SUPPLEMENTAL ENVIRONMENTAL IMPACT ASSESSMENT
MONTAGE CAY
ABACO

CONDUCTED
FOR

STERLING
GLOBAL FINANCIAL

SUBMITTED
TO

MINISTRY OF THE ENVIRONMENT AND HOUSING
DEPARTMENT OF ENVIRONMENTAL PLANNING AND PROTECTION

APRIL 2021

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SUPPLEMENTAL ENVIRONMENTAL IMPACT ASSESSMENT
MONTAGE CAY
ABACO
THE BAHAMAS

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Amendment and Revision	Date	Page(s)	Description ……
Original Submittal		All	

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SUPPLEMENTAL ENVIRONMENTAL IMPACT ASSESSMENT
MATT LOWE CAY – MONTAGE CAY
ABACO, THE BAHAMAS

Table of Contents

List of Figures

List of Tables

SUPPLEMENTAL ENVIRONMENTAL IMPACT ASSESSMENT
MATT LOWE CAY – MONTAGE CAY
ABACO, THE BAHAMAS

1 EXECUTIVE SUMMARY

This report serves as a supplement to the previously approved Environmental Impact Assessment, "ENVIRONMENTAL IMPACT ASSESSMENT OF PROPOSED MATT LOWE'S CAY DEVELOPMENT ABACO, BAHAMAS", dated April 8th, 2002.

As a supplement this report provides additional data and analysis to address terrestrial impacts specific to the amended terrestrial land use as depicted in the Conceptual master plan herein displayed as **APPENDIX 13.1** and validation that the baseline descriptions for flora and fauna are still reflective of current conditions. In addition, this EIA will address amendments to the revised proposed land use plan.

2 PURPOSE AND SCOPE

The purpose of this report is to assess the existing conditions and proposed terrestrial amendments of the development, and recommend measures for minimizing, avoiding, negating, or mitigating for potential impacts. This report is to address terrestrial areas of the proposed development.

The marine areas are not to be addressed as these are previously approved and the marina is completed and continues to function as a marina.

3 PROJECT DESCRIPTION

The Islands of The Bahamas form a 100,000 square mile archipelago that extends over 500 miles of the clearest water in the world. The Bahamas is nestled between the eastern coast of Florida and northern coast of Cuba, and comprises over 700 islands including uninhabited cays, islands, and islets.

Montage Cay, formerly known as Matt Lowe's Cay, is a fifty-three (53) acre island that has been partially developed but due to economic factors there has been no development activity for a number of years. The Cay lies in the Sea of Abaco and is approximately one hundred and ten miles north - north east of Nassau and approximately four miles from the center of Marsh Harbour. The topography of the Montage Cay is best described as saddle shaped, with the northern and southern extents being elevated (over +25ft., MLLW) relative to the low-lying central portions of the island. Elevations in the center of the island, in the vicinity of the proposed interior waterway, are generally less than +5 ft. MLLW.

The majority of the island's coastline is mostly non-littoral (composed of Ironshore) except for shallow, gently sloped sand beach along the central-western coastline and three isolated pocket beaches along the central eastern-coastline. High rock ridges characterize the northern and southern ends of the island, and portions of the western coastline. The shoreline in the vicinity of the marina entrance consists of

ironshore for at least 250 feet to either side of the entrance. Along this reach, and most of the coastline along the eastern shoreline, the ironshore features elevations of +5 to +5.5 ft. MLLW (+1.5 to +2 ft. mean higher high water (MHHW)), excepting the minor sand beaches which are lower, with back-berm elevations similar to that of the ironshore. Elevations along the back-berm of the sand beaches along the western shoreline are lower: about +4 ft. MLLW (+0.5 ft. MHHW).

The Developer, Sterling Montage Cay Limited aims to develop the island by maintaining the already existing marina. Additionally, the island has been slated for selling of lots for single family homes, restaurant facilities, recreational facilities, spa, and fitness center, a 36-room boutique hotel, back of house facilities, a helipad and seaplane facilities and 6 near water structures.

3.1 DETAILED PROJECT DESCRIPTION

Covered area and paved surfaces will comprise the following;

26 ESTATE VILLAS @ 15,000 S.F./VILLA = 390,000 S.F. (9.0 acres)

21 BRANDED VILLAS @ 8,200 S.F./UNIT = 172,200 S.F. (3.9 acres)

HOTEL COMMON AREA BLDGS./HARDSCAPE/Marina sidewalks/tennis/etc. = 219,391 (5 acres)

For a total of 781,591 S.F. (17.94 ACRES) or (33% OF 53-acre island)

Areas of Cleared Vegetation will total 1,284,578 S.F. (31 acres) of vegetation removal or (60% OF 53-acre total.

Note: of the areas cleared, most areas not covered with structure/impervious surfaces will be revegetated.

3.2 PHASING

The project will not adopt a phasing sequence, however the following construction sequence will prevail;

- Establish a man camp for up to 20 persons on the Cay
- Complete all civil infrastructure
- Complete and energize installation of Waste Water Treatment Plant (WWTP)
- Commence vertical construction on 2 Estate Homes and 2 Villas
- Commence vertical construction on the hotel components
- Continue vertical construction of villas as market forces dictate

3.3 ALTERNATIVES

The purpose of the discussion of alternatives in an Environmental Impact Assessment (EIA) is to provide a reasonable range of potentially feasible alternatives that are capable of avoiding or substantially lessening any significant environmental effects of a project, even if these alternatives would impede to some degree the attainment of the project objectives or would be more costly. The range of alternatives describes

those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects.

3.3.1 The 'No Action' Alternative

The no-action alternative would result in no impact to the terrestrial impact from this development but would not necessarily prevent any or all future developments for the same area. No action may also limit the long-term growth of the area in comparison with similar places in the Bahamas and elsewhere in the Caribbean which are larger and have a greater range of amenities. Employment levels would likely remain static and may act as a potential deterrent of regional and local development that would certainly take advantage of the Montage Cay improvements and any sufferance facilities offered at the Montage Cay operations. No additional significant additional impacts to the natural environment are likely to occur, in the no action alternative, however, the no action alternative would not provide the economic stimulus of the further development of Montage Cay.

4 ENVIRONMENTAL BASELINE

4.1 GEOGRAPHICAL LOCATION

Figure 4. 1: Location Plan, Abaco

The Abacos are a large and complex island group that includes a considerable number of cays along the eastern shore. Abaco occupies most of the eastern half of the Little Bahama Bank, extending in an arc for some 115 miles (185 kilometers).

Montage Cay is a fifty-three (53) acre island that has been partially developed but due to economic factors there has been no development activity for a number of years. The Cay lies in the Sea of Abaco and is approximately one hundred and ten miles north - north east of Nassau and approximately four miles from

the center of Marsh Harbour. The topography of the Montage Cay is best described as saddle shaped, with the northern and southern extents being elevated (over +25ft., MLLW) relative to the low-lying central portions of the island. Elevations in the center of the island, in the vicinity of the proposed interior waterway, are generally less than +5 ft., MLLW.

The majority of the island's coastline is mostly non-littoral (composed of Ironshore) with the exception of shallow, gently sloped sand beach along the central-western coastline and three isolated pocket beaches along the central eastern-coastline. High rock ridges characterize the northern and southern ends of the island, and portions of the western coastline. The shoreline in the vicinity of the marina entrance consists of ironshore for at least 250 feet to either side of the entrance. Along this reach, and most of the coastline along the eastern shoreline, the ironshore features elevations of +5 to +5.5 ft. MLLW (+1.5 to +2 ft. mean higher high water (MHHW)), excepting the minor sand beaches which are lower, with back-berm elevations similar to that of the ironshore. Elevations along the back-berm of the sand beaches along the western shoreline are lower: about +4 ft. MLLW (+0.5 ft. MHHW).

4.2 LAND USE

Prior to the Development commencing in 2002 the island was unoccupied save for a small marina and a single-family residence and support structure.

Figure 4. 2: Matt Lowe Cay Circa 2002

Figure 4. 3: Matt Lowe Cay 2015

Following the commencement of construction and development in 2002 the marina was excavated and developed together with infrastructural development of utilities, beach improvements and terrestrial vertical construction.

Development of the cay has remained unchanged since circa 2009.

4.3 PHYSICAL ASPECTS

4.3.1 Climate

The Bahamas has been described as having a tropical maritime wet and dry type climate, with winter incursions of modified polar air (Bahamas Department of Meteorology, 2005).

4.3.2 Air Temperature

The Bahamas' islands are not in the Caribbean. They are in the Atlantic. The Abacos are 150 miles east of, and roughly parallel to the area from Palm Beach to Miami. They are in the northernmost part of the Bahama chain which stretches 600 miles in a southeasterly direction almost to Haiti and the Dominican Republic

Since climate data is not available specific to Montage Cay, data for Marsh Harbour has been used. The climate of Great Abaco and the Abaco Cays is generally mild year-round with average temperatures ranging from between 64°F and 89°F. Winter temperatures in Abaco seldom fall much below 64°F and usually reach 85 °F during the afternoon (Bahamas Department of Meteorology). Summer nightly temperatures are usually 75°F or less while daily temperatures seldom rise about 90°F (Bahamas Department of Meteorology,).

Temperatures in the northern Bahamas are generally a few degrees cooler in winter and likewise, the southern Bahamas experiences hotter temperatures in the summer.

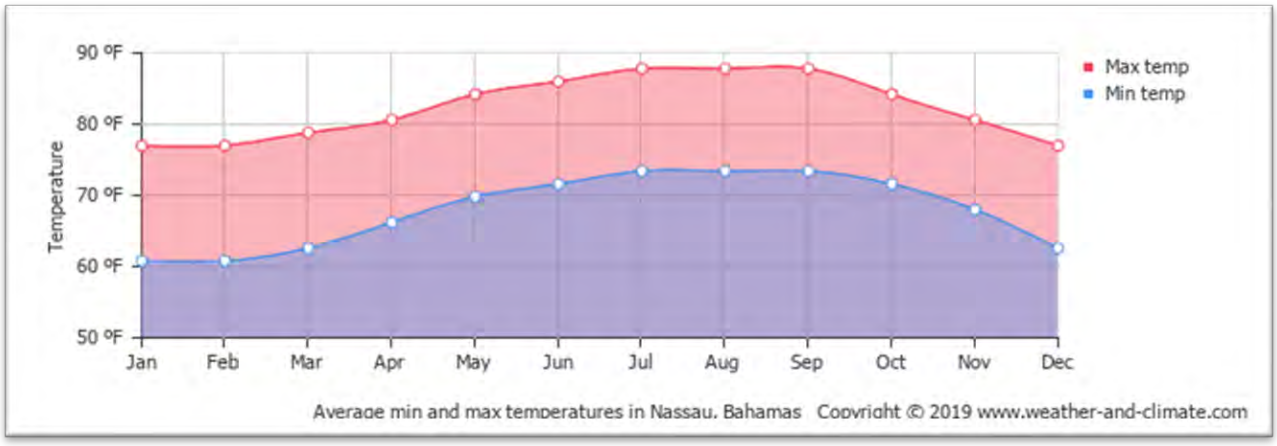

Figure 4. 4: Average Monthly Temperature

4.3.3 Sea Surface Temperature

Sea surface temperature normally varies between 74°F in February and 83°F in August. The following table depicts average monthly sea surface temperatures for Abaco.

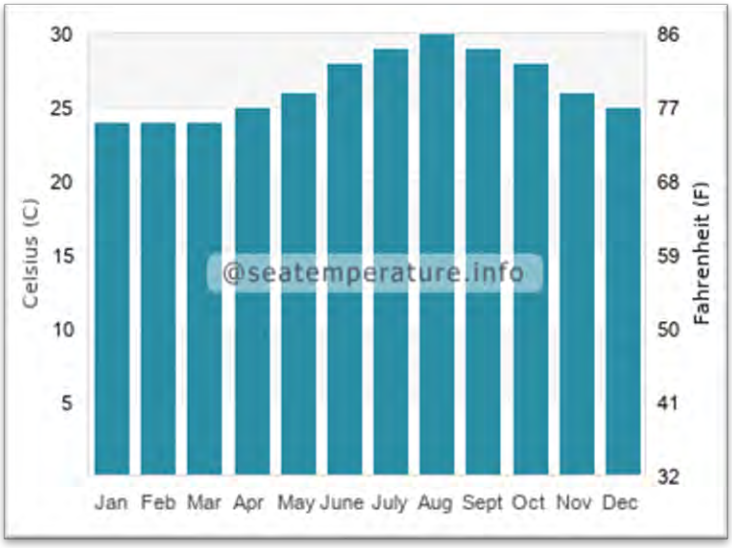

Figure 4. 5: Sea Surface Temperatures

4.3.4 Rainfall

The Bahamas experiences a wet and dry season typical of a maritime subtropical climate. The rainy season typically starts in mid-May and extends to mid-October followed by the dry season (Sealy, 2006). Throughout the northern Bahamian Island Groups rain showers occur any time of the year, but the typical rainy period occurs from May to October. In Abaco, monthly rainfall averages 3.5 inches.

The following Figure 4.6 depicts average monthly rainfall that can be expected for Abaco (there is no specific data available for Matt Lowe Cay.

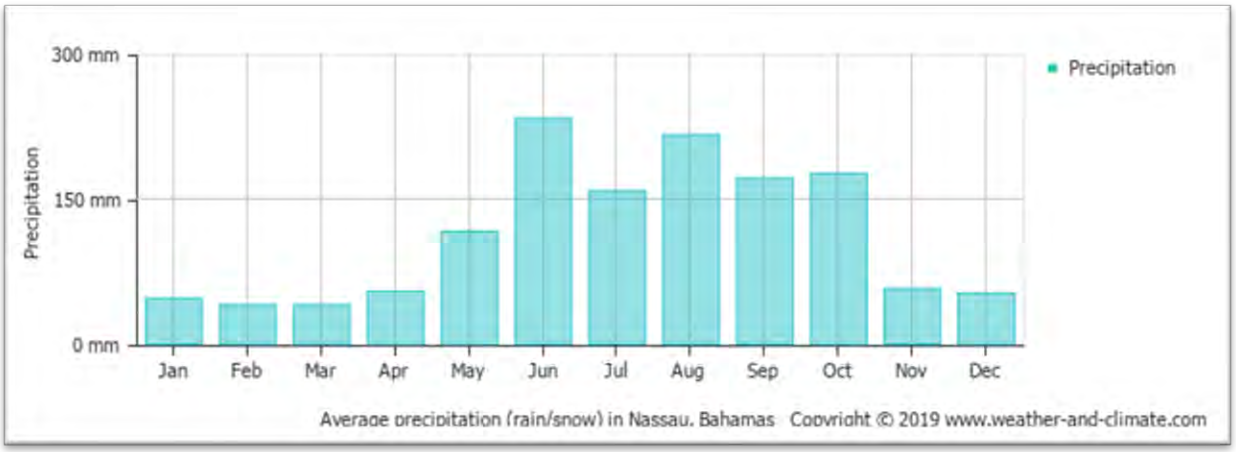

Figure 4. 6: Annual Average Rainfall

4.3.5 Winds

The following Figure 4.7 depicts general wind conditions that can be expected for Abaco.

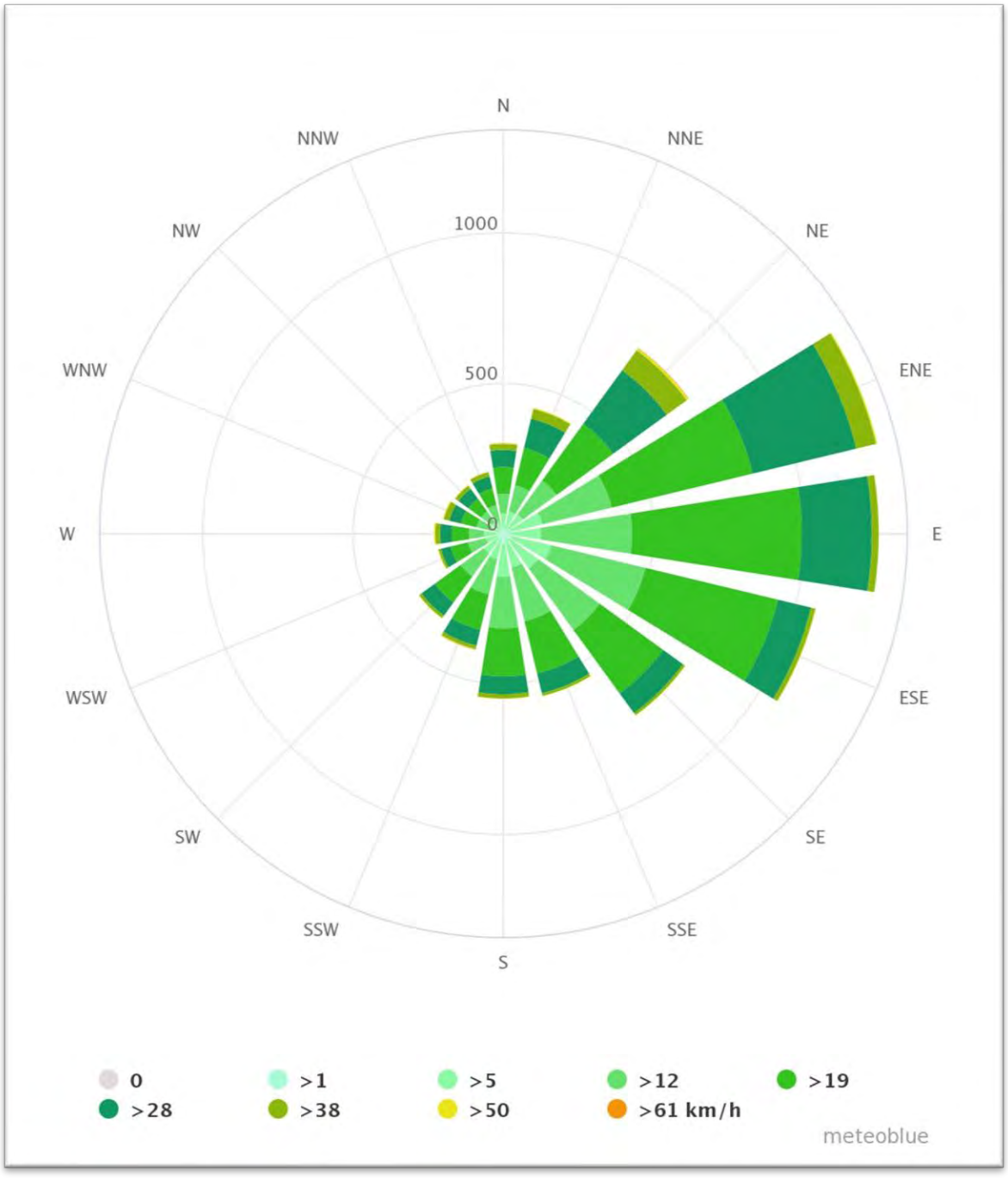

Figure 4. 7: Wind Rose

4.3.6 Hurricanes

The “prize” for 'Hurricane Capital of the Caribbean' goes to the island of Abaco in The Bahamas, with 18 severe hurricanes since 1851 (which is on average one hurricane per 8-9 years), although in the last 60 years there were only 4 (one hurricane every 15 years). Since 1944 Nevis, Key West and Cuba (Habana) have seen the most severe hurricanes (7 or about one every 8-9 years). Grand Bahama tied with Abaco for the most hurricanes (40, 1 every ~4 years). At the bottom of the list: Bonaire and Curacao which have in the last 150+ years only seen 12 named storms pass by (none of these were severe hurricanes). Also, the Eastern Caribbean does not see as many hurricanes as the Western Caribbean, which is a little deceiving since the area of the Western Caribbean region is bigger (Cayman, part of the Western part, is only ranked 31, while Nevis, in the Eastern region is number 6). The Bahamas region however, with its smallest area, is definitely more active than the East and West Caribbean. *(Caribbean Hurricane Network).*

According to the National Oceanic and Atmospheric Administration, database of Historical Hurricane Tracks, since 1859, 45 tropical storms have passed within 50 nautical miles of Montage Cay (National Oceanic and Atmospheric Administration).

