter creation for development of an ESHIA for the project.
- **Bahamas National Trust – Moriah Harbour Cay National Park Management Plan, 2017-2018 (Planning Consultant)** - Mrs. Moss-Hackett was responsible for writing the management plan for the Moriah Harbour Cay National Park on the island of Exuma. She executed numerous stakeholder consultations across the island and incorporated stakeholder input into the draft and final versions of the plan. She also compiled GIS data and designed maps to describe the geographical context, key habitats and species, stakeholder uses and management zones within the park.

- **The Nature Conservancy – Integrated Watershed and Coastal Areas Management (IWCAM) Project – Andros Demonstration Site, 2017 (Consultant)** - Mrs. Moss-Hackett was responsible for assisting TNC with planning and executing the EGA stakeholder workshop, giving presentations to stakeholders, facilitating the event, moderating small group sessions at the workshop, data gathering through stakeholder input, and preparation of the final workshop report.
- **Caribbean Development Bank, Water Supply Improvement Project – The Bahamas, December 2016 – April 2018 (Assistant to Socio-Environmental and Climate Specialist)** Funded by the Caribbean Development Bank (CDB) and the Bahamas Government, the project seeks to improve existing and develop new infrastructure for water supply on six islands in The Bahamas. Mrs. Moss-Hackett was responsible for monitoring compliance with the ESMPs during construction.
- **Inter-American Development Bank, Feasibility Studies for a Climate Risk-resilient Coastal Zone Management Investment Program in The Bahamas.** September 2014 – November 2016 (Project Coordinator). A technical cooperation between the Government of The Bahamas and the Inter-American Development Bank (IDB). The Programme was executed by the Ministry of Environment and Housing and guided by the Technical Advisory Committee. As Project Coordinator, Mrs. Moss-Hackett was responsible for the development of the project implementation plan, which included the workplan, schedule, and procurement plans for the life of the program. Financial management of all aspects of the project, including financial reporting, disbursement requests and day-to-day finances as per the IDB Procurement Policy were also the responsibility of the Project Coordinator. Additionally, Mrs. Moss-Hackett served as the point of contact between the IDB and the Ministry of Environment and Housing and managing communications on behalf of the executing agency. She organized meetings and documented minutes for the Technical Advisory Committee, and was responsible for identifying linkages and potential synergies between the ICZM Program and other national and international programmes and initiatives.

## **Other Work Experience**

Interim National Project Coordinator, GEF-funded Pine Islands - Forest/Mangrove Innovation and Integration (Grand Bahama, New Providence, Abaco and Andros) Project

## **Publications**

- Bahamas Ecological Gap Analysis. BEST Commission, 2014.
- Land and Sea Use Plan for the Island of Andros. The Nature Conservancy, 2010.
- Andros: Living of the Land and Sea. DVD. The Nature Conservancy, 2010.
- Bahamas Environment Science and Technology Commission (2006). Road Map for Science and Technology in The Bahamas. BEST, Nassau, The Bahamas, 40pp.
- Lasker, H.R. 2006. High Fertilization Success in a Surface-Brooding Caribbean Gorgonian. *Biology Bulletin* 2006 210: 10-17.
- Bahamas Environment Science and Technology Commission (2003), *The National Invasive Species Strategy for The Bahamas*. BEST, Nassau, The Bahamas, 35pp.
- Bahamas Environment Science and Technology Commission (2005), *National Capacity Needs Self-Assessment (NCSA) Project*. BEST, Nassau, The Bahamas, 145pp.
- Bahamas Environment Science and Technology Commission, *National Biodiversity Enabling Activities to the Convention on Biological Diversity - Third National Report (2003)*. BEST, Nassau, The Bahamas, 142pp.

## David Dean

<b>Position Title and No.</b>	Ornithologist
<b>Name of Expert:</b>	David Dean
<b>Country of Citizenship/Residence</b>	The Bahamas

### EDUCATION

2014	CV Bethel Senior High School – High School Diploma
2011	CH Reeves Junior High School – BJC Certificate

### EMPLOYMENT RECORD

Period	Employing organisation and title/position. Contact information for references	Country	Summary of activities performed relevant to the Assignment
<b>2021 - Present</b>	SEV Consulting Group <i>Ornithologist</i> S. Helena Moultrie <a href="mailto:hmoultrie@sevconsulting.com">hmoultrie@sevconsulting.com</a>	The Bahamas	Successfully completed bird surveys for following development projects - Adelaide Pines, Exuma Yacht Club, Bel Air Hotel & Residences, and East Grand Bahama school Complex.
<b>2020 - 2021</b>	Science and Perspective <i>Field Assistant for bird surveys</i> Dr. Ancilleno Davis <a href="mailto:ancilleno@scienceandperspective.com">ancilleno@scienceandperspective.com</a>	The Bahamas	Mr. Dean worked as a field assistant to Dr. Davis completing bird surveys for various projects across The Bahamas, including bird surveys for BPL Station D Power Plant project and Shell LNG storage facility project.
<b>2019-2020</b>	Ardastra Gardens and Zoos Park Attendant	The Bahamas	Mr. Dean worked with animals at Ardastra including various bird species.

### Language Skills

- English (Speaking, Reading, Writing); Very Good

# Mayer G. Murphy

## EDUCATION

Bachelor of Environmental Studies  
Prince Edward Island, Charlottetown, PE

Sept 2019-May 2023 University of

- Within a 4<sup>th</sup> year course, conducted an environmental impact assessment for aquaculture farms in PEI resulting in helping improve wastewater practices; identified sustainable alternatives to disposing of aquaculture waste and sustainable transportation, the project concluded with a proposed policy agreement
- Researched and presented a variety of papers and presentations using Microsoft Word, Excel, PowerPoint, and Access
- Adaptability skills further developed by having to adjusted to online learning during the COVID-19 pandemic

## WORK EXPERIENCE

SEV Consulting Group

June 2023 – Present

Position: Environmental Technician

Ms. Murphy is responsible for field data collection on terrestrial and marine species as well as assisting with preparation of EIAs and EMPs. She also works as an environmental monitor for projects under construction as per monitoring requirements of each project's EMP.

## VOLUNTEER WORK EXPERIENCE

Internship

Sept 2021-Present

Hunter-Clyde Watershed Group, Charlottetown, PE

- Developed listening and interpersonal skills through weekly check-ins where feedback was given to help support and further develop learning skills and knowledge during internship with the Hunter Clyde Watershed Group
- Assigned and conducted field research on Brook Trout to determine if there were any size differences; results were then added to the website
- Work both independently and as part of a group while assisting with field work such as planting trees, checking water quality and redd surveying of Brook Trout; learned and conducted test water quality

1. Intern, Boat Registration Department

July – Aug 2021

Bahamas Port Department, Nassau, Bahamas

2. Sorted boat registration records into spreadsheets using Microsoft Access; assisted with answering phone calls

3. Conducted a research project to identify ways boats could be better equipped to handle hurricanes

## CERTIFICATIONS

PADI Open Water and Advanced Open Water Diver

2023

Valid Standards of Training, Certification and Watchkeeping for Seafarers

2019

Valid Emergency First Aid and CPR Training

2019