Environmental Impact Assessment:
Exuma Fund 2 Ltd.

Stocking Island, Exuma, The Bahamas

JULY 2025

Prepared by:

Waypoint Consulting Ltd
P.O. Box N4805
Nassau, The Bahamas
1-242-376-1448

Table of Contents
Environmental Impact Assessment
Exuma Fund 2 Ltd.
Stocking Island, Exuma, The Bahamas

Table of Figures

Table of Tables

1 Executive Summary

This Environmental Impact Assessment (EIA) pertains to the proposed resort residential subdivision situated on a privately-owned 34.07-acre sea-to-sea parcel on Stocking Island, Exuma, The Bahamas. An EIA identifies potential environmental impacts based on site investigations and recommends measures for minimizing or mitigating those potential impacts with reference to local legislation, international conventions and/or best practices. This EIA was prepared in accordance with the EIA guidelines of the Department of Environmental Planning and Protection (DEPP) to secure a Certificate of Environmental Clearance (CEC). A CEC is required for full construction activities to commence.

The proposed development is a resort residential subdivision complete with up to 38 residential homes, a 32-slip marina, private resident docks, moorings, back-of-house facilities, associated amenities, and beach improvements. Back-of-house operations will service waste management, electricity, and potable water facilities. The roll-on/roll-off ramp (RORO) requires some dredging for construction materials to land safely; pending the conclusion of project construction this RORO will become inactive with no maintenance dredging anticipated. While the lagoon area reaches depths of -12ft MLLW, the marina requires limited dredging, approximately 300 cubic yards, to achieve a depth of -4ft MLLW around the coastal perimeter to allow for the safe maneuvering of vessels. Dredge materials will be placed on existing beaches and elsewhere on site. Additionally, racket courts will serve as a dual-purpose helipad for infrequent landings and takeoffs, and emergency uses.

At present, there are no built structures on the parcel. Access to inland portions of the site is via an established trail accessed from the shoreline. The lagoon is part of the greater Elizabeth Harbour though bounded on three (3) sides by Stocking Island with vessel access largely dictated by high tide. The interior of the site comprises undulating terrain with a mangrove wetland creek connecting to the lagoon. No development is anticipated in the wetland creek and the four (4) acre buttonwood formation will remain largely intact. Cognizant of the natural setting, the developer has avoided, to the extent possible, sensitive environmental features such as wetlands and buttonwood formations.

Biological Baseline

Biological assessments (terrestrial, avian, and marine) were performed to document baseline conditions and assist with impacts analysis. Botanical surveys identified two (2) communities: Interior Upland and Coastal. A total of forty-four (44) species were recorded on site. Of these, twenty-eight (28) were native species, thirteen (13) protected species, and three (3) invasive species listed on the National Invasive Species Strategy (2013). Avian surveys identify the presence, abundance, and habitat utilization of bird species within the boundaries of the site; six (6) avifauna species were recorded. Marine benthic surveys focused on areas planned for coastal development, namely the proposed marina and RORO. The substrate is predominately sandy bottom with sparse seagrasses.

Coastal Bathymetric Surveys

Coastal bathymetric surveys were performed by Applied Technology & Management (ATM), a Geosyntec company, in March 2024. These surveys were performed in the navigational channel to access the lagoon, the lagoon, and the proposed RORO area to the south of Stocking Island. Sediment probes were done by hand with most sites confirming sand substrate. Bathymetric surveys were used to inform marina design specifications and

identify the dredge area. Other marine features include the private residential docks, six (6) moorings, and channel markers. All coastal marine structures are designed for vessels with a length of 50ft or less.

Impacts

Baseline studies facilitate review of proposed project features for impacts determination being positive, negative, or neutral over the short and long term. Project master planning considered environmental due diligence to mitigate known and unknown impacts. Terrestrial impacts associated with upland development pertain primarily to the unavoidable loss of habitat. Sensitive environmental features such as the buttonwood formation and mangrove fringed creek were considered during the master planning process. The high relief windward dune is susceptible to erosion due to steep slopes and exposure to ocean waves. Structures for windward lots meet DEPP guidelines at fifty (50) feet inland from the dune crest. Here, foundation design and construction practices should adhere to recommendations by a professional engineer.