The Bahamas lays within the Atlantic hurricane belt where hurricane activity is a regular occurrence for this region of the world. Hurricane season extends from June 1 to November 30. Statistics show The Bahamas is in the path of hurricanes with historically more than 50 tropical cyclones of hurricane intensity passing within 125 miles of Nassau between 1886 and 1999 (Bahamas Department of Meteorology, 2005). The Bahamas experienced direct impacts from Hurricanes Andrew (1992), Floyd (1998), Michelle (2001), Frances and Jean (2004), and Irene (2011). The island was further impacted by Hurricanes Sandy (October 2012) and then the unprecedented Hurricane Dorian in September 2019, with disastrous effect.

The Abacos and possibly Montage Cay may expect to experience hurricane conditions on the average of once in nine years. Due to the relatively small size of Montage Cay a single hurricane would be anticipated to affect the whole island equally. Hurricane watches and warnings will provide advance notice to residents and visitors of Montage Cay for evacuations or preparations.

New structures will be built to endure winds of up to 140 miles per hour as per the hurricane construction standards of the Bahamas Building Code Edition III.

Following the catastrophic events of Hurricane Dorian forecasters are being challenged as the models they depend on failed to anticipate the strength and impact of that deadliest storm. Dorian was the strongest hurricane in modern records to make landfall in the Bahamas. The name Dorian may eventually be retired.

4.3.7 Littoral Drift.

Along the existing Ironshore littoral transport does not appear significant nor critical to the island’s beaches or adjacent shores. The pocket beaches along this shoreline (which are principally ephemeral, except for the more significant embayment of Mother’s Beach). There are no plans for further beach or coastline activities that may impact longshore drift.

4.3.8 Topography

The topography of the Montage Cay is best described as saddle shaped, with the northern and southern extents being elevated (over +25ft., MLLW) relative to the low-lying central portions of the island.

Elevations in the center of the island, in the vicinity of the proposed interior waterway, are generally less than +5 ft. MLLW.

4.3.9 Hydrological and Hydro geographical Resources

Like many small cays of The Bahamas, Montage Cay does not obtain freshwater from a public drinking water system or wells. It is apparent that there are no freshwater sources within the project limits due to the limited size of the island and the associated limited recharge capability to support the water supply and demand needs of the development. The freshwater ground source is not considered to be a dependable viable option for supporting the development. Consequently, no investigation of this source has been performed in connection with the EIA.

4.4 BIOLOGICAL IMPACTS

4.4.1 Terrestrial Survey

Original terrestrial and marine surveys were conducted at Montage Cay from March 31 to April 1, 2012. Aerial drone imagery and ground-truthing foot transects were conducted during the period February 27th, 2015 through March 1st, 2015.

However, as the island was in the line of passage of Hurricane Dorian in 2019, this survey also focused on changes from impacts of the storm.

Please refer to **APPENDIX 13.3** for the full report on botanical assessment.

4.4.1.1 Methodology

Vegetation types were mapped by examining aerial photography and verified by walking along the perimeter of the vegetation using existing roads and accessing the interior of vegetation using recently cleared survey lines. Vegetation Type taxonomy are based on Areces et al. (1999). Vascular plant species occurring in each vegetation type were recorded and used to compile a floral list. Plant taxonomy is based on Corell and Corell (1982). The presence, location and abundance of vascular species listed under the Conservation and Protection of the Physical Landscape Act, Protected Trees Order (1997) and the National Invasive Species Strategy for The Bahamas, 2013 were noted when encountered. Field studies were conducted on 30 November 2020.

4.4.1.2 Verification of changes from prior baseline assessment

While there is notable damage to the vertical structures, and to a lesser extent the composition of vegetation since the 2015 assessment; the changes since the passage of Hurricane Dorian are relatively minimal and the site is in recovery.

4.4.2 Avian Survey

Avian surveys were conducted on October 14th and 15th, 2020 to identify the presence, abundance and habitat utilization of avian species within the boundaries and nearshore waters of Montage Cay, near Abaco, Bahamas for Sterling Global Financial. Notes on Habitat and other wildlife were collected to describe the conditions that may affect the bird behavior detectability and abundance within the study area.

Please refer to **APPENDIX 13.2** for the full Avian Survey Report.

4.4.2.1 Methodology

The assessment comprised 6 hours and 20 minutes of active avian surveys traveling 7.07 km and approximately 8 hours of additional exploration on the property to determine sites of interest. Morning and afternoon surveys were conducted between the hours of 8:49 AM and 6:30 PM on October 14th and between the hours of 6:55 AM and 3:30 PM on October 15th, 2020. observations of birds were made using binoculars and the naked eye for visual identification with some species identified by the calls they made without visual confirmation.

4.4.2.2 Verification of changes from prior baseline assessment

Avian surveys conducted in 2002 indicated a total of 9 species to be present. Further studies conducted in 2015 indicated 10 species to be present however no migrant species were observed.

Surveys conducted in October 2020 revealed a total of 41 species. Of the total numbers recorded 14 species were ordinarily resident species and the rest were nonbreeding nonresident migratory species.

The three independent surveys bore similar results indicating that avian specie recovery post Hurricane Dorian has taken place.

4.5 NATIONAL PARKS

There are six national parks in Abaco, and all administered by The Bahamas National Trust.

Abaco National Park - In 1994, The Bahamas National Trust (BNT) established the Abaco National Park primarily to protect the northern most range of the Bahama Parrot. The Park located approximately 44 miles south west of Montage Cay on 20,500 acres of the south-eastern portion of Great Abaco Island encompasses over 5,000 acres of pine forest, the major habitat of the Bahama Parrot. The Park is also home to many diverse species of birds making this one of the most important bird areas of The Bahamas. The Park also preserves a large portion of Abaco's water table, protecting her limited freshwater reserves.

Fowl Cays National Park – Established in 2009, Fowl Cays National Park is a 1,920-acre reserve that is 5 miles north of Montage Cay and is conveniently reached from most central Abaco Cays and settlements. The park has steadily become attractive to scuba divers and is an extremely popular area for local boating and snorkeling. The reefs and three 25' to 40' dive spots in untouched water are renowned.

Walker's Cay National Park- Established in 2002 and is located in the northernmost island in the Bahamas. Walker's Cay is fringed by its own barrier reef. The stunning coral formations and surrounding marine environment host schools of pompano and amberjack, large marine predators, such as sharks and barracudas, multitudes of colorful tropical fish, turtles, and eagle rays. Renowned for underwater cathedrals teeming with unprecedented concentrations of fish, visibility that reaches 100 feet and an endless variety of marine life, this underwater paradise is a mecca for divers. This park is located 42 miles north, north east of Montage Cay.

Black Sound Cay National Reserve – Established in 1988 and is located off Green Turtle Cay in Abaco, 24 miles north east of Montage Cay. This miniature park comprises a thick stand of mangrove vegetation and is an important habitat for waterfowl and other avifauna which winter in the region.

Tilloo Cay Reserve - Established in 1990, Tilloo Cay Reserve is eleven acres of wild and pristine natural environment that provides nesting for Tropic birds as well as other seabirds. This park is located approximately 5 miles south of Montage Cay.

Pelican Cays Land and Sea Park - Established in 1972, is located 8 miles north of Cherokee Sound, Great Abaco. This 2,100-acre land and sea area is a sister park to the Exuma Cays Land and Sea Park. It contains beautiful undersea caves, extensive coral reefs and abounds with terrestrial plant and animal life.

4.6 SOCIO-ECONOMIC

4.6.1 Population

The combined population of the Abaco islands was about 17,224 as of the 2010 census, and the principal settlement and capital is Marsh Harbour. The racial make-up is about 50% white and 50% black.

In addition to Marsh Harbour there are several other settlements on Great Abaco including Cherokee Sound, Coopers Town, Crossing Rock, Green Turtle Cay, Hope Town, Little Harbour, Rocky Point, Sandy Point, Spring City, Treasure Cay, Wilson City, and Winding Bay.

Surrounding Great Abaco are several smaller islands known as cays, many of which were popular with tourists visiting the islands. A few notable cays include Castaway Cay (formerly Gorda Cay), Elbow Cay, Tilloo Cay, the Grand Cays, Great Guana Cay, Man-O-War Cay, Green Turtle Cay, Moore's Island, and Walker's Cay.

There is no resident population on Montage Cay save for a caretaker and his family.

Following the catastrophic events of Hurricane Dorian, populations of all settlements north of Casuarina were severely impacted and return of residents has been limited due to damage to residential units and severe impacts to infrastructure.

Current assessments of actual numbers of returning residents are currently unavailable.

4.6.2 Labour Estimates

Labour demands will fluctuate during construction with an estimated thirty (30) persons employed and twelve (12) persons employed during operation.

At the time of construction labour availability and location of employee housing will be further considered given the volatile situation as post Dorian the situation is changing.

4.6.3 Transportation

Transportation on island is limited to golf carts and all-terrain vehicles. Use of existing pathways and additional widening of proposed pathways will be required during construction for access by heavy

construction equipment and materials transport. It is anticipated that any necessary widening will be restored and replanted with native species upon build-out.

A helipad is proposed on the existing marina entrance breakwater and will be addressed in an environmental management plan.

4.6.3.1 Air transportation

Owners and guests will arrive in Abaco at Marsh Harbour International Airport which is an international airport with immigration and custom facilities to host frequent flights between Nassau and Florida. All travel from Marsh Harbour International Airport to Montage Cay will be by ground transportation to a fixed base and then by water taxi to Montage Cay.

The effects of post Dorian travel and the existing COVID pandemic will further dictate the availability and frequency of available airlift.

4.6.3.2 Sea Transportation

The majority of goods and supplies arrive at the port of Marsh Harbour that has regular sailings from Nassau, Freeport and from Florida.

Whilst extensive damage occurred to the port and associated infrastructure the port continues to function whilst repairs are being undertaken.

From the port of Marsh Harbour there will be a short drive by barge or boat to Montage Cay.

4.7 CULTURAL RESOURCES

The subject property at Montage Cay has no known cultural resources. There are however some anecdotal reports suggesting that an unknown quantity was discovered on the Cay.

4.8 WASTE STREAMS

Management of island waste requires a complete understanding of all sources including solid waste 'garbage' and liquid sewerage.

4.8.1 Solid Waste Stream

Currently there are no municipal waste collection service serving Montage Cay. All municipal solid waste is collected at a way station on the island and periodically disposed of to a landfill located on the mainland at Snake Cay.

4.8.2 Liquid Waste Stream

Montage Cay has no water borne sanitation. All existing residences together with commercial operations are reliant upon septic systems and drain fields.

It is proposed that new structures will be grouped in multiples of units and served by "FAST "activated sludge treatment systems subject to design development with the Water and Sewerage Corporation.

4.9 UTILITIES

Montage Cay is connected to the main power grid of Marsh Harbour by an underwater power cable. The 13.2 kV grid is interconnected via a substation on Montage Cay to Hope Town and Man O War.

Bahamas Power and Light are currently studying the replacement of the Abaco Feeder submarine network that is to be constructed in 2021.

Telecommunication currently includes island distribution of fiber optics with the connection to the mainland not yet completed.

4.9.1 Potable Water

There is no municipal water supply to Montage Cay, all water is produced by reverse osmosis.

Current production capability is thirty thousand gallon per day (gpd) with a build out capacity of ninety thousand gpd. Raw water feed is by well and there are currently three available intake wells.

Potable water storage on the island consists of one hundred and forty thousand gallons storage capacity at the utility site.

4.9.2 Electricity

Montage Cay is connected to the main power grid of Marsh Harbour by an underwater power cable. The 13.2 kV grid is interconnected via a substation on Montage Cay to Hope Town and Man O War. Site distribution is in place and transmission voltage is at 480V underground cable to existing transformers.

There is additional power generation provided on an as needed basis by a 300kVback-up generator at the utility site and a 40kV generator at the manager's cottage. Total demand load will be supplemented with renewable energy technologies such as passive solar, photovoltaics, and high efficiency appliance selection.

4.9.3 Fuel Storage and Distribution

Fuel storage on the island consists of day tank storage for the backup generators only.

4.9.4 Renewable Energy Discussions

While in some parts of the world an obvious improvement in the levels of environmental consciousness, education, and responsibility has occurred over the past decades, attitudes towards the use of renewable energy are still commonly negative. More often than not, renewable energy is dismissed as prohibitively expensive and unreliable compared to energy derived from non-renewable (finite) fossil fuels.
Giving preference to renewable energy may further:

- reduce the dependence on imported fuels by using domestic resources (resulting in foreign currency savings)
- attract a more environmentally responsible category of guests (generating an overall lower environmental impact at the sites visited)
- offer possibilities of integrating passive space conditioning concepts with renewable energy systems already in the early stages of planning, designing, and constructing new facilities, thus reducing installed power and overall energy requirements

- generate additional employment opportunities in the renewable energy professions

The Developer through his design team will investigate the reduction in energy on the Cay.

Passive solar measures including ceiling and wall insulation, low E glass in windows and energy efficient appliances will aid in reduced cooling demands.

In addition to the above, potential homeowners will be provided with an option to install solar and incorporate same into their home designs.

4.10 Construction and Materials Source

Limestone sand and limestone rock are locally available, there is a small selection of locally available building materials in Marsh Harbour while most other construction materials are imported from Florida.

5 LEGAL ASPECTS

5.1 Domestic Legislation

All development projects are carried out within a framework of national regulations, international conventions, corporate policies, and procedures and recognized third party guidelines, all of which have different applications, remits, requirements, and implications.

The Developer will comply with the legal requirements of The Government of The Bahamas, and The Developer's own internal standards and topic-specific conventions to which The Bahamas is a signatory. The Developer will also consider, when relevant, to the establishment of mitigation measures, the application of relevant international standards including International Finance Corporation (IFC) guidelines and World Bank Environmental, Health and Safety (EHS) Guidelines.

Table 5. 1: Overview of applicable Bahamian legislation by Title and Chapter

Title IV	
Ch. 18	Consular Relations and Commonwealth Officers Act, 1969
Ch. 26	Public Works Act, 1964
Ch. 28	Out Islands Utilities Act, 1965
Ch. 37	Local Government Act, 1996
Ch. 51	**Antiquities, Monuments, and Museum Act, 1998;** Antiquities, Monuments, and Museum Regulations, 1999
Title XIV	
Ch. 140	International Persons Landholding Act, 1994
Ch. 194	Electricity Act, 1956
Title XIX	
Ch. 195	Out Islands Electricity Act, 1965
Title XX	
Ch. 196	**Water and Sewerage Corporation Act, 1976;** Water Supply Rules, 1953
Ch. 197	Water Supplies (Out Islands) Act, 1953;

	Water Supplies (Out Islands) Rules
Title XXI	
Ch. 199	Housing Act, 1968; Housing Regulations, 1983
Ch. 200	Buildings Regulation Act, 1971 Buildings Regulation (General) Rules, 1971 Building Regulation (Extension to the Out Islands) Order, 1975
Ch. 201	Roads Act, 1968
Ch. 204	Coast Protection Act, 1968
Title XXV	
Ch. 215	Explosives Act, 1970 Explosives Regulations, 1970
Ch. 216	Explosive Substances (Illegal Use and Possession) Act, 1958
Ch. 217	Inflammable Liquids Act, 1958
Ch. 218	Liquefied Petroleum Gas, Act 1988 Liquefied Petroleum Gas Regulations, 1988
Ch. 219	Petroleum Act, 1978 Petroleum Regulations, 1978
Title XXVI	
Ch. 223	Derelict Motor Vehicles (Disposal) Act, 1967
Ch. 232	**Environmental Health Services Act, 1987**
Title XXX	
Ch. 248	Wild Animals (Protection) Act, 1968
Ch. 249	Wild Birds Protection Act, 1952 Wild Birds Protection (Reserves)
Ch. 250	Plants Protection Act, 1916 Plants Protection Order 1918 Prohibition of the Importation of Plants Order, 1971 Prohibition of the Importation of Plants (State of California) Order, 1982 Plants Protection (Import of Citrus Fruits, Plants and Other Propagative Material from Florida) Order, 1993 Plants Protection (Restriction on Imports of Fruits, Vegetables, Flowers, Plants and other Propagative Materials) Pink Mealybug) Order, 1997 Plant Protection Rules, 1916
Title XXXI	
Ch. 251	Land Surveyors Act, 1975 Bye-laws of The Bahamas Association of Land Surveyors 1993 Land Surveyors Regulations, 1975
Ch. 252	Acquisition of Land Act, 1913
Ch. 253	Out Islands Dilapidated Buildings Act, 1952
Ch. 257	Private Roads and Subdivisions (Out Islands) Act, 1965
Ch. 258	Subdivisions (Local Improvement Associations) Act, 1965
Ch. 259	Reclamation and Drainage Act, 1937
Ch. 260	**Conservation and Protection of the Physical Landscape of The Bahamas Act, 1997** **Declaration of Protected Trees Order, 1997**

	Conservation and Protection of the Physical Landscape of The Bahamas Regulations, 1997
Ch. 269	**Port Authorities Act, 2006**
Ch. 270	Abutments Act, 1864
Ch. 271	Abutments (Out Islands) Act, 1883
Ch. 274	Abandoned Wreck Act, 1965
Ch. 275	Merchant Shipping (Oil Pollution) Act, 1989 Merchant Shipping (Oil Pollution) (Indemnification of Ship Owners) Regulations 1978
Ch. 278	Water Skiing and Motor Boat Control, 1971 Water Skiing and Motor Boat Control Regulations. 1971
Ch. 282	Archipelagic Waters and Maritime Jurisdiction, 1996
Ch. 283	The Bahamas Maritime Authority Act, 1995
Title XLVIII	
Ch. 391	The Bahamas National Trust Act, 1959 The Bahamas National Trust (Amendment) Act 2010
Ch. 328A	Family Islands Development Encouragement Act, No. 14, 1997 Forestry Act, 2010 **Planning and Subdivision Act, 2010**[1]
Ch. 39 of 2019	**Ministry of the Environment Act, 2019**
Ch. 40 of 2019	**Environmental Planning and Protection Act, 2019**

[1] The Bahamian court has held in the case of Simmons and BIRD v The Town Planning Committee and 4M Harbour Island 2019/Pub/ JRV/0018 that The Planning and Subdivision Act does not apply to Harbour Island, as the legislation that extended this Act to the family Islands referred to Eleuthera and not Harbour Island. Therefore, projects on Harbour Island are governed by the old law, which is the Town Planning Act ch. 255

5.2 INTERNATIONAL LEGISLATION

Table 5. 2: International Conventions and Protocols in force in The Bahamas

Convention/Protocol	Entry in force / accession	Detail/Objectives
Convention on Wetlands of International Importance (Ramsar Convention), 1971	June 1997 (entry in force)	The Convention aims to maintain the ecological characteristics of wetlands of international importance and to plan the "wise use", or sustainable use, of all wetlands on the territory of the countries which have ratified the Convention. Its aim is to protect wetlands, in order to stem the progressive encroachment on and loss of wetlands now and in the future.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973	March 1979 (entry in force)	This convention regulates international trade in certain animal and plant species. Depending on the annex in which they are listed, the species are subject to export conditions (with systems of permits and special authorizations). The States must set up the necessary institutions for controlling trade in the species and issue export permits.
Convention of Biological Diversity	September 1993 (entry in force)	This convention has three main objectives: the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Implementation of this convention entails drafting national strategies for conservation and sustainable utilization of biological diversity. It is considered to be the key document for sustainable development.
United Nations Framework Convention on Climate Change; 1992	June 1992 (entry in force)	The United Nations Framework Convention on Climate Change was adopted in Rio de Janeiro in 1992 by 154 States, in addition to the European Community. It entered into force on 21 March 1994 and in 2004 had been ratified by 189 countries. This convention is the first attempt by the UN to more clearly identify what climate change actually is and how to remedy it.

Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks	January 1997 (entry in force)	To encourage cooperation between States to ensure conservation and promote the objective of optimum utilization of fisheries resources both within and beyond the exclusive economic zone.
Kyoto Protocol, 1997	April 1999 (entry in force)	The protocol stipulates legally binding commitments on industrialized countries obliging these countries to reduce the annual average emissions of greenhouse gases by about 5.2% over the period 2008-2012.
United Nations Convention to Combat Desertification; 1994	February 2001 (entry in force)	This convention aims to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies. *Not directly relevant to this project.*
Stockholm Convention on Persistent Organic Pollutants	January 2006 (entry in force)	To protect human health and the environment from persistent organic pollutants.
Basel Convention Controlling Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention), 1989	August 1992 (accession)	Conscious of the damage that could be caused to human health and the environment by hazardous and other wastes and the trans-boundary movements of these wastes, the States undertake to employ strict controls to protect human health and the environment against the harmful effects of the production and management of hazardous and other wastes.
Montreal Protocol on Substances that Deplete the Ozone Layer, 1989	May 1993 (accession)	The Montreal Protocol on Substances that Deplete the Ozone Layer was designed to reduce the production and consumption of ozone depleting substances in order to reduce their abundance in the atmosphere, and thereby protect the earth's ozone Layer.
Vienna Convention for the Protection of the Ozone Layer, 1985 (Vienna Convention)	April 1993 (accession)	This convention served as a framework for efforts to protect the globe's ozone layer. The objectives of the Convention were for Parties to promote cooperation by means of systematic observations, research and information exchange on the effects of human activities on the ozone layer and to adopt legislative or administrative measures against activities likely to have adverse effects on the ozone layer.

International Convention for the Prevention of Pollution from Ships (MARPOL), 1973	May 2011	The purpose of this convention is to regulate pollution by hydrocarbons, chemical products, packaging, garbage, sewage and atmospheric emissions. It is the reference text in the field of marine pollution prevention. The convention is primarily based on the specification of and compliance with technical rules, e.g. requirement for double-hulled oil tankers and tankers carrying chemical products, requirement for oil-water separators and to maintain documentation. The Wider Caribbean Region (WCR) (Caribbean Sea and Gulf of Mexico) became a designated Special Area under Annex V of the MARPOL Convention, which prohibits the discharge of all garbage by ship.
International Convention on Civil Liability for Oil Pollution Damage, 1969 and 1992	October 1976 (accession)	International maritime treaty adopted to ensure adequate compensation where oil pollution damage is caused by maritime accidents.
Convention for the Unification of Certain Rules of Law Relating to Assistance and Salvage at Sea	February 1913 (accession)	To provide a uniform set of rules governing assistance and salvage at sea.
International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage 1992 (1992 Fund Convention)	July 1976 (accession)	To supplement the International Convention on Civil Liability for Oil Pollution Damage, 1969; to ensure that adequate compensation is available to persons who suffer damage caused by pollution resulting from the escape or the discharge of oil from ships; and to ensure that the oil cargo interests bear a part of the economic consequences of such oil pollution damage, to the relief of the shipping industry.
Convention on Facilitation of International Maritime Traffic, as amended (FAL)	May 1998 (accession)	To prevent unnecessary delays in maritime traffic, to aid co-operation between Governments, and to secure the highest practicable degree of uniformity in formalities and other procedures.
Convention on the International Regulations for Preventing Collisions at Sea (COLREGS)	July 1997 (entry in force)	To update and replace the International Regulations for Preventing Collisions at Sea, 1960; to maintain a high level of safety at sea.
International Convention for the Safety of Life at Sea (SOLAS), 1974	February 2000 (entry in	The convention aims to ensure that ships of signatory countries comply with a series of safety standards and practices.

Caribbean Challenge Initiative, 2013.	May 2013	An agreement made between 9 Caribbean government and territories committing them to accelerate and expand efforts to safeguard the Caribbean region's marine and coastal environment, further promote the sustainable use of natural resources through new commitments to conservation.
The Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region (WCR) or Cartagena Convention. 1983	June 2010	Focused on the protection of the marine environment from pollution within the Caribbean, it includes a series of specific protocols on oil spills, specially protected areas and wildlife and land based sources of marine pollution
United Nations Convention on the Law of the Sea (UNCLOS) (Montego Bay Convention), 1982	July 1983 (entry in force)	This convention defines the powers of enforcement available to the states affected by an illegal act of marine pollution.
International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) 1990	January 2002 (accession)	Article 3 of this convention requires that ships and installations at sea have an oil pollution emergency plan. The Developer must develop an Oil Spill Response Plan.
ILO Conventions	May 197 (entry in force)	International labor standards are legal instruments drawn up by the ILO's constituents (governments, employers, and workers) and setting out basic principles and rights at work. They are either conventions, which are legally binding international treaties that may be ratified by member states, or recommendations, which serve as non-binding guidelines.

5.3 GOVERNMENT INSTITUTIONS

The sections below present a summary of the key government policies and statutory instruments and laws relevant to the Project as well as the government departments and national governing bodies and authorities that will have an interest in the EIA.

The Bahamas is organized into a parliamentary constitutional monarchy headed by Queen Elizabeth II. As a member of the Commonwealth, its political and legal traditions are considered to be close to those of the United Kingdom. The country is divided into 32 districts that provide a system of local government,

with the exception of Grand Bahama Island, whose affairs are handled directly by the Grand Bahama Port Authority.

Local government in The Bahamas exists in two forms, namely second-schedule and third-schedule district councils. There are a total of 32 local government districts: 13 second-schedule districts, which are further sub-divided into town areas, and 19 third-schedule districts, which are all unitary authorities.

The Government of The Bahamas executive branch consists of, The Prime Minister and his Cabinet of Ministers, which are elected members of Parliament appointed by the Prime Minister.

The Ministry that has direct responsibility for managing environmental affairs in The Bahamas is the Ministry of the Environment.

Bahamas Investment Authority

The Bahamian government's proactive economic growth and development policies are guided by the Bahamas Investment Authority (BIA), established to reduce bureaucratic delays for domestic and international investors.

Operating from the Office of the Prime Minister, the BIA has been designated a "one-stop shop" designed to simplify investing in The Bahamas. The BIA serves as the administrative arm of the National Economic Council and Investment's Board.

The BIA has the following areas of responsibility:

- Develop investment policies
- Promote investment
- Evaluate project proposals
- Monitor and co-ordinate project implementation
- Administer the government's investment concessionary legislation

All non-Bahamians or Permanent Residents seeking to do business in The Bahamas must obtain prior approval from the Bahamas Investment Authority (BIA). The application for BIA approval must be in the form of a comprehensive Project Proposal. The application must include all of the requirements set forth in the Project Proposal Guidelines issued by the BIA. Bahamian legal counsel usually submits the formal application to the BIA along with the required supporting documents.

The application process is as follows:

1. Submit the Project Proposal, along with supporting documents to the BIA.
2. The BIA will process the application and submit the same to the National Economic Council for a determination. The NEC is comprised of a group of Government ministers including the Prime Minister and the Minister of Finance.
3. Depending on the nature of the proposed business activity, the relevant Government Ministry or Agency would be consulted for input:
    a. Ministry of the Environment.
    b. Ministry of Works and Transport.

c. Ministry of Housing.
d. Respective Family Island Local Government
e. Department of Environmental Planning and Protection

4. Once a determination has been made, the BIA will communicate to the applicant in writing. If the determination is favorable, the BIA will issue a "project approval in principle", subject to any stipulated conditions and to satisfying the requirements of the relevant government agencies.

The Ministry of the Environment (MoE)

The MOE's area of responsibility includes:

i. to manage, protect and conserve all land, water, air and living resources of The Bahamas, having regard to the environmental, economic, and social benefits they may confer on The Bahamas;
ii. to undertake, commission and coordinate environmental studies and research relating to the environment of The Bahamas.
iii. advising as to public or private sector proposals that would significantly affect the environment of The Bahamas; and
iv. providing advice as to procedures for the assessment and monitoring of environmental impacts;

The departments, agencies, and authorities under the responsibility of the MoE are:

a. the department responsible for environmental health services;
b. the agency responsible for national geographic information services.
c. the authority responsible for public parks and public beaches.
d. the body responsible for forestry; and
e. the body responsible for scientific research, reviewing Environmental Impact Assessments, advising on environmental projects, and administering multilateral environmental agreements.

The Department of Environmental Planning and Protection ("the Department")

The Department of Environmental Planning and Protection (DEPP) is under the responsibility of the Ministry of the Environment. The duty of the Department is to promote best practices in environmental management and to minimize harm to the environment. The Department is comprised of the Director, Deputy Director, Assistant Directors, and appointed environmental officers. The Department is subject to the general control and direction of the Director. The functions of the Department include the regulation, oversight and review of Environmental Management Plans and Environmental Impact Assessments, promoting and enforcing compliance with the Environmental Planning and Protection Act, 2019 ("the Act") and any regulations made under that Act. The Act makes it a requirement to obtain a Certificate of Environmental Clearance in accordance with prescribed regulations prior to commencing work on a project and it provides that any person who commences work on a project without first obtaining a Certificate of Environmental Clearance commits an offence.

The Act provides for regulations relating to Environmental Management Plans and Environmental Impact Assessments to be issued. The Regulations have not yet been passed, but it is expected that the Regulations, when passed, will address the types of projects, developments and activities which shall

require the preparation of an Environmental Management Plan or Environmental Impact Assessment and the procedures for the assessment of Environmental Management Plans and Environmental Impact Assessments as well as the requirements for public consultation.

The Department of Environmental Health Services (DEHS)

The DEHS is the environmental regulatory department of The Bahamas Government. It is responsible for environmental control, solid waste collection, and disposal. It is also the responsible for enforcing industrial regulation, public health guidelines, for regulating and enforcing public sanitation. The oil spill contingency plans are also responsibility of this Department.

The Bahamas National Trust

The Bahamas National Trust is a non-profit organization established through The Bahamas National Trust Act in 1959. It is responsible for establishing and managing national parks and protected areas, historic preservation, public awareness and outreach on environmental issues.

Other Government Agencies

Other government agencies in The Bahamas share specific environmental responsibilities that may be relevant for the proposed Project, which during the approval process may require the procurement of additional information and/or permits. These include the following:

- Department of Fisheries: responsible for enforcing fisheries regulations and establishing marine reserves.
- Department of Agriculture: responsible for the conservation of birds and plants;
- Department of Lands & Surveys, Forestry Unit: responsible for managing forest resources;
- Ministry of Tourism and Aviation: responsible for Road Traffic, Postal Department, Department of Civil Aviation, Department of Meteorology, and Port Department.
- National Emergency Management Agency (NEMA): Mission is, "To reduce the loss of life and property within the Commonwealth of The Bahamas, by ensuring that adequate preparedness and mitigation measures and response and recovery mechanisms are established to counteract the impact of natural, man-made and technological hazards" and
- National Oil Spill Advisory Committee: Purpose is to ensure that The Bahamas is in a state of readiness, as it pertains to oils spills in the territorial and archipelagic waters of The Bahamas.

Other governmental organizations of interest are:

- Bahamas Maritime Authority;
- The Bahamas Electricity Corporation (BPL);
- Water and Sewerage Corporation;
- Ministry of Public Works & Urban Development - Civil Engineering Department.
- Ministry of Public Works & Urban Development - Building Control Division.
- Department of Physical Planning.
- The Royal Bahamas Police Force.
- The Royal Bahamas Defense Force.

- Bahamas Customs.
- Bahamas Immigration.
- Ministry of Tourism;
- Antiquities, Monuments and Museums and
- Bahamas Telecommunications Company (BTC)

National Policy and Legislation

The fundamental objective of The Bahamas' environmental policy is to improve the quality of life of population through the reasonable use of natural resources, especially water, and with the aim of achieving sustainable economic development to meet the needs of present and future generations.

The Commonwealth of The Bahamas has established a comprehensive institutional and legal framework for environmental protection and natural resources management. Three key organizations, The Department of Environmental Planning and Protection (DEPP), the Department of Environmental Health Services (DEHS) and The Bahamas National Trust (BNT), together with specific governmental resource management agencies, provide the institutional direction for environmental protection and management. Environmental protection is supported by a number of laws and regulations that control activities in the physical and biological environment. Recent modifications to long-established natural resources laws, and new laws and regulations dealing with the physical environment, have enhanced the existing legal framework. Additional laws are currently under development to update the existing legal structure.

The project will be designed, constructed, operated, and maintained in accordance with applicable Bahamian environmental laws and regulations.

Bahamian legislation which pertains to the physical and natural environment and which may pertain to the proposed development is listed in Table 5.1 (specific legislation marked in bold are directly applicable to the project).

6 ENVIRONMENTAL IMPACT ANALYSIS

6.1 IMPACT ASSESSMENT METHODOLOGY

Impacts were assessed through previous studies, additional field data collection and desktop analysis. Methodologies included a review of aerial photography and Site conceptual plans; data gathering and ground-truthing for vegetation surveys; historical research, a review of scientific literature, government reports, and socio-economic research.

These resources aided in the decision-making process to determine the impacts of the revised Master Plan on Montage Cay. Impacts were reduced or avoided where possible through an exploration of alternatives and elimination process according to parameters such as environmental constraints, environmental impacts, feasibility, costs, and constructability.

6.2 LAND USE IMPACTS

Land use change is considered to be minimal to moderate as the island transitions to a commercial luxury resort and marina. The proposed change in land use affects namely the land and its alteration from a private and partially developed with swaths of undeveloped dry broad leafed evergreen formation to that of a commercial built environment. The existing marina will remain largely as is with greater vessel traffic anticipated during construction and operation. The installation and use of a helipad subject to approval will expand transportation to include both the sea and air.

Based on a sum of building square footage, total island occupation by built structures is estimated at 17%.

Total Island Area = 53 acres or 2,308,680 sq. ft.

Total Built Environment as percentage of Total Island Acreage = 17%

According to the Florida Land Use Cover and Forms Classification System (FLUCCS), the residential lots are considered of low to moderate density with units per acre varying between one and two dependent on lot size. The highest concentration of units per acre occur as expected in the commercial hotel area and in close proximity to the marina but even here the density may be considered moderate, rarely if ever exceeding 5 units per acre.

6.3 VISUAL AND AESTHETIC IMPACTS

Montage Cay is situated in the Sea of Abaco, a tranquil body of water between the island of Great Abaco and the numerous barrier islands. Hence, occupants of Montage Cay benefit from a natural seascape complete with views of the historic Bahamian settlements of Man-O-War Cay and Elbow Cay. The Cay has several pocket beaches and a large expanse of dry broad leaved evergreen formation surrounding the existing marina, the focal point of the interior. Of note is the relatively high species diversification within the dry broad leaved evergreen formation given the small island size. The developer should consider a small construction footprint and native landscaping to maintain the inherent beauty and diversity of the small cay.

Changes in aesthetics at the Site are considered neutral, if not slightly negative due to the unavoidable loss of vegetation for building. However, it should be noted that the Cay was previously used for farming by the inhabitants of Man-O-War Cay and a remnant mangrove wetland inundated with Casuarina trees was excavated for the existing marina feature. With thirteen (13) invasive species observed on site, should the site remain as is, species diversity will likely decrease over time. Moreover, overall ambience on the Cay and nearby residents may be periodically affected by overhead helicopter noise during lift-off and landing.

Landscaping will be utilized throughout the Site for beautification purposes with emphasis on native species tolerant to high salt, sun, and low water conditions. It is recommended that the developer consider Abaco's traditional small historic communities and natural settings. The structural designs, setbacks, and Site development will be according to the Bahamas Building Code and an architectural code and subject to approval by a town planner. The development code will address structures, fencing, signage, lighting, and landscaping among other items.

6.4 IMPACTS TO THE PHYSICAL ENVIRONMENT

Cumulative physical impacts are considered minimal and limited to clearing and foundation excavation in build-out of dwellings, infrastructure and amenities features. Construction and expansion of road and buildings may require additional steps to create a solid and durable foundation including localized penetration of subsurface limestone in order to properly support the new facilities. The existing marina will remain largely as is with no anticipated additional excavation or channel dredging required.

Weather and climate are environmental factors that will persist throughout the development period, and as such the developer shall take into consideration the impacts from anticipated and unexpected weather events that may naturally alter the physical environment.

The proposed development seeks to avoid undue environmental harm where possible. The use of mitigation techniques and best management practices will mitigate and alleviate adverse impacts.

6.4.1 Coastal and Oceanographic Impacts

All coastal and or marine impacts save for the proposed overwater structures were previously experienced during the now existing marina and man-made coastal features.

6.4.2 Hydrologic Impacts

Excluding the saltwater table, no significant subterranean freshwater lens is known to exist at the Site that would be otherwise affected by the project. The marina as currently constructed will not be expanded.

No site-specific hydrological studies have been conducted nor is it presumed that they will be required as the minimal land mass of the Site would not accumulate nor develop any freshwater lens of any magnitude. Hydrologic impacts refer to harmful substances released into surface or ground waters either directly or indirectly and these cause change to surface and sub-surface water flows.