In terms of biological impacts, proposed development features will result in an unavoidable loss of habitat for the construction of residences, guest recreational facilities, and back-of-house facilities. Construction practices will mitigate the loss of vegetation through a small clearing footprint, evaluating tree relocation potential prior to clearing to allow for root pruning, and revegetation following construction completion. Additionally, while impacts are not anticipated in the wetland areas, maintaining setbacks and an open flow of water to the lagoon will avoid short-term and long-term adverse impacts. Elsewhere, it would be appropriate to remove established individuals of invasive species and implement a long-term invasive species management strategy. A native nursery for translocated trees and propagation of native vegetation, with particular attention to species listed on the Protected Tree Order 2021, will encourage biodiversity threatened by the ongoing existence and proliferation of invasive species. Avifauna species diversity was relatively low which may have been attributed to inclement weather; no long-term impacts are anticipated to avifauna.

Construction of the marina will use traditional dock pilings and adhere to policies set forth by DEPP and the Ministry of Works. Impacts to the marine environment will be concentrated within the immediate footprint of the marina, dredge area, and RORO. Given the structure height, existing bathymetry, and latitudinal location of the sun, shading impacts are anticipated to be minimal on marine flora, where present, though may influence predator/prey relationships. Adhering to best management practices for turbidity control, no long-term impacts are anticipated in the area designated for marina dredging; maintenance dredging is not anticipated for at least 5 to 10 years pending a storm event. Motile species such as conch, if present, will be relocated just prior to construction.

Conclusion

In accordance with this EIA document and with the proper planning, application, and monitoring of the EMP, and if best management practices (BMPs) are conscientiously planned, engineered and implemented, many of the impacts that are generated during construction and operation should be minimized or completely eliminated for the proposed project. Sensitive environmental features such as the wetland creek and buttonwood formation were considered during preparation of the project plan and incorporated as natural features. As a low-density residential community, Exuma Fund 2, Ltd. aligns with existing land uses in the immediate vicinity and contributes to the local economy of Great Exuma.

2 Purpose and Scope

This document serves as the EIA for Exuma Fund 2, LTD, a residential and resort development, located on Stocking Island, Exuma, The Bahamas. The purpose of this report is to assess and document the environmental impacts associated with the proposed project components in relation to the natural setting.

An EIA is prepared in accordance with DEPP EIA guidelines, the Environmental Impact Assessment Regulations 2020, and the Environmental Planning and Protection Act 2019. An EIA identifies potential environmental risks and impacts based on site investigations and recommends measures for minimizing or mitigating those potential impacts with reference to local legislation and international conventions. Importantly, an EIA is used for planning purposes to consider project features and impacts prior to construction. The determination of environmental impacts is limited to the project area and its area of influence, known as the site.

Terrestrial surveys, including botanical and wildlife, and marine surveys were performed to document existing site conditions. The terrestrial survey records observed flora and fauna to identify present vegetation communities. Botanical, wildlife, and marine assessments were performed March 18-20, 2024. Waypoint Consulting Ltd. and DEPP conducted a joint site visit to Exuma Fund 2, LTD on June 5, 2024. The contents of this EIA are based on the DEPP site visit and approved EIA TOR.

3 Geographic Location & Present Land Use

The 34.075-acre parcel on Stocking Island Exuma is privately owned. The parcel is approximately one hundred and forty-five (145) miles southeast of New Providence and 1.7 miles northwest of the Georgetown public dock. The parcel is bounded to the north and east by the Exuma Sound and west and south by Elizabeth Harbour.

3.1 Geographic Location

Figure 3-1 Exuma Fund 2 Ltd., The Bahamas

Figure 3-2 Exuma Island Chain, The Bahamas

Figure 3-3 Stocking Island, The Bahamas

Figure 3-4 Aerial Drone Image – March 18, 2024

3.2 Present Land-Use

At present, the ~34-acre parcel is undeveloped and vegetated. A well-maintained nature trail runs from Elizabeth Harbour to Exuma Sound which is frequented by guests aboard anchored and visiting vessels. The lagoon is used as a hurricane hole and by vessels able to navigate the shallow channel as an anchorage.