The primary cause of surface water impacts result from run-off from roads and car parks. Subsurface groundwater maybe impacted by these run-offs but are subject to pollution from poorly installed or maintained drains sewers and the like. The results are concentrated run-off, increased flooding, loss of wetlands, shoreline modifications and loss of unique natural features and aesthetic losses. These factors are mitigated by the prior installation of drainage wells in accordance with the approved designs of the Ministry of Works.

6.4.2.1 Erosion and Sediments Impacts

Erosion and sediment impacts are limited to activities associated with preparation for construction and supporting infrastructure, i.e. lay-down area and road improvements, and site clearance. Other potential erosion and sediment impacts such as fill storage, storm-water management, and protection of sensitive environments falls under the auspice of an Environmental Management Plan.

Excavation debris should be stockpiled away from the shoreline. Should there be any concern for possible siltation into the open water, it is recommended to employ containment devices, perimeter ditching and/or contour ploughing techniques to prevent runoff. The developer shall make provisions for the safe and legal disposal of all wastes and prevention of any spillages, leakage of polluting materials, etc.

It is imperative that the developer employ best management practices during construction and operation as basin construction and dredging activities could impact the Sea of Abaco. An environmental management plan is to discuss these practices.

6.4.2.2 Stormwater Management

A total of seven deep water disposal wells have been installed. There is no further expansion of roadways that will require additional wells, and it is anticipated that the wells previously designed and installed will suffice.

6.4.3 Air Quality Impacts

No long-term adverse air quality impacts are to be anticipated. Temporary minor air quality impacts may occur during earthmoving activities associated with marina construction. The development will result in a minor, but insignificant, decrease in air quality due to the increase of watercraft traffic but does not necessitate air quality testing.

6.4.4 Noise Quality Impacts

Long-term adverse noise impacts are dependent on the frequency and duration of helicopter use to and from the Cay. It is anticipated that flights will be infrequent and noise disturbance will be minimal. Pilots should exercise caution to avoid avifauna collisions and use flight paths limiting noise disturbance over land. Should flights become frequent, noise levels may become a nuisance and pose a greater impact on neighboring communities and avifauna.

Elsewhere, temporary noise impacts may occur during development construction due to earthmoving and related construction activities. This issue is temporary and expected to dissipate upon development completion. **Table 6.1** contains estimated noise levels to be anticipated during construction.

Table 6. 1: Noise Level Ranges of Typical Construction Equipment

Equipment	Levels in dBA at 50 feet [a]
Front Loader	73-86
Trucks	82-95
Cranes (moveable)	75-88
Cranes (derrick)	86-89
Vibrator	68-82
Saws	77-82
Pneumatic Impact Equipment	83-88
Jackhammers	81-98
Pumps	68-72
Generators	71-83
Compressors	75-87
Concrete Mixers	75-88
Concrete Pumps	81-85
Back Hoe	73-95

Pile Driving (peaks)	95-107
Tractor	77-98
Scraper/Grader	80-93
Paver	85-88
[a] Machinery equipped with noise control devices or other noise-reducing design features does not generate the same level of emissions as that shown in this table.	

6.4.5 Fire and Hurricane Risks

Fire

All buildings associated with the development will comply with all fire requirements of The Bahamas Building Code, thus minimizing to the extent possible all fire-associated risks. There are, however, no current or intended municipal fire services and the developer will provide this service at his discretion.

Hurricane

The Bahamas are subject to hurricanes generally between June 1 and November 30, though tropical disturbances have formed outside the given Hurricane Season. The greatest risk for a hurricane strike occurs between August and October. The most destructive hurricanes in recent years have Andrew (1992), Lili (1996), Floyd (1999 with winds of 155mph), Michelle (2001), Frances (2004 with winds of 140 mph), Jeanne (2004), and Irene (2011), Sandy (October 2012) and Hurricane Dorian (2019).

Hurricanes bring tremendous quantities of rain, often 25% of the annual average which would easily overwhelm a natural or installed drainage system. Storm water drainage across the Bahamas is notoriously inadequate and intense rainstorms produce severe flooding in localized areas very quickly.

Extensive flooding can occur in low-lying coastal areas from storm surges caused by extreme low barometric pressures when the ocean sometimes rises as much as 12 to 17 ft. The rising sea destroys onshore structures as seawater surges onto shore and then rushes back to the ocean as the storm passes. The beach may incur significant changes including erosion or accretion depending on the intensity, direction, and length of storm. Sea structures may be weakened or damaged after days of intense wave action.

Montage Cay should maintain a hurricane contingency plan to secure all fueling facilities, physical buildings and their contents; evacuation protocols; and emergency and health provisions.

All construction standards will be in compliance with The Bahamas Building Code 3rd Edition. New structures will be built to endure winds of up to 140 miles per hour as per the hurricane construction standards of the Bahamas Building Code 3rd Edition. Hurricane watches and warnings will provide advance notice to construction workers and residents for preparations and evacuations.

6.5 BIOLOGICAL IMPACTS

Biological impacts associated with the proposed development are considered moderate given the total build-out footprint affecting primarily, the loss of vegetation and dry broad leaved evergreen formation. Overall vascular plant species diversification at one hundred twenty-four (124) species is considered relatively high for the small study area and the removal of vegetation for building will likely result in a decrease of species diversity. However, of note is the high number, thirteen (13), of invasive species observed on Montage Cay. Invasive species pose a significant threat to small islands and overall biodiversity; phased removal for control and eradication is highly recommended.

Impacts to wildlife primarily concern avifauna given the proposed helipad. Scientific studies note that avifauna response to such sound exposure generally produces signs of alertness and may initiate flight in some instances. Every effort should be made to minimize direct contact with avifauna and avoid undue noise. Avoiding avifauna collisions protects the pilot and passengers from undue harm. Seasonal migration patterns will account for a likely larger number of avifauna during the winter months due to winter residents. Pilots should also take care to note that most birds fly below 2,500 feet. The approach and departure path indicates that the helicopter will be below this level over the entire island. Flight plans should avoid the nearby protected areas to minimize wildlife disturbance. Pilots should fly at height and power settings that minimize noise nuisance.

Marina

Any and all anticipated impacts from the construction of the marina are assumed to have previously occurred as the marina has been in operation for a number of years.

6.5.1 Habitat Fragmentation Impacts

Habitat fragmentation impacts will be moderate given the avoidable loss of vegetation for buildings, infrastructure, and amenities. While the island was previously disturbed and partially developed, the unified formation of dry broad leaved evergreen formation on the west coast will likely result in the loss of species diversification. However, building structures are concentrated on the perimeter of Montage Cay with ample vegetation noted on the interior bisected by pathways and a main promenade. No physical barrier is proposed that would inhibit species movement on land following recommendations to preserve the existing dune with adequate setback. Through the implementation of small construction footprints, setbacks, and native landscaping, habitat fragmentation impacts can be lessened.

Marine habitat fragmentation is not anticipated as all impacts are assumed to have previously occurred and the marina has been in operation for several years. In terms of the overwater bungalows, no habitat fragmentation is anticipated in the benthic deep water hard bottom community save for the areas of pile installation.

6.5.2 Habitat Degradation

Habitat degradation impacts are considered minimal to moderate due to the unavoidable loss of habitat necessary for construction clearing and building. Broad-leaved evergreen communities, in The Bahamas are areas that contain the highest floral species diversity of any plant community. They are usually found as a second or third transition zone from the shoreline, behind coastal dune and/or coastal shrubland

communities. Broad leaved evergreen communities comprise approximately 24.57 acres at the site. Montage Cay has relatively high species diversification with 124 vascular species identified. However, the island has incurred previous disturbance from farming, excavation of the marina, and man-made beaches.

With thirteen invasive species identified, the proliferation of these species to the detriment of native species survival is of concern. The greatest biological threat posed to biodiversity, particularly on small Cays, is localized impacts as a result of alteration of habitat through the introduction of aggressive opportunistic species such as those recommended for removal or eradication. The developer through invasive species removal and monitoring can minimize this threat that given no development would impede and negatively affect overall species diversity.

6.5.3 Impacts on Special Ecological Features and Biodiversity

No impacts on special ecological features are anticipated; however, biodiversity is expected to be moderately impacted given the change in land use and necessity for clearing for construction footprints and building. Biodiversity at the Montage Cay is relatively high given its small landmass, while marine biodiversity is not considered notable.

No wetland features were present on the site; however, the current marina location was known to have been a wetland of significant size. At present, a small patch of *Rhizophora mangle* (red mangrove) was observed along the western shoreline immediately north of Piper Beach. Individual wetland species may recolonize in the marina or other low-lying areas due to the close proximity of seed sources from neighboring island.

Additionally, two (2) caves were observed within the dry broad leaved evergreen formation along the southeastern coast of the island. While not readily observed to be connected, there is some speculation that the two may be joined and further investigation is recommended.

6.6 Socio-Economic Impacts

Socio-economic impacts are considered significant with positive economic impacts culminating with the on-going operation of the luxury resort. Such an enterprise requires full-time staff across a multitude of disciplines ranging from hospitality, dock masters, local artisans and skilled labor, and management.

It is anticipated that construction will begin following construction permitting approvals.

Impacts to neighboring communities are also considered positive with on-going maintenance needs, transportation and provisioning to require local services. The majority of construction personnel will be local and positive contribution to the local economy of the Abacos, including Marsh Harbour, Man-O-War Cay and Elbow Cay.

6.7 Waste Stream Impacts

6.7.1 Solid and Hazardous Waste Impacts

Little to no hazardous waste impacts are anticipated on the Site and few hazardous materials will be utilized for construction at Montage Cay.

Solid waste during construction will be disposed of in a centrally located staging area which will be disposed of on an 'as required' basis to the waste staging facility in Snake Cay on the mainland.

An emergency spill plan is recommended to be in place during construction and operation activity. This plan should provide training for staff and methods of cleanup in the case of an incident. Solid waste during construction will be disposed of in a centrally located staging area, on an 'as required' basis. The current practice is of transporting waste to Nassau after which time it will be disposed of on-island by means of an incinerator.

6.7.2 Water and Wastewater Impacts

No impacts are anticipated from the reverse osmosis water treatment plant. The plant is currently operational and all wells currently installed. No impacts are anticipated from the installation of FAST systems to supplement the septic tank systems.

6.8 Cultural Resource Impacts

No impacts to cultural resources were identified during previous studies.

7 PROPOSED MITIGATION MEASURES

An environmental mitigation plan addresses impacts that have been previously identified and assessed. There does not have to be a single measure for every adverse impact, but there are often several options that would help. Mitigation can be implemented through project design, scheduling of activities, operational techniques, protective technologies, restoration of disturbed sites, preventive management plans and compensation for unavoidable impacts.

Mitigation techniques are proposed to offset terrestrial and marine impacts associated with the proposed project. The following techniques mitigate for habitat loss associated with land clearing, the removal of protected trees, the occupation of seabed and preliminary proposed mitigation for the lagoon. Where feasible, mitigation is to occur on-site with some off-site mitigation possible in consultation with the BNT.

a) Removal of invasive species. This EIA strongly recommends phased removal of all *Casuarina equisetifolia*, Australian Pine, and *Terminalia catappa*, Indian Almond, species on site by the developer. A moderate number of individuals were noted on Gonzo Beach. To maintain the site as exotic-free once invasive species are removed, a long-term maintenance program is necessary. Periodic removal of *Casuarina equisetifolia* saplings from beach areas and undeveloped parcels will assist in preventing the reestablishment of these species.
b) Native landscaping. Landscape design should incorporate indigenous plant material. Indigenous species are tolerant to the stresses of a coastal tropical climate and act as resource for food or habitat to local animal species. Use of indigenous plants will help to reduce water demand, particularly those species with drought-tolerance. Native plant species, particularly fruiting shrubs and trees provide a source of food for resident and migrant avifauna species.
c) Alternative Energy Sources. Montage Cay is ideal for the introduction of alternative sources, namely, passive solar and photovoltaic array. It is recommended that conventional energy

sources, diesel and gas, be supplemented by alternative energy sources or achieved by high efficiency standards. Any supplemented energy source would contribute to a reduction in overall petroleum products, thus eliminating future transportation of petroleum products.

8 ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan will be drafted as a standalone document.

9 PUBLIC CONSULTATION

Public Consultation will be conducted under the dictate of The Department of Environmental Planning and Protection.

10 CONCLUSION

This Environmental Impact Assessment for Montage Cay recommends moving forward with the proposed luxury resort and spa on Montage Cay. Of note, the marina which currently exists will not be further expanded. The anticipated positive economic stimulus to the Abacos and the greater Bahamas during construction and throughout the resort's operation negate any concerns with physical and biological impacts to Montage Cay. However, preservation of the existing natural habitat is recommended through limited construction clearing for building footprints and native landscaping to maintain the Cay's existing high biodiversity to the greatest extent as possible. Removal of invasive species on site will also contribute to preserving the Cay's biodiversity.

Additionally, integrating overwater structures to the overall accommodation portfolio of the Bahamas caters to a tourist niche not yet endorsed. Adherence to an Environmental Management Plan with monitoring to evaluate developer compliance should prove sufficient to eliminate unnecessary environmental degradation.

Furthermore, it is in the best interest of the developer to maintain the inherent beauty of Montage Cay and its environs to encourage first-time and repeat visitors. Helipad operations will facilitate travel to and from the Cay and is not anticipated to incur any long-term impacts when in compliance with ICAO standards for helipad operation and meeting the approval of the Department of Civil Aviation.

11 RECOMMENDATIONS

The following recommendations in addition to previously mentioned mitigation techniques identify additional studies and measures to understand the existing environment and ensure minimal impact during development.

The proposed recommendations include:

a) Environmental Management Plan. The developer should employ best management practices during construction activities including practices that prevent erosion and sediment runoff,

ensure proper material storage and disposal, and monitoring of the marine environment for turbidity. A strict monitoring regime and Environmental Management Plan will be required to be submitted to The Department of Environmental Planning and Protection (DEPP) for review and approval prior to the commencement of any maritime construction activities due to the very sensitive environment in which the Cay exists.

b) Helipad. Considerations for the helipad shall be submitted to the Department of Civil Aviation. It is strongly recommended that a Helipad Operations Manual be developed. Helipad Operation Manuals describe the heliport details including physical characteristics, facilities, normal operating procedures, emergency procedures, and maintenance practices. The manual should include specific recommendations for conditions unique to Montage Cay. To alleviate environmental concerns, the manual should also include guidelines on fuel spill prevention and clean-up, fire protocols, and bird avoidance measures. Additionally, noise impacts from aircraft constitute the single greatest environmental impact and as such it is anticipated that the developer will meet with local stakeholders whose natural ambience may be affected by overhead helicopter traffic.
c) Open Space. It is recommended that the developer identify an area or a setback allowance to ensure some degree of dry broad leaved evergreen forest is preserved. While the built environment accounts for 17% of total land area.
d) Invasive Species Removal. Thirteen (13) invasive species were identified on the site. Invasive species pose a significant threat to small island ecosystems and biodiversity. It is recommended that the developer implement a phased removal and monitoring program.

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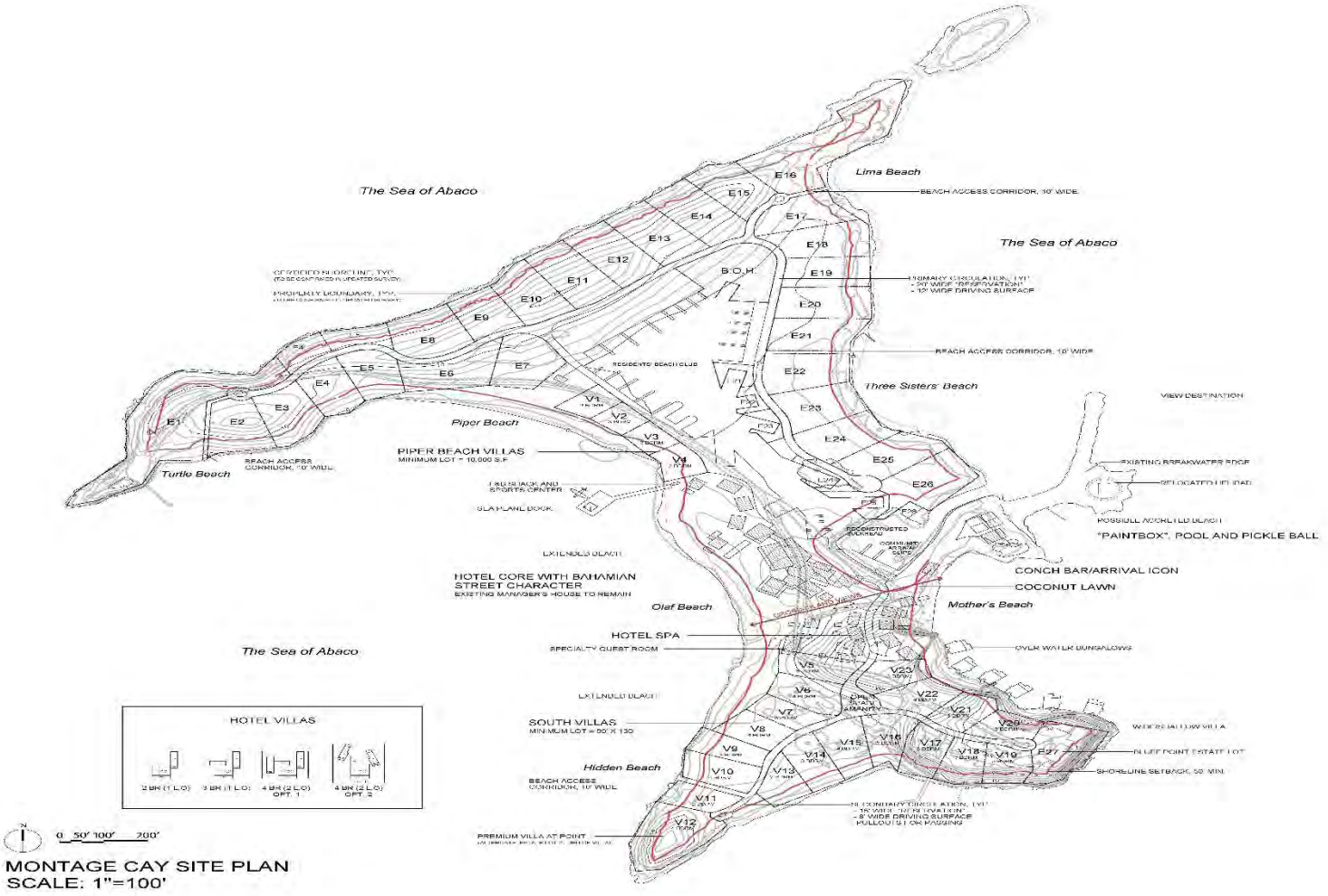
13 APPENDICES

13.1 CONCEPTUAL PLAN



13.2 AVIAN SURVEY

Montage Cay Avian Survey October 14-16th 2020

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Montage (Matt Lowe's) Cay avian survey report with notes on plants
Observers: Dr. Ancilleno Davis and Christopher Johnson

1.0 AVIAN SURVEYS

Avian surveys were conducted on October 14th and 15th, 2020 to identify the presence, abundance and habitat utilization of avian species within the boundaries and nearshore waters of Matt Lowe's Cay, also called Montage Cay, near Abaco Bahamas for Sterling Global Financial. Notes on Habitat and other wildlife were collected to describe the conditions that may affect the bird behavior detectability and abundance within the study area.

1.1 Methodology

The assessment comprised 6 hours and 20 minutes of active avian surveys traveling 7.07 km and approximately 8 hours of additional exploration on the property to determine sites of interest. Morning and afternoon surveys were conducted between the hours of 8:49 AM and 6:30 PM on October 14th and between the hours of 6:55 AM and 3:30 PM on October 15th, 2020. observations of birds were made using binoculars and the naked eye for visual identification with some species identified by the calls they made without visual confirmation. The details of the surveys are below in Table 1.

Date	Time	Duration	Distance
Oct. 14th, 2020	8:49 AM	76 min	1.67 km
Oct. 14th, 2020	10:52 AM	65 min	0.96 km
Oct. 14th, 2020	2:47 PM	75 min	1.39 km
Oct. 14th, 2020	4:13 PM	18 min	0.27 km
Oct. 14th, 2020	6:14 PM	6 min	0 km
Oct. 15th, 2020	6:55 AM	93 min	1.63 km
Oct. 15th, 2020	2:29 PM	53 min	1.15 km
total		6 hr 20 min	7.07 km

The species identified in each area of the property were identified and are listed in Table 3. Taxonomy is based on *The Clements Checklist of Birds of the World*, August 2019 edition. Status

is based on the International Union for Conservation of Nature (IUCN). These results are based on a small sample size and do not represent the total expected diversity at the site. In particular, many migrant warbler species that reside in the Bahamas over the winter were not detected during these surveys but may use the site and nesting seabirds may use the site during the summer months but were not detected. Several resident species detected on Abaco Island and other cays may use the site but were not detected during this survey.

The Birds 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; 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.

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; Unassessed (**UA**) species have not received a formal evaluation from the IUCN and are generally not considered species of conservation concern. In addition to the IUCN categories, Species that are specified in the Wild Birds Protection Act Chapter 249 of the Statute Laws of the Bahamas are designated as Managed (**MA**).

The results are summarized in the tables below.

1.2 Results

1.2.1 Species Observed

1.2.1.1 Species diversity

A total of forty-one (41) species were recorded on Matt Lowe's Cay during the survey period (Table 3).

Approximately one third (n = 14)of recorded species were permanent resident species which breed in the islands of the Bahamas and are of low conservation concern. Twenty-three species are winter residents that stay in the Bahamas during the north american winter but do not breed here. They account for more than half of the detected species and this indicates that this island may be a significant stopover site and a good candidate for management as part of a broader migration corridor for these and other species. The only near-threatened species

detected was the White Crowned Pigeon which is managed as a hunted species in the Bahamas.

Table 2 Avifauna survey abbreviations

TABLE KEY:	
RANGE	**STATUS**
PRB = Permanent Resident Breeding	**LC =** Least Concern (IUCN)
RNB = Resident Non-Breeding	**NT =** Near Threatened (IUCN)
SRB = Summer Resident Breeding	**VU =** Vulnerable (IUCN)
WR = Winter Resident	**MA =** Managed (Regulated – Bahamas)
E = Endemic (Distribution)	**D =** Declining
MI = Migrant	**UA =** Unassessed

Table 3 Bird species detected on Montage (Matt Lowe's) Cay October 14th to 16th 2020 along with geographic range and conservation status.

Common name	Scientific Name	Range	Status
American Kestrel	*Falco sparverius*	PRB	LC
American Redstart	*Setophaga ruticilla*	WR	LC
Bank Swallow	*Riparia riparia*	MI	LC
Barn Swallow	*Hirundo rustica*	MI	LC
Belted Kingfisher	*Megaceryle alcyon*	WR	LC
Black-and-White Warbler	*Mniotilta varia*	WR	LC
Black-throated Blue Warbler	*Setophaga caerulescens*	WR	LC
Blue Grosbeak	*Passerina caerulea*	WR	LC
Cape May Warbler	*Setophaga tigrina*	WR	LC
Cattle Egret	*Bubulcus ibis*	PR	LC
Common Ground-dove	*Columbina passerine*	PRB	LC
Common Yellowthroat	*Geothlypis trichas*	WR	LC
Gray Catbird	*Dumetella carolinensis*	WR	LC
Great Blue Heron	*Ardea herodias*	WRB	LC
Great Egret	*Ardea alba*	PRB	UA
La Sagra's Flycatcher	*Myiarchus sagrae*	PRB	LC
Magnificent Frigatebird	*Fregata magnificens*	PRB	LC
Magnolia Warbler	*Setophaga magnolia*	WR	LC
Northern Mockingbird	*Mimus polyglottos*	PRB	LC
Northern Parula	*Setophaga americana*	WR	LC
Northern Waterthrush	*Parkesia noveboracensis*	WR	LC
Ovenbird	*Seiurus aurocapilla*	WR	LC
Painted Bunting	*Passerina ciris*	WR	LC
Palm Warbler	*Setophaga palmarum*	WR	LC

Peregrine Falcon	*Falco peregrinus*	WR	LC
Prairie Warbler	*Setophaga discolor*	WR	LC
Reddish Egret	*Egretta rufescens*	PRB	LC
Red-legged Thrush	*Turdus plumbeus*	PRB	LC
Red-winged Blackbird	*Agelaius phoeniceus*	PRB	LC
Semipalmated Plover	*Charadrius semipalmatus*	WR	LC
Spotted Sandpiper	*Actitis macularius*	WR	LC
Swainson's Thrush	*Catharus ustulatus*	MI	LC
Swainson's Warbler	*Limnothlypis swainsonii*	WR	LC
Thick-billed Vireo	*Vireo crassirostris*	PRB-E	LC
Tri-colored Heron	*Egretta tricolor*	PRB	LC
White-crowned Pigeon	*Patagioenas leucocephala*	PRB	NT MA
White-eyed Vireo	*Vireo griseus*	WR	LC
Yellow-crowned Night Heron	*Nyctanassa violacea*	PRB	LC
Yellow-rumped Warbler	*Setophaga coronata*	WR	LC
Yellow-throated Vireo	*Vireo flavifrons*	WR	LC
Yellow-throated Warbler	*Setophaga dominica*	WR	LC

1.2.1.2.1 Permanent Resident Breeding

Permanent Resident Breeding species refers to the resident species that live year-round in the Bahama Islands and breed. A total of twelve (13) species were found in this category during the surveys on Montage Cay.

Figure 1 Common Ground-Dove (Columbina passerina bahamensis)

1.2.1.2.2 Summer Resident Breeding

Summer Resident Breeding refers to migrant species that breed in The Bahamas during summer months from April to October and spend the rest of the year in other regions. No species were found in this category during the study period. Further assessments during the summer would make it more likely for these species to be detected in the future.

1.2.1.2.3 Winter Resident Non-Breeding

Winter Resident Non-breeding species refers to the annual non-breeding fall/winter migrants which pass through the Bahama Islands from North America en route to southern regions and may remain in the Bahamas. Twenty-three (23) species in this category were recorded on the island. These birds are protected internationally via the Migratory Bird Treaty with the United States of America and Canada and locally by the Wild Birds Protection Act in the Bahamas.

Figure 2 Palm warbler (Setophaga palmarum)

Figure 3 Yellow-throated warbler (Setophaga dominica)

1.2.1.2.4 Winter Resident Breeding

Winter Resident Breeding birds visit the Bahamas to mate and breed during the winter months the only species detected in this category was the Great Blue Heron.

Figure 4 Great Blue Heron (Ardea herodias)

1.2.1.2.5 Resident non-breeding species

Resident non-breeding birds spend most of their lives in the Bahamas but leave to breed in another location or have not been recorded breeding in the Bahamas. The Cattle Egret is the only species detected in this category, but they are becoming more common throughout the Bahamas and may breed throughout the region.

1.2.1.2.6 Endemic Species

Endemic species are found only in a restricted geographic area. Endemism must be described at scale. Some species are only found in a small area, on a particular island, or within a region like the Caribbean. The Thick-billed Vireo found at the site is a regional endemic that lives year round in the Bahamas and Turks and Caicos, but may migrate to the north coast of Cuba.

Figure 5 Thick-billed vireo (Vireo crassirostris)

1.2.1.3 Conservation Status

1.2.1.3.1 Protected Species

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

1.2.1.3.2 Species of Concern

"*Near Threatened*" (NT) by the IUCN classifies a species that may be considered *threatened* with extinction in the *near* future, although it does not currently qualify for the *threatened* status.

White-crowned Pigeons (*Patagioenas leucocephala*), are designated a near-threatened species by IUCN and are managed as a hunted species in the Bahamas. Hunting is allowed with a permit and limits and regulations are determined by the Government of the Bahamas.

1.2.2 Habitat Utilization

The site surveyed included; rocky coastal edges and blackland coppice areas in the center of the property; a large landscaped areas throughout the property are covered in grass and feature borders of fruit trees and ornamental plants with several mature ficus trees around the property, an intact marina breakwaters and several beaches; unpaved but drivable roads and overgrown but walkable pathways weave through the coppice on the island. No permanent or ephemeral wetlands were found in the study area. Various native fruit trees were present, but there was little fruit to be seen except on the Seagrape and fig trees. The fig trees near the marina had fruit on the trees but none on the floor below, implying foraging by the local fruit eating species. These fruit along with insects serve as food resources for the birds throughout the property. The birds detected on the property did not appear to be in transition through the property but were using the property and potentially residing there for most of the day. The exceptions are the Magnificent Frigate birds, Peregrine Falcons, herons and egrets. No species were seen at active nests or engaged in nesting behavior.

2.0 Other species

On the property two resident dogs are well fed, and socialized and primarily restrict their movement to the area around the caretaker's house or in direct proximity to the caretaker. larger slow moving species such as Glossy Ibis and herons can be vulnerable to dogs and may avoid areas where dogs are present. THe herons on the property were detected on docks and pilings where they could escape readily and on the far side of the island where they were not in proximity to the dogs.

Cuban knight anoles (*Anolis equestris*) were reported by the caretaker and a nocturnal survey detected one adult male. These lizards are invasive alien species and eat small invertebrates and vertebrates including small birds. their presence on the island may suppress bird diversity and can eliminate smaller species such as hummingbirds. On the other hand, the juveniles of the species may serve as food for the American Kestrel and Merlin along with the heron species. steps should be taken to control these species and also prevent their spread to other islands.

One Black rat (Rattus rattus) was detected. Rats are known to climb trees and eat chicks and eggs of wild birds and kill adults roosting at night. Rats are virtually impossible to eliminate from native habitats without significant investment and collateral damage to native wildlife and the resident dogs.

The Cuban flathead frog (*Eleutherodactylus planirostris*) is a native frog that was found on the property and may provide a food source for local birds especially herons.

Four prominent invasive plant species were found on the island. these include Casuarina sp., Scaevola taccada, Jumbay and Brazilian pepper. These plant species are able to proliferate extensively, destroying native plant diversity and reducing habitat usefulness for wild animal species.

4.0 Recommendations

To support bird life on the island, and reduce future impacts to bird diversity and the survival success of resident and migratory birds, the following recommendations are made:

1. ensure that cats are not introduced to the islands and if they are, require they be neutered and/or kept inside.
2. Remove the invasive plant species on the island.
    a. The few Casuarina saplings identified on the island are easily removed when small.
    b. Scaevola is readily identifiable and removed.
    c. Brazilian pepper will be the most difficult to control and is widespread throughout the island. This species will invade natural areas as well as landscaped hedges. To adequately control Brazilian pepper, it is recommended to cut down the larger trees and apply herbicide to ensure that they do not recover.
    d. Jumbay may be cut down where found and is not very competitive with native vegetation.
3. Protocols, community education and voluntary codes of conduct for homeowners can set the island apart as a bird sanctuary and further improve reliability and safety in the habitat for native and migratory birds.

Thank you for this opportunity. This report constitutes the completion of the proposed work. Please remit final payment upon receipt.

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JSS CONSULTING
Environmental Consulting Services

MONTAGE CAY

Botanical Assessment

Submitted by: JSS Consulting

Prepared for: Sterling Global Ltd

Date: December 18, 2020

Table of Contents

1.0INTRODUCTION

Matt Lowe's Cay, a 53acre island less than 2 miles Northwest of mainland Abaco was acquired by Sterling Global in 2019 and renamed Montage Cay (see figure 1).

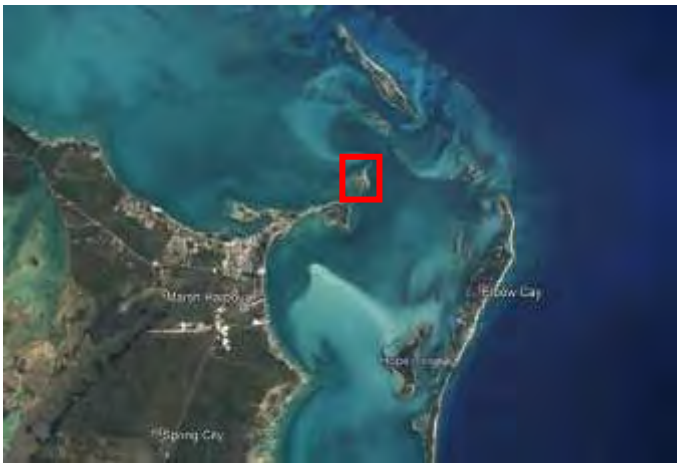

Figure 1: Project Location

A biological baseline assessment was conducted of the island to map vegetation types, determine floristic diversity, record protected species abundance and identify the presence of invasive species. Two previous assessments were conducted in 2002 and 2015 that provided historical data. However, as the island was in the line of passage of Hurricane Dorian in 2019, this survey also focused on changes from impacts of the storm.

2.0 METHODOLOGY

Vegetation types were mapped by examining aerial photography and verified by walking along the perimeter of the vegetation using existing roads and accessing the interior of vegetation using recently cleared survey lines. Vegetation Type taxonomy are based on Areces et al. (1999). Vascular plant species occurring in each vegetation type were recorded and used to compile a floral list. Plant taxonomy is based on Corell and Corell (1982). The presence, location and abundance of vascular species listed under the Conservation and Protection of the Physical Landscape Act, Protected Trees Order (1997) and the National Invasive Species Strategy for The Bahamas, 2013 were noted when encountered. Field studies were conducted on 30 November 2020.

3.0 FINDINGS

3.1 Vegetation Types

There are four (4) major categories of terrestrial ecosystems at Montage Cay: beach strand communities (*Uniola paniculata* Herbland); Rocky shore communities (*Rhachicallis americana* Shrubland); dry broad-leaved evergreen formations; and human-altered. These areas are further described in the sections below.

3.1.1 Beach Strand (*Uniola paniculata* Herbland)

There are seven (7) sandy shorelines along the coast of the island. Four (4) of these are naturally occurring and three (3) are man-made. All the sandy shorelines of Montage Cay have had some level of enhancement above the high-water mark. The main enhancement activities include removal of invasive species, expansion of sand substrate and the creation of small dunes vegetated primarily with *Uniola paniculata* (sea oats). Coconut (*Cocos nucifera*) was also a common species planted on all the sandy shorelines. Other species recorded include sea rocket (*Cakile lanceolata*) and sea purslane (*Sesuvium portulacastrum*). Other species such as sea ox-eyed daisy (*Borrichia frutescens*), bay cedar (*Suriana maritima*) and lily (*Hymenocalis arenicola*) recorded in the 2015 survey was notably less in the 2020 survey. Below is brief description of the beaches on Montage Cay:

Table 1: Description of Beaches on Montage Cay

Beach	Location	Description
1	Western shoreline (South)	Man-made beach
2	Western shoreline (Center towards South)	Man-made beach
3	Western shoreline (Center towards North)	Naturally occurring beach with enhancement in size of sand substrate.
4	Western shoreline (North)	Man-made beach
5	Eastern shoreline (North)	Naturally occurring beach with minimal enhancement.
6	Eastern shoreline (Center towards North)	Naturally occurring seasonal beach that was enhanced by the inclusion of breakwaters
7	Eastern shoreline (South)	Naturally occurring beach with minimal enhancement.

Figure 2: Location of Beaches at Montage Cay

Changes to beach strand vegetation from the 2015 survey included erosion and loss of individuals of Coconut palms. Erosion was observed at Beach #6, where a retaining wall previously covered with sand and vegetation could be seen exposed in the 2020 survey.

Photo 1: Beach #6 (2015)

Photo 2: Beach #6 (2020)

3.1.2 Rocky Shore (*Rhachicallis americana* Shrubland)

Rhachicallis americana shrubland (RAS) is present as a thin band averaging three meters wide, along the entire northern and southern coastline of the island. It was also present on the extreme Southwestern and North-eastern peninsulas of the site. It averaged ten meters in width at these locations and is subject to complete wind and salt spray. Vegetation is less than one meter in height in this plant community. *Rhachicallis americana* is the most common species. Other species are present in lesser quantity and include buttonwood (*Conocarpus erectus),* sea purslane (*Sesuvium portulacastrum*) and occasional species common in beach strand and dry broad-leaf evergreen formation vegetation.

Photo 3: *Rhachicallis americana* Shrubland along south western shoreline (view facing South - 2020)

3.1.3 Dry Broad-Leaved Evergreen Formations

Dry broad-leaved evergreen formation (DBEF) was present on the site as naturally occurring vegetation and as areas of habitat restoration. There are two forms of DBEF communities on the island: Forest and Shrubland.

Forest:

Most of the northern, western and southern interior upland areas on the site are represented by naturally occurring dry broad-leaved evergreen forest (DBEF). The vegetation height in these areas averaged 15-20 feet in height at the time of the investigation however the 2015 study recorded the height at 20-25 feet. The difference in height is likely due to top die back of trees resulting from wind and or salt damage during Hurricane Dorian. Photo 4 below are aerial images of the island in 2019 prior to Hurricane Dorian with green vegetation and 2020 post hurricane image which shows storm damaged vegetation.

Photo 4: Aerial image of Montage Cay years 2019 and 2020

Photo 5: Naturally occurring Broad-leaved Evergreen Forest with storm damaged trees (2020)

Photo 6: Naturally occurring Broad-leaved Evergreen Forest (2015)

Common species in these communities included gumelemi (*Bursera simaruba*), stoppers (*Eugenia spp*.), poisonwood (*Metopium toxiferum*), lancewood (*Nectandra coriacea)*, pigeon plum (*Coccoloba diversifolia*), cinnecord (*Acacia choriophylla*), crabwood (*Ateramnus lucidus*), milkbark (*Drypetes diversifolia*) and white indigo berry (*Randia aculeata*).

Shrubland:
Naturally occurring dry broad-leaf evergreen shrubland is present along the coastal ridgeline. Vegetation height was 6-8 feet. Species composition is similar to DBEF Forest.

Habitat Restoration:
DBEF was also present in areas to the East of the marina as buffer patches that were revegetated after the area was raised with dredge material during the marina construction (see photo 10). For the most part, vegetation in this area was similar to the naturally occurring DBEF. Several species such as Jamaican Caper (*Capparis cynophallophora*) were introduced that were not observed in other areas of natural vegetation on the site.

Karst Features:
The porosity of the carbonate geology of the Bahamas allows for rapid infiltration of rainfall and surface runoff that dissolves the rock substrate creating characteristic sinkholes, caves and caverns (karst features). Karst features observed on the island include two (2) caves which are present within the dry broadleaf evergreen formations along the south eastern coast of the island and sinkholes within the DBEF vegetation type. Although no possible point of connection was observed between the two caves, based on the proximity of the locations, it is likely that these are one system with two openings connected underground.

Photo 7: Sinkhole in DBEF Montage Cay (2020)

Photo 8: Interior of cave along south eastern shoreline of Montage Cay (2015)

3.1.4 Wetlands

No wetlands were observed on the site. The area known to have a wetland of significant size is now a marina.

One small patch of *Rhizophora mangle* (Red Mangrove) that was observed along the Western shoreline immediately to the North of Beach #6 during the 2015 survey received substantial storm damage.

Photo 9: Red Mangrove patch along western shoreline of Montage Cay years 2015 and 2020

3.1.5 Human Altered

Human altered areas on the site includes structures, lawns, roads, a storage yard, landscaped areas and sections of disturbed vegetation. The entire area East of the marina was completely human altered. It was previously cleared and revegetated with a series of lawns separated by a buffer of native broadleaf vegetation. Photo 10 below are aerial images of the area in 2004 completely cleared and 2019 showing revegetation.

Photo 10: Aerial view of human altered areas years 2004 and 2019

Photo 11: Section of Lawn in Human altered area (2020)

Disturbed vegetation was present at several locations. Vegetation in these areas were primarily invasive species such as Jumbay (*Leucaena leucocephala*) and Brazilian pepper (*Schinus terebinthifolius*) with remnant fruit species such as Mango (*Mangifera indica*) in an old farm area.

3.2 Vegetation Map

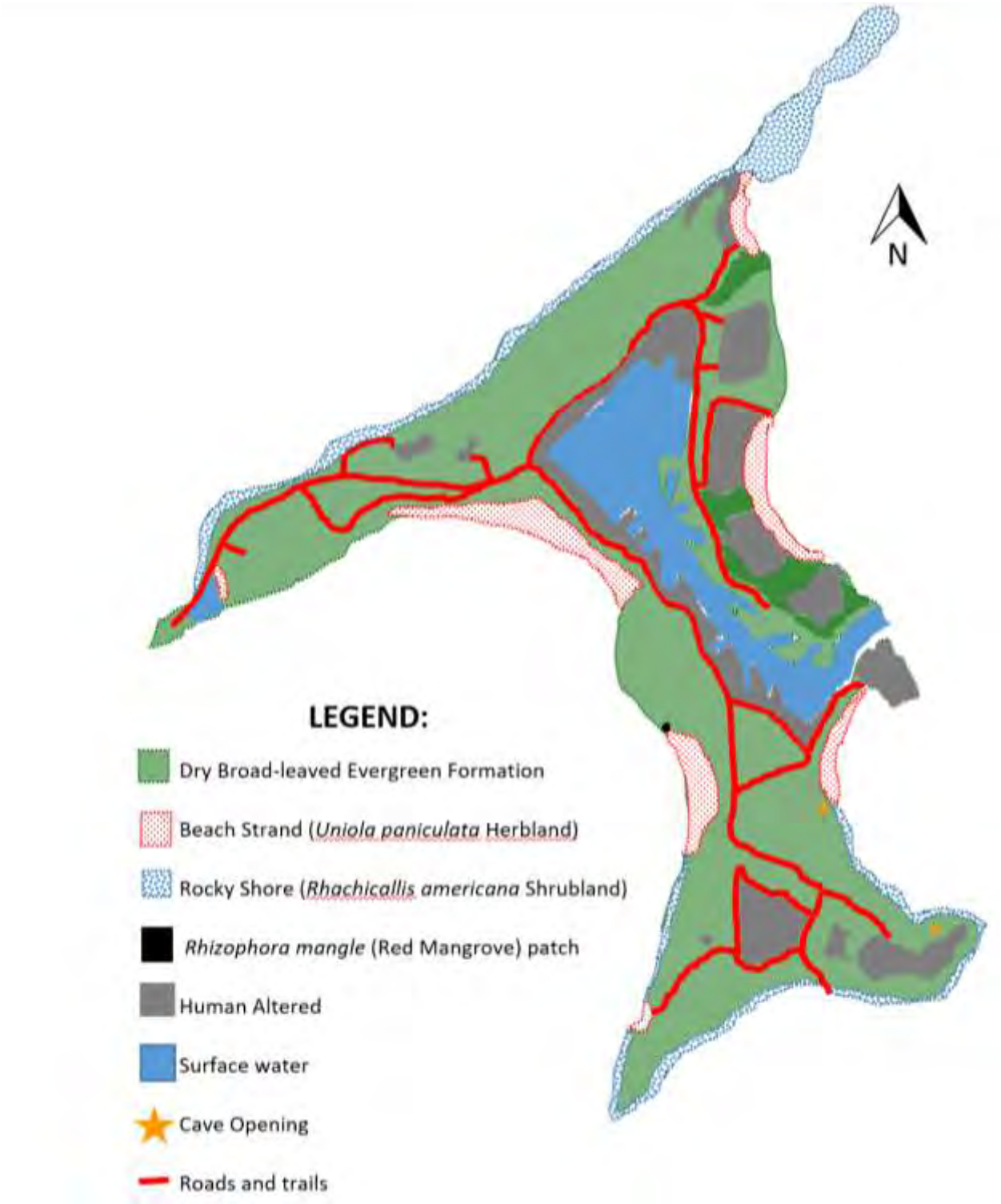

Figure 3: Vegetation Map

3.3 Vascular Plant Diversity

A total of one hundred and forty (140) species were recorded on the site (See Table: 1). The number of species recorded, relative to the small size of the study area, indicates a fairly high species diversification in the Dry Broad –Leaved Evergreen Formations which is typical for this vegetation type in The Bahamas. It is highly unlikely that all of the species present were recorded during this investigation, however the plants recorded is a fair representation of the species present within the vegetation types with the exception of the Beach strand locations that had lower than typical species diversification.

Table 2: Vascular plant species recorded on Montage Cay

Botanical Name	***Common Name***	**DBEF**	**BS**	**RS**	**HA**
Acacia choriophylla	Cinnecord	√			
Adonidia merrillii	Christmas palm				√
Agave sisalana	Agave	√			
Amyris elemifera	White torch	√			
Asparagus densiflorus	Asparagus fern	√			√
Ateramnus lucidus	Crabwood	√			
Bidens alba	Shepherd's needle				√
Borrichia frutescens	Sea ox-eye daisy		√	√	
Bourreria ovata	Strongback	√			
Brysonima lucida	Guanaberry				√
Bucida buceras	Black olive				√
Bumelia americana	Milkberry	√		√	√
Bursera simaruba	Gumelemi	√			
Caesalpinia major	Nickerbean	√			√
Cakile lanceolata	Sea rocket		√		
Canavalia rosea	Bay bean				√
Capparis cynophallophora	Jamaican Caper				√
Carica papaya	Pawpaw, Papaya				√
Carissa Macrocarpa	Natal plum				√
Casasia clusiifolia	Seven year apple	√	√	√	
Cassytha filiformis	Love vine			√	
Casuarina equisetifolia	Australian Pine		√	√	√
Catharanthus roseus	Periwinkle				√
Cenchrus incertus	Sand bur				√
Centrosema angustifolium	Butterfly pea				√
Cephalocerus millspaughii	Bahama Dildo	√			
Chiococca alba	Snowberry	√			
Chrysobalanus Icaco	Coco plum	√			√
Coccoloba diversifolia	Pigeon plum	√			
Coccoloba krugii	Bow-pigeon	√			

Botanical Name	*Common Name*	DBEF	BS	RS	HA
Coccoloba uvifera	Sea Grape		√	√	√
Coccothrinax argentata	Silver top palm	√			√
Cocos nucifera	Coconut palm		√		√
Codiaeum variegatum	Croton				√
Colubrina arborescens	Snake bark	√			
Conocapus erectus	Buttonwood	√	√	√	
Conocarpus erectus var. sericeus	Silver buttonwood		√	√	
Cordia sebestena	Geiger tree	√		√	
Crinum asiaticum	Crinum lily				√
Crossopetalum rhacoma	Poison cherry	√			
Delonix regia	Poinciana				√
Drypetes diversifolia	Milkbark	√			
Echites umbelatta	Devil's Potato	√			√
Eleusine indica	Fowl foot grass				√
Encyclia sp.	Orchid	√			
Epipremnum aureum	Pothos vine				√
Erithalis fruticose	Black torch	√			
Ernodea littoralis	Golden creeper		√	√	
Erythroxylum rotundifolium	Rat wood	√			
Eugenia axillaris	White stopper	√			
Eugenia foetida	Spanish stopper	√			
Exostema caribaeum	Prince wood	√			
Ficus aurea	Strangler fig	√			√
Ficus citrifolia	Shortleaf fig	√			
Ficus macrocarpa	Green island ficus				√
Guaiacum sanctum	Lignum Vitae	√			
Guapira discolor	Narrow-leaved blolly	√		√	√
Guapira obtusata	Broad-leaved blolly	√			
Guettarda krugii	Velvet seed	√			
Guettarda scabra	Rough velvet leaf	√			
Hamelia patens	Firebush				√
Hibiscus sp.	Hibiscus				√
Hippomane mancinella	Manchineel	√			
Hypelate trifoliata	White Ironwood	√			
Ipomoea pes-caprae	Railroad vine		√		
Ipomoea purpurea	Morning Glory	√			√
Jacquinia keyensis	Joewood		√	√	
Jacqumontia havanensis	Jacqumontia	√			
Jasminum fluminense	Jasmine vine				√
Jatropha integerrima	Jatropha				√

Botanical Name	***Common Name***	**DBEF**	**BS**	**RS**	**HA**
Krugiodendron ferreum	Ironwood	√			
Lantana involucrate	White sage	√			
Lantana sp.	Lantana big				√
Lasiacis divaricate	Wild Bamboo	√			
Leucaena leucocephala	Jumbay	√			√
Malpighia polytricha	Touch me not	√			
Malvaviscus arboreus	Sagra's malvaviscus	√			
Mangifera indica	Mango	√			√
Manilkara bahamensis	Wild dilly	√	√	√	
Mastichodendron foetidissimum	Mastic	√			
Metopium toxiferum	Poisonwood	√		√	
Nectandra coriacea	Lancewood	√			
Nerium oleander	Oleander				√
Oeceoclades maculata	Spotted orchid	√			
Pandanas sanderi	Varigated Pandanas				√
Phoenix Sp.	Date Palm				√
Picramnia pentandra	Snake root	√			
Piscidia piscipula	Jamaica dogwood	√			
Pithecellobium sp.	Ram's horn	√			
Pithecellobium unguis-*cati*	Cat claw	√			
Platycerium sp.	staghorn fern				√
Pluchea odorata	Cough-bush				√
Plumeria obtuse	Frangipani	√			
Psidium longipes	Sweet Margret	√			
Psychotria ligustrifolia	Bahama Wild coffee	√			√
Randia aculeata	White indigo berry	√			√
Reynosia septentrionalis	Darling plum	√			
Rhabdadenia biflora	Mangrove vine				√
Rhachicallis americana	Sand-fly bush			√	
Rhizophora mangle	Red Mangrove		√		
Rhoeo spathacea	Oyster plant	√			√
Rivinia humilis	Rouge berry	√			
Ruellia brittonia	Mexican petuna				√
Salmea petrobioides	Bushy salmea		√	√	
Sansevieria hyacinthoides	Bowstring hemp				√
Scaevola taccada	Hawaiian Seagrape		√		
Schinus terebinthifolius	Brazilian pepper				√
Sesuvium portulacastrum	Sea purslane		√	√	
Sida Sp.	Sida	√			
Simarouba glauca	Paradise tree	√			
Smilax sp	Smooth smilax	√			

Botanical Name	*Common Name*	DBEF	BS	RS	HA
Smilax havanensis	Green-brier	√			
Solanum bahamense	Cankerberry	√			√
Solanum erianthum	Wild tobacco				√
Sophora tomentosa	Necklace pod		√		
Spartina sp.	cord grass			√	
Sporobolus virginicus	Seashore rush-grass		√	√	
Stenotaphrum secundatum	St. Augustine grass				√
Suriana maritima	Bay cedar		√	√	
Swietenia mahagoni	Mahogany	√			
Tabebuia bahamensis	Five-finger	√			
Tabebuia impetiginosa	pink poui				√
Tamarindus indica	Tamarind				√
Tecoma stans	Yellow Elder				√
Terminalia catappa	Tropical almond	√			√
Thespesia populnea	Seaside Mahoe				√
Thrinax morrisii	Silver thatch palm	√	√	√	
Tillandsia utriculate	Bromeliad	√			
Tournfortia volubilis	Soldier vine	√			√
Trema lamarckiana	Pain in back	√			√
Turnera ulmifolia	Buttercup	√			√
Uniola paniculate	Sea Oats		√		
Urechites lutea	Wild Alamanda	√			
Wedelia trilobata	Carpet Daisy		√		
Zanthoxylum coriaceum	Hercules club	√			
Zanthoxylum flavum	Yellow wood	√			
Zanthoxylum rodoxylon	Cuban Yellow wood	√			
Ziziphus taylori	Ziziphus	√			
Zoysia Sp.	Zoysia		√		√

3.4 Invasive Species

Thirteen (13) invasive species were observed on the site. These species are outlined below along with their occurrences and abundance on site and recommendations for control.

Table 3: Invasive species recorded on Montage Cay

Species	Occurrence and abundance	Recommendations*
Asparagus densifloris Asparagus fern	Occasional species in human altered area near location of old structure.	None listed
Casuarina equisetifolia, Australian Pine	A few seedlings were observed in vegetation types along the coastline	Control

Species	Occurrence and abundance	Recommendations*
Delonix spp., Poinciana	One (1) individual was observed in the human altered vegetation type	Control
Ipomoea purpurea, Morning Glory	This species was observed in abundance in Human altered areas and within the dry broadleaf evergreen formation along the edges of roads and trails	Control
Jasminum fluminense, Jasmine vine	This species was observed in abundance in Human altered areas	Control
Leucaena leucocephala, Jumbey	This species was observed in abundance at Human altered areas and within the dry broadleaf evergreen formation along the edges of roads and trails	Control
Rhoeo spathacea, Oyster Plant	This plant was observed as an occasional species in human altered areas and within the dry broadleaf evergreen formation near human altered areas	None listed
Sansevieria hyacinthoides, Bowstring hemp	This plant was observed as an occasional species in human altered areas and within the edges of dry broadleaf evergreen formation near human altered areas	None listed
Scaevola taccada, Hawaiian Seagrape	This plant was observed as a common species in vegetation types along the coastline	Eradication
Schinus terebinthifolius, Brazilian Pepper	This species was observed in the human altered areas of the site	Eradication
Tabebuia impetiginosa, Pink poui	A few individuals were observed as intentionally planted species within landscaped human altered areas. Seedlings of this species were also observed in abundance within the dry broadleaf evergreen formation along the edges of roads and trails near landscape human altered areas	None listed
Terminalia catappa, Almond	This species was observed in the human altered areas	Control
Wedelia trilobata, Carpet daisy	A patch of this species was observed on one of the beach strands and appeared to be intentionally planted and not naturally occurring or established by natural dispersal means.	Control

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

There is an active Australian Pine removal program in place that has successfully eradicated the species from the island (post 2002 assessment). There are occasional seedlings that emerged which are controlled by maintenance removal exercise.

Photo 12: Australian Pine along Beach Strand (2002)

Photo 13: Australian Pine seedling (2020)

There is also active removal of *Scaevola taccada*, however, improper removal and disposal can result in redistribution of this species.

Photo 14: Patch of S*caevola taccada* on Beach Strand (2020) (2020)

Photo 15: Discarded uprooted *Scaevola taccada*

Of note, there were areas of extensive vine coverage with a few invasive species such as morning glory (*Ipomoea purpurea*), jasmine (*Jasminum fluminense*) and Jumbay (*Leucaena leucocephala*) which is present in large stands with individuals up to 25 feet in height.

Photo 16: Stands of *Leucaena leucocephala* (Jumbay) on Montage Cay (2020)

Photo 17: Extensive coverage of vegetation with Morning glory, *Ipomoea purpurea* (L) and Jasmine vine, *Jasminum Fluminense* (R) year 2020

Umbrella Tree, (*Schefflera actinophylla*) which was previously recorded in 2015 was not noted in the 2020 survey.

3.5 Protected Species

Three (3) species listed on the Conservation and Protection of the Physical Landscape Act, Protected Trees Order (1997) was observed during the investigation. These species are outlined below along with their occurrence and abundance on the site.

Table 4: Protected species recorded on Montage Cay

Species	Abundance	Occurrence
Lignum Vitae (*Guaiacum sanctum*)	Occasional species	Dry Broad –Leaved Evergreen Formation
Mahogany (*Swietenia mahogani*)	Occasional species	Dry Broad –Leaved Evergreen Formation
Beefwood (*Guapira discolor*)	Common species	Vegetation types along coastline
	Occasional species	Dry Broad –Leaved Evergreen Formation

3.6 Other observations:

Three (3) 55gallon barrels with suspected hydrocarbon material is located in the human altered area within the maintenance yard. The barrels are in an advanced stage of corrosion and the contents are exposed. There is evidence that some material has leaked from one or more of the containers.

Photo 20: 55 gallon barrels with suspected hydrocarbon material

Photo 21: Corroded barrels with exposed material

Photo 22: Hydrocarbon-stained ground around 55 gal barrels

4.0 RECOMMENDATIONS

4.1 Contamination Remediation

The suspected hydrocarbon spill and remaining material contained in the 55gallon drums in the maintenance yard should be removed by a licensed professional and disposed of in accordance with requirements of the Department of Environmental Health Services.

4.2 Invasive species Removal Plan

While there is an effective removal and control program in place for the Australian Pine species, there are a number of other invasive species on the island for which guidance on proper removal and disposal can prove beneficial to the overall invasive species control program.

5.0 CONCLUSION

While there is notable damage to the structure, and to a lesser extent the composition of vegetation since the 2015 assessment; the changes since the passage of Hurricane Dorian are relatively minimal and the site is in recovery.

6.0 REFERENCES

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Laws of the Bahamas http://laws.bahamas.gov.bs/

MONTAGE CAY
ABACO
THE BAHAMAS

Overwater Bungalows
Environmental Considerations

Prepared For

STERLING GLOBAL FINANCIAL

Prepared by

ISLANDS
BY DESIGN

Environmental Considerations for Overwater Structures on Montage Cay

Table of Contents

1 Overview

As part of the continued development of Montage Cay, Sterling Global Financial (SGF) seeks to feature overwater bungalows. These overwater bungalows will become part of the hotel experience for the Montage experience. Montage proposes a total of 6 (six) single story bungalows connected to the mainland.

The Resort at Montage Cay is a proposed development of 78 hotel rooms, 22 villas, and 25 single family homes.

Six of the hotel keys are overwater guest rooms on the east side of the Cay. Five of these overwater guest rooms are single key guest rooms of 728 net square feet each. One of the six overwater guest rooms is a suite of 1450 net square feet. This guest room has a living area separate from the bedroom.

Similar to construction of marina docks, these guest rooms are proposed to be of wood frame and supported by 12-inch diameter, treated wood pilings. The finish floor of the overwater guest rooms will be 6' over mean high tide. Each guest room will be no more than one story of approximately 10' over the finish floor.

The overwater guest rooms have been designed so that only a portion of the guest room is over the water. The entry and bathrooms of the overwater guest rooms are over land. The bedrooms and living areas are over water.

With regards to climate variability, the bungalow design considers sea level rise and extreme weather events. The Bahamas lies within the North Atlantic Hurricane zone and experiences tropical cyclones from time to time. To account for potential storm surge and sea level rise, the bungalows are designed for 180 mph wind speed velocity and will sit at six feet above mean sea level, approximating a twenty-five (25) year storm event.

Environmental consequences and risks generated by an overwater bungalow can be extrapolated from impacts associated with similarly constructed docks and marinas. Environmental considerations for overwater structures pertain to the issue of habitat degradation due to impacts of shading and physical disturbance.

Shading alters the penetration of light, thus the light intensity, through the water column, vital for photosynthesis. Impacts of shading are most pronounced in estuarine environments where light rarely penetrates farther than two (2) to five (5) meters below the surface. In The Bahamas light penetration far exceeds five (5) meters along most coastlines and any impacts as a result of shading are mitigated by placement of overwater structures away from dense seagrass beds and at heights that allow light penetration dependent on the orientation and daily migration of the sun.

Physical disturbance for the construction of overwater bungalows mimics that of docks where disturbance is typically greatest during construction when sediments are displaced for the installation of piles. With appropriate pile installation methodology and management of sediment dispersal, sediment impacts can be mitigated.

Overall, the environmental impacts for the proposed overwater bungalows at Montage Cay are considered minimal. Bungalow design and site placement allow light penetration, minimize disturbance to the seafloor, avoid pollutant inputs, and account for climate variability.

Climate Change and Coastal Resiliency

When considering climate change as it relates to The Bahamas it is important to note that the country is an archipelago of small islands, most of them uninhabited, and that more than 80% of the land surface is only a meter or less above mean sea level. The natural resources of the country are very limited. The economy is built on tourism and services. Bahamians, like other island peoples, have historically had a close personal relationship with the land and the sea. Until the advent of modern tourism and banking industries, most Bahamians relied on the resources of both land and sea for survival.

Adaptation Options

Climate change presents new challenges due to the speed of the anticipated changes and the magnitude of the investments needed to adapt to predicted changes. In the case of some small islands the only option may be retreat and abandonment of property. The do-nothing option or no-action strategy is the one against which all other options may be compared. All too often, however, it is the default option because other options are either not available or are not known. Across The Bahamas no one option alone is likely to achieve the desired results of reducing vulnerability to climate change. Zoning practices based on vulnerability assessments, restricting types of development, prohibiting activities that exacerbate the impacts, and replacement and provision of increased security for settlements and infrastructure, are options that need to be considered. Costs associated with planned adaptation will be high but the cost of not acting will be measured directly in loss of life, loss of competitiveness in the tourism sector and often at the expense of the environment.

Conclusion

Overwater bungalows will have minimal environmental impact but have a great economic benefit for the project and The Bahamas. Overwater bungalows will improve the guest experience by offering a unique product that is not currently available in The Bahamas and only minimally available in the Caribbean. The exclusive experience will market blue waters and beaches of The Bahamas through social media as well as Montage's direct media marketing. The overwater bungalows will deliver a VIP experience and employ a higher number of Bahamians compared with landside bungalows. Furthermore, since the overwater bungalows are an additional charge to guests, the Government will receive increased tax and VAT benefits.

2 Description of Overwater Structures

Montage proposes 6 bungalows located on the south side of Montage Cay. The finished floor level of the bungalows will sit at a height of six feet above mean sea level.

In addition to wind, the decks may be subjected to waves generated during a hurricane due to storm surge. Circular piles shed much of the water energy due to their profile. However, this energy must be

considered in the design of the superstructure. The proposed superstructure decking will be constructed of wolmanized timber. In addition, a significant portion of vertical wave forces (uplift) can be attributed to the entrapment of air between the deck and the wave. Therefore, the decking will be fastened to the stringers using screws with a 3/8" spacing between boards. This spacing will substantially reduce the wave forces yielding a more durable structure.

Electrical supply to the bungalows from shore side will be in electrical conduits as per Bahamas Building Code (Edition III) and affixed below decks as per typical dock construction.

A potable water supply will be provided to each cabana, similarly the PVC conduits will be affixed below the decking.

3 Marine Benthic Discussion

The bungalows will be placed in an area of mostly sand with some sparse sea grass. A full description of the marine benthic environment is available within "Matt Lowe Cay, Abaco, Bahamas – Environmental Impact Assessment " conducted in 2015 by Islands By Design Ltd.

4 Coastal Discussion

4.1 Wind

The following figure depicts wind direction and speed for the Abaco Islands as can be seen the lee side of Montage Cay on which the structures are proposed to be constructed, will be sheltered for the highest anticipated winds.

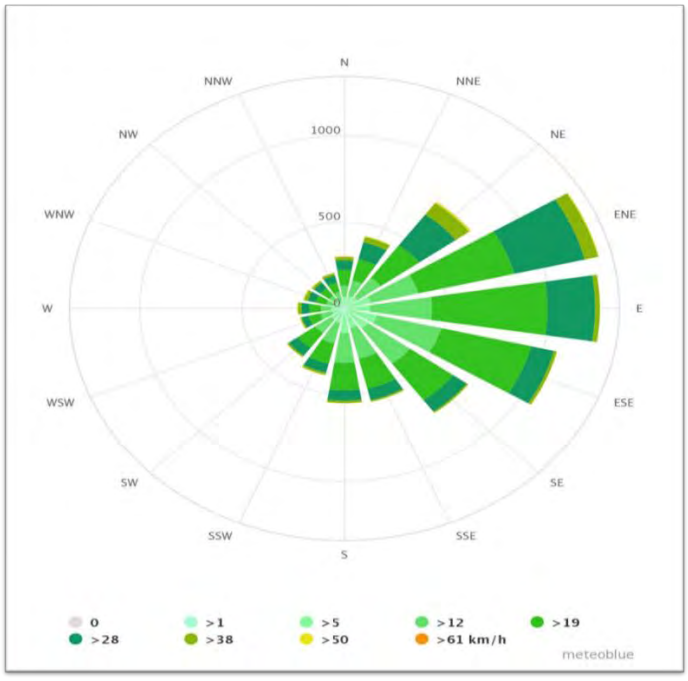

Figure 1: Wind Rose Abaco Islands (*Metblue)*

4.2 Tides

Tidal data extracted from Settlement Point records. Tides at Montage Cay are mixed-semidiurnal, meaning two high tides and two low tides occur per day. The mean tidal range between mean high water (MHW) and mean low water (MLW) is approximately 0.84 m (2.7 feet).

Datum	Value (meters)	Value (feet)	Description
MHHW	0.91	2.98	Mean Higher-High Water
MHW	0.84	2.74	Mean High Water
MTL	0.42	1.37	Mean Tide Level
MSL	0.42	1.38	Mean Sea Level
DTL	0.44	1.45	Mean Diurnal Tide Level
MLW	0.00	0	Mean Low Water
MLLW	-0.03	-0.09	Mean Lower-Low Water
NAVD88	--	--	

Table 1: Tidal data extracted from Settlement Point Records

4.3 Water Levels

Water levels can be generated by a combination of wave set-up, low pressure systems and storm surge, tides, waves, currents, and sea level rise (SLR). Tides, storm surge, and SLR are evaluated to determine extreme water levels for Montage Cay. The following list provides a brief assessment of the threat of extreme conditions:

- **Tides.** As discussed in Section 4.2, tides at Settlement Point, Bahamas, typically range 0.84 m (2.7 feet). Extreme tidal levels have been recorded with ranges up to 5 feet (Table 1 HAT & LAT).

- **Storm Surge.** Montage Cay is located in the Atlantic Ocean hurricane band, resulting in frequent storm event. The island is relatively protected due to bathymetry and surrounding islands from the south and west directions but remains exposed to the storms from the north and east. Storm surge is associated with low pressure systems, which can cause the mean water level to rise. Storm events as associated storm surge are evaluated in the Numerical Modeling section.

- **Sea level rise.** SLR is an increasing threat to low-lying islands and waterfront projects. Projections of SLR for the Project range from 0.2 meters to 0.5 meters over a 30- to 50-year time period and are detailed in the Sea Level Rise section.

No local storm surge data are available for Montage Cay, however, data from the Bimini Islands, located approximately 130 miles west of Montage Cay are presented below (Table 2). These values were results

of MIKE 21 HD simulations for the RW Bimini Ferry Terminal and were used to simulate storm surge applied on MHW events.

Return Period	Surge Elevations (feet)
25-year	6.4
50-year	7.2
100-year	8.3

Table 2: Bimini Islands Nearshore Storm Surge (Bimini Ferry Terminal)

Climate Change and Coastal resiliency

When considering climate change as it relates to The Bahamas it is important to note that the country is an archipelago of small islands, most of them uninhabited, and that more than 80% of the land surface is only a meter or less above mean sea level. The natural resources of the country are very limited. The economy is built on tourism and services. Bahamians, like other island peoples, have historically had a close personal relationship with the land and the sea. Until the advent of modern tourism and banking industries, most Bahamians relied on the resources of both land and sea for survival.

ADAPTATIONS OPTIONS

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4.4 Storm Events

Extreme coastal storm events, such as hurricanes, are of particular concern for Montage Cay due to the frequency of occurrence in the Caribbean. The long fetch of open Atlantic Ocean allows for storms to develop and mature into categorically classified hurricane systems by the time they reach the warmer waters of the Caribbean. NOAA's Hurricane Database and online tracking tool have historical information of hurricane statistics dating as far back as 1880, to the present. In the past century, NOAA's Historical Hurricane Tracks analysis shows that 146 storms have passed within 100 nautical miles (185 km) of Montage Cay.

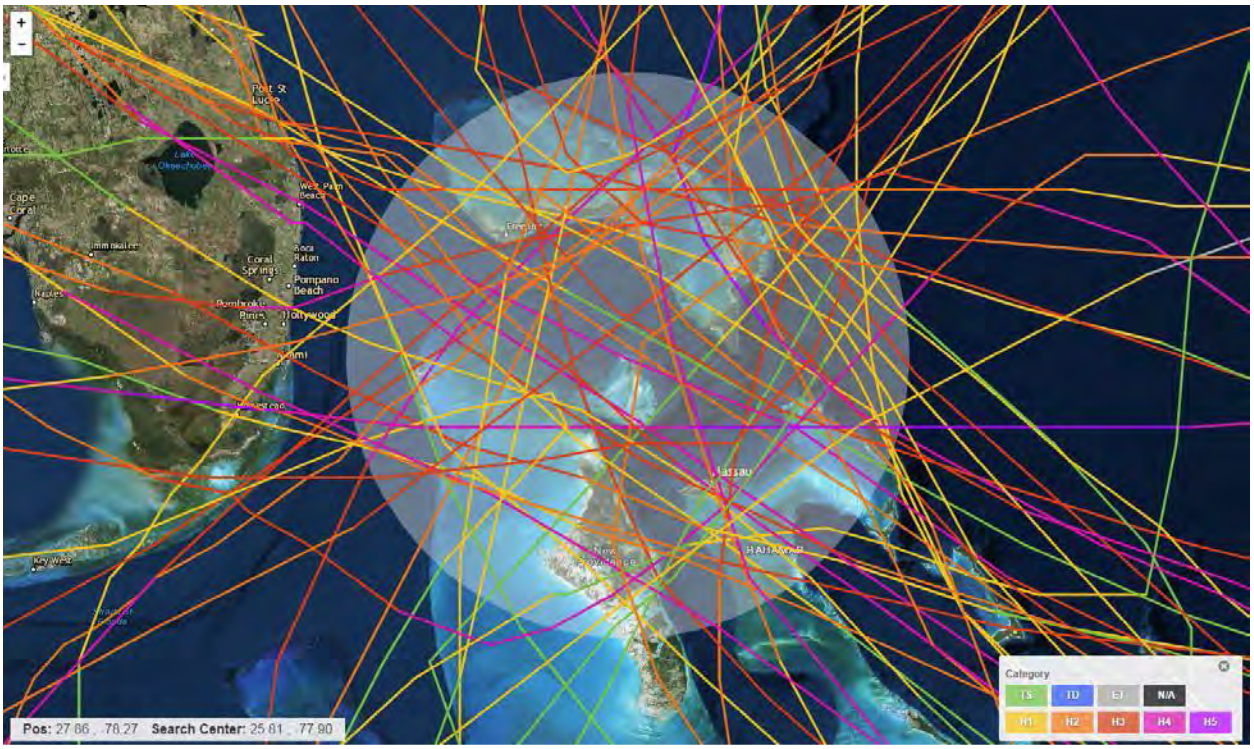

Figure 2: Historical Storm Tracks (Cat 1-5- 100nm from Montage Cay)

4.5 Sea Level Rise (SLR)

The following table outlines the latest SLR projection data by NOAA, which are recommended for design criteria:

Scenario	Time Horizon	Sea Level Rise Scenario (NOAA 2017)	Future Sea Level Rise (ft.)
1	25 Years (2024)	Intermediate	0.41
2	50 Years (2067)	Intermediate	1.75
3	100 Years (2117)	Intermediate	4.12

Table 3: Sea-Level Rise Projected Water Levels (NOAA)

4.6 Currents

The currents during typical tidal cycles are not significant, the currents can reach 2 knots at several areas with sharp angles, which is expected. The average currents at the channel along the south beach are between 0.1 – 0.25 m/s and the maximum currents are between 0.15 – 0.4 m/s. The currents are not strong enough to influence swimming activity, but will certainly add some circulation at the site.

5 Environmental Considerations

The Bahamas coastline is a heterogeneous mix of rocky shoreline, sandy beaches, and mangrove wetlands that transition to the marine environment at the littoral zone. Most near shore environments are characterized by hard bottom, sand, seagrass and corals. It is the impact of overwater structures to these coastal ecosystems, terrestrial and marine, that draws concern from coastal resource managers.

Dependent on the location and present baseline conditions, environmental considerations associated with any overwater structure include to a varying degree impacts to vegetation (habitat degradation) and physical substrate (sediment disturbance,) and risks (hurricane and fire risk).

Docks and commercial marinas introduce additional environmental considerations for the management of utilities namely wastewater and petroleum products. However, in the case of Montage Cay these potential pollution sources are non-existent.

It must be reiterated that the environmental baseline present at the proposed location determines the extent of anticipated impacts. With a mostly sand and sparse sea grass benthic environment, long term impacts are not anticipated. Some short-term degradation of sea grasses may occur due disturbance of the seafloor due to pile installation and construction.

5.1 Shading

Of primary importance and consideration is the benthos below the proposed footprint of the overwater structures. Most marine shallow-water habitats and benthic invertebrates rely heavily upon photosynthesis; thus the introduction of shading alters the transmissibility of light limiting the diversity of marine organisms. Environmental factors such as water quality, tide regimes, and water depth also influence the penetration of light. This impact is most pronounced in estuarine environments where dock structures exacerbate low light conditions negatively affecting submerged vegetation by inhibiting photosynthesis. In The Bahamas, the transmissibility of light well beyond five (5) meters mitigates the concern for shading impacts. Furthermore, the placement of overwater bungalows at a height of six (6) feet above MSL further reduces the potential for shading impacts.

Dock height, orientation, width, and plank spacing have been identified as factors affecting the survival of seagrass under docks. Dock height is the most influential and subject to the specific tidal regime of the area (Shafer & Ludin, 1999). Dock height was the only statistically significant variable: docks less than 12-16 inches above the marsh shaded out all vegetation in every study site for estuarine environments (Kearney et al, 1983). At six (6) feet above MSL, the overwater bungalows are placed well above sixteen (16) inches.

5.2 Pile Installation

Impacts associated with the physical installation of pilings and dock structures are directly related to the installation methodology and existing marine benthos. Methodology used for the installation of piling is the greatest contributing factor to potential vegetation and sediment impacts. Suspended sediment

generates turbid conditions which reduces light penetration invoking the effects of shading as mentioned above.

An unavoidable loss of vegetation and disturbance of sediments is expected for the footprint of the piling; however, disturbance and the potential for regrowth in the immediate vicinity of the piling depends largely on the installation methodology. Jetting in particular leads to a greater disturbance on the seafloor than that of socketing and drop hammering. Pile installation methodology will be chosen in coordination with the contractor and environmental impacts, if any, managed through implementation of an Environmental Management Plan (EMP).

5.3 Wood Preservative

The most commonly applied wood preservative is chromated copper arsenate (CCA) which replaces the heavily toxic creosote and pentachlorophenol (PCP) now banned for use on small dock and piers by most states in the United States. Wood used for dock structures is continuously exposed to, if not fully emerged, in saltwater known to accelerate decay. To thwart the onset of decay and to deter wood-boring and fouling organisms that hasten decay, wood destined for marine use is treated with a preservative, such as CCA.

CCA treatments are applied in a variety of strengths (the amounts of preservative retained in the wood after treatment) depending on use and not surprisingly, wood placed in saltwater receives the highest concentration at 2.50 lbs./cu. Ft versus 0.10 to 0.25 lbs./cu. ft. for above ground installation according to recommendations from the Southern Pine Council. Approximately 99% of the leaching occurs within the first 90 days in the marine environment. The leaching rate decreases by about 50% daily once the wood is immersed in seawater (NOAA NCCOS OCRM, 2005).

It is important to note that the metals leached from CCA adsorb more readily onto fine grained sediments (silts/clays) than sand which dominates Bahamian substrate. Moreover, given the semidiurnal tidal regime of The Bahamas bioaccumulation of contaminants is unlikely.

All treated wood piles will be in accordance with AWPA M4-06 and ASTM D25 -12 (2017).

5.4 Water Quality

Environmental consideration for water quality again pertains to environmental baseline conditions, construction methodology and management during operation. Suspended sediment and silt generate turbid conditions suppressing light penetration, releasing adsorbed contaminants contributing to poor water quality and negatively impacting present marine biota.

Changes in water movement due to pilings redirecting water flow or speeding movement around the pile may result in scour and alter predator-prey behavior. Minimizing the numbers and size of piling is supported by the scientific literature (Shafer & Lundin, 1999) (Shafer & Robinson, 2001).

But such issues are moot should the overwater structure be built to the Bahamas Building Code and properly sited and operated such that poor water quality would not ensue. The Bahamas has a semi-

diurnal tide regime with an average tidal fluctuation of approximately 2.5 ft, with slightly greater variations in spring or neap tide events.

5.5 Fire

All buildings associated with the development will comply with all fire requirements of The Bahamas Building Code, thus minimizing to the extent possible all fire-associated risks. There are, however, no current or intended municipal fire services and the developer will provide this service at his discretion.

5.6 Hurricane

Structures perched over the water are at risk for extreme ocean conditions most often associated with a large tropical event such as a hurricane. The Bahamas resides in the Hurricane Belt and the structures are proposed to be located over seabed and subject to those anticipated conditions. Extensive flooding can occur in low-lying coastal areas from storm surges cause by extreme low barometric pressures when the ocean sometimes rises as much as twelve (12) to seventeen (17) ft. The rising sea destroys onshore structures as seawater surges onto shore and then rushes back to the ocean as the storm passes. The beach may incur significant changes including erosion or accretion depending on the intensity, direction, and length of storm. Sea structures may be weakened or damaged after days of intense wave action.

All construction standards will be in compliance with the Bahamas Building Code 3rd Edition where new structures will be built to endure winds of up to 160 miles per hour as per the hurricane construction standards.

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7 Appendix

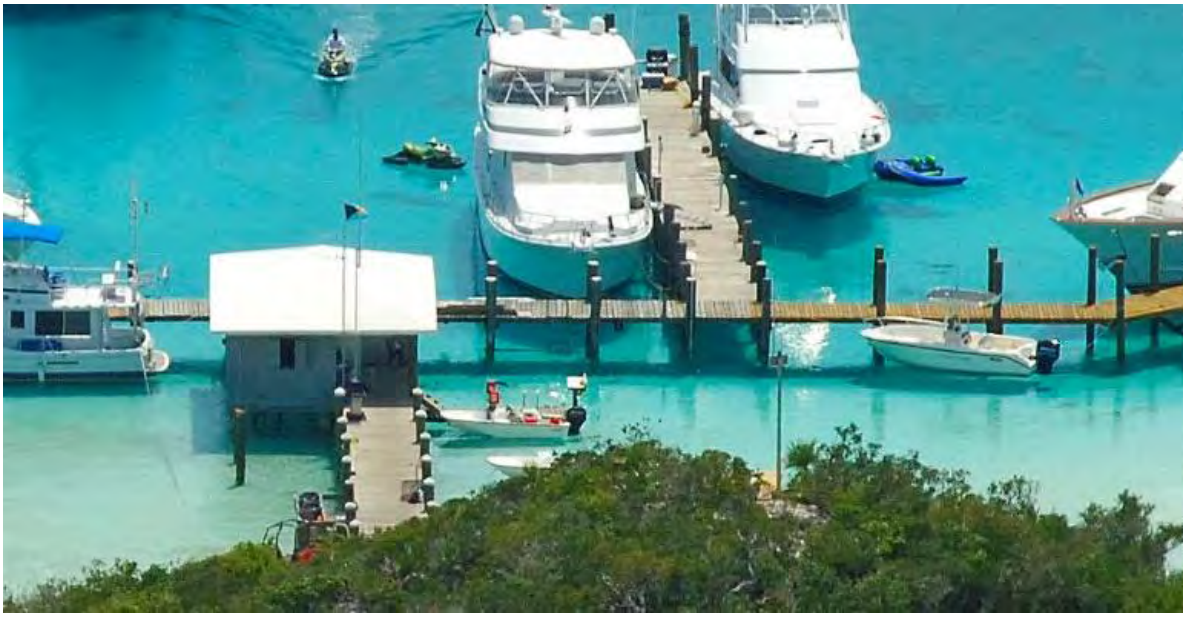
7.1 Examples of Overwater Structures Bahamas

Bonefish Pond National Park N.P.

Kamalame Cay – Andros

Potters Cay – P.I. Bridge

Great Harbour Cay – Berry Islands



Compass Cay – Exuma

Highbourne Cay – Exuma

Harbour Island – Eleuthera

Harbour Island – Eleuthera

Harbour Island – Eleuthera

Harbour Island – Eleuthera

Twisted Lime in Sandy Port https://sealifecaribbean.com/restaurants/twisted-lime-bar-grill/

Never say Never Again Bar https://disneycruiselineblog.com/wp-content/uploads/2019/06/Nassau-Never-Say-Never-Again-Bar-Grill_20190621.jpg

Coco Cay – Berry Islands

https://www.overwaterbungalows.net/new-overwater-bungalow-resort-bahamas-wins-approval-build.html

https://www.overwaterbungalows.net/overwater-bungalows-in-the-caribbean

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13.5 FIXED BASE OPERATIONS

Sterling Global Financial as part of the continued development of the Montage Cay purchased a parcel of land on mainland Abaco within Marsh Harbour that is to serve as a Fixed Base Operations (FBO), site to facilitate guests, goods and services to and from Montage Cay.

The parcel is the former residence of Mr. Edison Key that was extensively damaged during the passage of Hurricane Dorian in September 2019.

Figure 1 - Location Plan
(Image courtesy of Google Earth)

Figure 2 - Fixed Base Operations
(Image Courtesy of Google Earth)

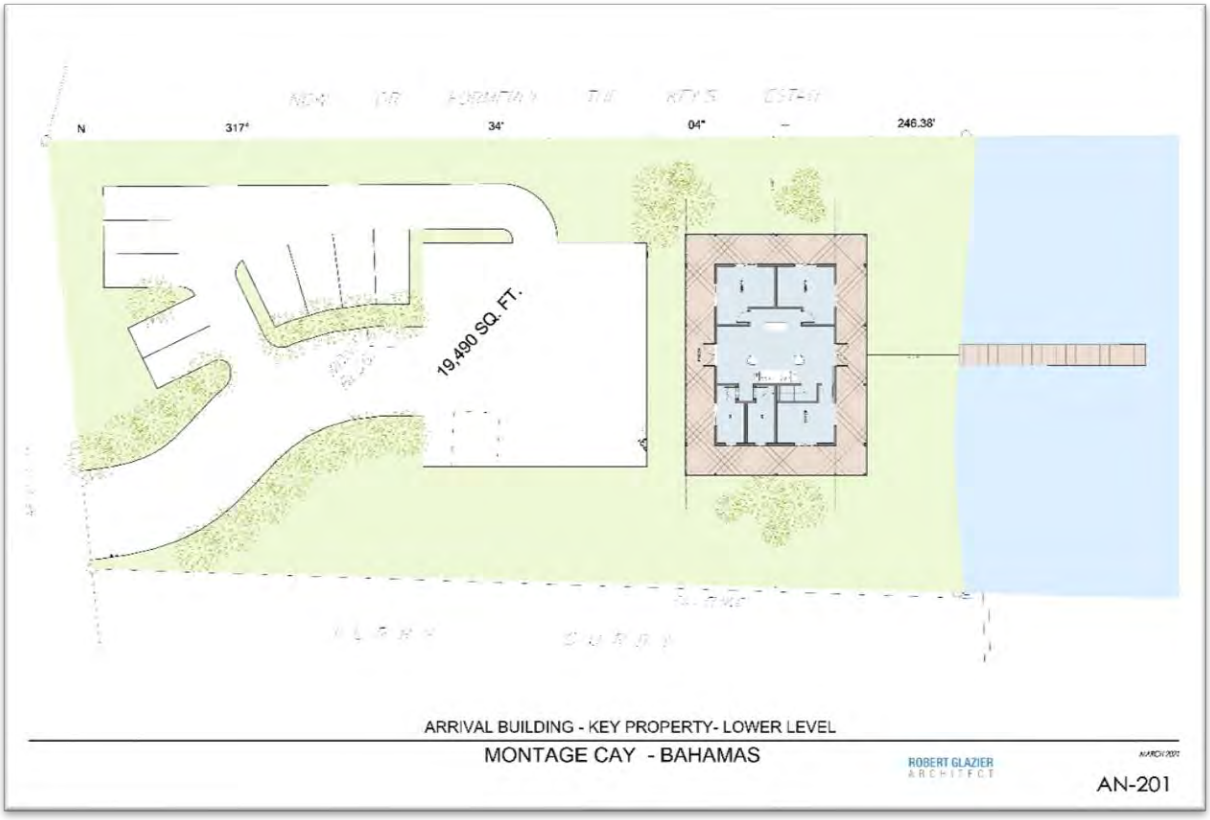

Figure 3 - Arrivals Building

Description

The parcel comprises approximately one half acre and is to be developed with a two storey arrivals and departures building with guest amenities and parking areas.

Arrivals and departures will be facilitated over a timber dock to be constructed and will be one-hundred feet in length to accommodate vessels.

The existing bathymetry is shallow, whilst previously having been dredged to depths unknown, the area is to be dredged to a depth of six feet at mean low water (MLW).

1 INTRODUCTION

A benthic survey was conducted for a small parcel of water along the southeastern side of Marsh Harbour, Abaco. The survey area is illustrated in **Figure 7.** The purpose of the investigation was to map benthic communities/cover types, determine species diversity, and identify the presence or absence of protected and invasive species.

2 METHODS

Benthic cover types were mapped using U.A.V. (Unmanned Aerial Vehicle) aerial photography combined with on-site investigations. Four (4) benthic transects were swum within the survey area (See **Figure 8**), and observations recorded. Species were visually identified, and those that could be photographed were

documented as such for later reference. One-hundred and nine (109) digital photographs were taken documenting the benthos of the area. List of Benthic species observed at the site can be found in Table 1.

Identification of species is based on three books by Paul Humann et al., “Reef Coral Identification,” “Reef Creature Identification,” and “Reef Fish Identification.”

During the on-site survey, a species list of organisms observed was compiled.

3 RESULTS

3.1 Benthic Types

Two (2) main benthic types were observed within the site. The identified cover types are:

- Rock
- Thalassia

Figures 4 and **Figure 5** illustrate the different benthic cover types, locations, and respective sizes.

3.1.1 Rock

This benthic cover type is found over most of the survey area. It is bounded by the shoreline and limits of the Survey Area, and transitions into the Thalassia cover type discussed in Section 3.1.2., which lies to the south. It consists of a generally flat rocky substrate with some localized undulation, with pockets of sand, loose rocks, hurricane debris (dock piling, sheet metal, lighting fixtures) and trash (glass bottles) throughout. Near the shoreline, both the loose rock and underlying rock substrate are dominated by Fuzzy Finger Algae (*Dasycladus vermicularis*), with broken glass and large pieces of concrete that appear to have broken off of the damaged seawall – likely during Hurricane Dorian in September 2019.

Further offshore the Fuzzy Finger Algae is far less dominant, yet is still present in a mix of very sparse Turtle Grass (*Thalassia testudinum*), Three Finger Leaf Algae (*Halimeda incrassata*), and Pink Bush Algae (*Wrangelia penicillata*). Two Black Ball Sponges (*Ircinia strobilina*) and a few small specimens of Finger Coral (*Porites porites*) and Lesser Starlet Coral (*Siderastrea radians*) were observed, as well as small Brown Variable Sponges (*Anthosigmella varians*) and Corky Sea Finger (*Briareum asbestinum*) near the center of the Rock cover type. This invertebrate presence was not found throughout the remainder of the cover type, and colonization elsewhere was limited to species of algae. At the northeastern corner of the Survey Area a few Grooved Blade Sea Whips (*Pterogorgia guadalupensis*) were noted growing from the rock substrate. Silver sides (*Atherinidae sp*.) and Bar Jacks (*Caranx ruber*) were the only mobile species seen in the area.

The benthos in front of the damaged dock in the survey area was previously dredged, but to what depth is unclear, as sediment probing was not conducted at the time of the survey. The area is filled in with sand and uncolonized by algae or invertebrates, but the outline of the area dredged can still be clearly seen in the surrounding rock and is visible in the U.A.V. photography.

Figure 4 - Rock

3.1.2 Thalassia

This benthic community type is found south of the Rock benthic type. It lies further away from the shoreline in slightly deeper water, and is somewhat sheltered from southeast trade winds (and associated wind waves) by the nearby breakwater. It consists of short-bladed, medium-density Turtle Grass (*Thalassia testudinum*) with Pink Bush Algae (*Wrangelia penicillata*) and Green Jointed-Stalk Algae (*Halimeda monile*) mixed in, growing from a sandy substrate. Thalassia densities vary slightly throughout this cover type, with a patch near the breakwater adjacent to the survey area being a touch denser, and the shallower, transitional areas being sparser, but species composition remaining relatively intact throughout.

Two pieces of bent metal roofing and what appears to be an old, disused concrete boat mooring were noted within this cover type. They were not hosting any readily-visible fish or invertebrate species, and only Stinker Sponges (*Ircinia felix*) and a few species of algae already found elsewhere within this cover type were colonizing these objects.

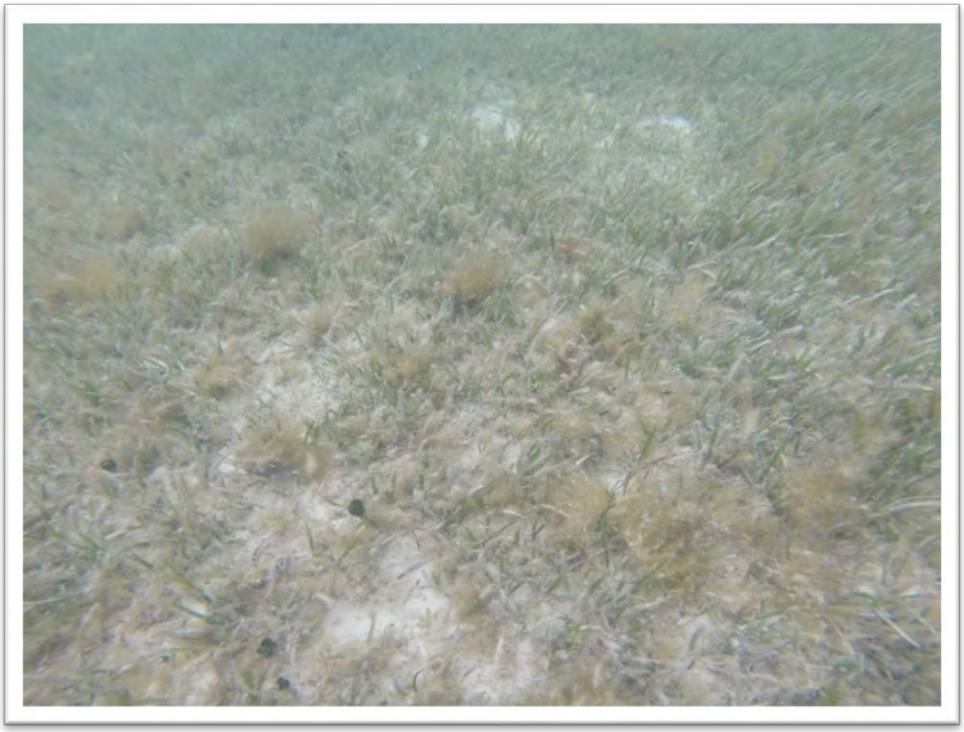

Figure 5 – Thalassia

Benthic Survey Species List for the water off the southeastern portion of Marsh Harbour, Abaco List of species observed at the Site, 22 March 2021. Survey conducted between 1030am-12pm.			
Mobile Species		Sessile Species	
Common Name	Scientific Name	Common Name	Scientific Name
Bar Jack	*Caranx ruber*	Algae, Fuzzy Finger	*Dasycladus vermicularis*
Silversides	*Atherinidae sp.*	Algae, Fuzzy Tip	*Neomeris annulata*
		Algae, Green Jointed-Stalk	*Halimeda monile*
		Algae, Pinecone	*Rhipocephalus phoenix*
		Algae, Pink Bush	*Wrangelia penicillata*
		Algae, Three Finger Leaf	*Halimeda incrassata*
		Alga, Watercress	*Halimeda opuntia*
		Algae, Y Branched	*Dictyota sp.*
		Bristle Ball Brush	*Penicillus dumetosus*
		Coral, Finger	*Porites porites*
		Coral, Lesser Starlet	*Siderastrea radians*
		Corkscrew Anemone	*Bartholomea annulata*
		Corky Sea Finger	*Briareum asbestinum*
		Flat-Top Bristle Brush	*Penicillus pyriformis*
		Green Mermaids Wine Glass	*Acetabularia calyculus*
		Grooved Blade Sea Whip	*Pterogorgia guadalupensis*
		Manatee Grass	*Syringodium filiforme*
		Mermaids Fans	*Udotea sp.*
		Sponge, Black Ball	*Ircinia strobilina*
		Sponge, Brown Variable	*Anthosigmella varians*
		Sponge, Stinker	*Ircinia felix*
		Sea Pearl	*Ventricaria ventricosa*
		Turtle Grass	*Thalassia testudinum*

Table 1 - Benthic Species Observed

3.3 Protected and Endangered Species

No species listed as an Endangered Species by CITES (the Convention on International Trade in Endangered Species) was observed within the survey area.

No species protected by the laws of the Commonwealth of the Bahamas were observed within the survey area.

3.4 Invasive Species

No species listed as an Invasive Alien Species under the Bahamas Environment Science and Technology (BEST) Commission National Invasive Species Strategy, were observed.

4 APPROACH CHANNEL

An approach channel will have to be dredged to a depth of six feet at mean low water (MLW) extending approximately one hundred and thirty feet beyond the end of the proposed dock on a bearing of 120°.

Figure 6 - Dredge Extents

Approach Channel

An approach channel will have to be dredged to a depth of six feet at mean low water (MLW) extending approximately one hundred and thirty feet beyond the end of the proposed dock on a bearing of 120°.

Dredging will result in approximately 2100 cubic yards of spoil material that will be transported to Montage Cay for later re-use.

Figure 7 - Location of the survey area

Figure 8 - Transect locations and orientations

Figure 9 - Benthic cover types

5 CONCLUSION

Based on on-site investigations and observations along with desktop studies it can be concluded that the construction of a dock and its associated dredging will not dramatically impact any critical habitat, nursery, or foraging grounds for local marine species. There will be damage to some of the benthic habitat found within the survey area that will be irreversible in nature.

However, by constructing the dock, this damage will be mitigated with the creation of new habitat for juvenile fish and invertebrate species. Dock pilings throughout the Bahamas have been shown to act as substrate for invertebrate growth and shelter for juvenile fish and invertebrates, and this is likely to encourage greater species diversity and abundance in the area in future.

The majority of the benthic habitat and species observed within the study area will remain unaffected if the recommendations within this report are considered.

An Environmental Management Plan will be drafted and govern construction of this facility.

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