Figure 3-5 Drone Aerial Image to the Northeast, March 2024


Figure 3-6 Raised boardwalk and well-maintained walking path, Stocking Island, March 2024

3.3 Area of Influence

At present, development on Stocking Island consists of a mixed-use properties with pockets of commercial restaurants such as Chat N' Chill and hotels such as a Kahari Resort and Peace and Plenty Beach Club as well as private homes set amidst undeveloped parcels. Much of the developed land is located within the immediate vicinity of the sheltered lagoons and the Exuma Fund 2 Ltd. project. Given its proximity to Great Exuma the project's influence will extend beyond its immediate footprint. At less than 2 miles southwest, Georgetown is the community in closest proximity to Stocking Island with Great Exuma hosting an international airport, year-round population, and supporting infrastructure.

Local areas of influence include:

- Direct and indirect economic impacts to Exuma for labour, transportation, and supplies and community support initiatives.
- Secondary impacts to adjacent cays and communities.

Figure 3-7 GoogleEarth image depicting nearby uses including Chat N'Chill, Peace and Plenty Beach Club, Kahari, private homes and docks, and vessels anchor/moored

Figure 3-8 Chat N'Chill, The Snappy Turtle Bar & Grill located in the vicinity of the Exuma Fund 2, Ltd (March 2024)


Figure 3-9 Left: Private homes and docks along navigational channel, Right: Kahari Resort & Dock (March 2024, June 2024)

3.3.1 *Elizabeth Harbour Mooring Field*

Elizabeth Harbour experiences a significant volume of anchored vessels (several hundred sailing and motorboats) during the winter and spring months which has caused degradation to marine benthic habitat and water quality. To curtail damage caused by anchors and chains, the Bahamas National Trust in association with the Elizabeth Harbour Conservation Partnership, established a state-of-the-art mooring field in Elizabeth Harbour and Moriah Harbour National Park. Installation of the mooring field was completed in January 2024. These moorings are located to the immediate west of the Exuma Fund 2, Ltd. development. Access to the resort and RORO area may warrant relocation of select mooring installations in coordination with the Port Department and Bahamas National Trust.

Figure 3-10 Drone aerial showing anchored and/or moored vessels, March 2024

Figure 3-11 Mooring Field with vessels, March 2024

Figure 3-12 Stocking Island Mooring Field, Elizabeth Harbour Conservation Partnership[1]

[1] Mooring Field. Elizabeth Harbour Conservation Partnership. 2024 https://elizabethharbourpartnership.org/reserve-a-mooring/

3.4 Historic Aerial Imagery

Historical aerial imagery was obtained to identify prior coastal modification including dredging, if any, in the vicinity of the project. Of note, the dual channel to access the interior lagoon was dredged between 1942 and 1956. The channels are noticeably absent on the 1942 aerial and present on the 1956 aerial. The southern channel is marked by buoys but almost impassable at low tide. Please see below for 1956 image which supports the dredging of the channel for maintenance purposes as this has been an active channel for nearly 70 years.

Figure 3-13 Channel dredging 1956 aerial

3.5 National Parks & Protected Areas

The Exuma Fund 2, Ltd. development on Stocking Island, Exuma is situated approximately 0.5 miles to the northwest of the Moriah Harbour National Park. Established in 2002 and expanded in 2015, the 22,833-acre Moriah Harbour National Park is managed by the Bahamas National Trust. The Park was established to protect bird

populations while allowing traditional uses as bonefish grounds and harvesting of silver top thatch palms. A General Management for Moriah Harbour Cay National Park 2019-2029 is available on the BNT website: www.bnt.bs.[2]

Figure 3-14 Moriah Harbour Cay National Park, Bahamas National Trust, Exuma, The Bahamas[3][4]

[2] General Management Plan for Moriah Harbour Cay National Park 2019-2029. Bahamas National Trust. 2019

[3] Moriah Harbour Cay National Park. Park Boundaries. www.bnt.bs

[4] Moriah Harbour National Park. Bahamas National Trust. https://bnt.bs/explore/exuma/moriah-harbour-cay-national-park/

4 Project Description

The proposed development is a resort residential subdivision complete with a 32-slip marina, private resident docks, 6 moorings, associated amenities, back-of-house facilities, and upland beach improvements. Back-of-house operations will service waste management, electricity, potable water, and sewerage facilities. While the RORO and marina necessitate limited dredging of 660 cubic yards and 300 cubic yards, respectfully. The racket courts will serve as a dual-purpose helipad for infrequent and emergency use.

The USD$80 million project will entail the following features:

4.1 Master Plan

Table 4-1 Master Plan of Project Features Exuma Fund 2, LTD	
Project Features	
25 Hotel Rental Villas & Residential Units	38 Residential Lots
32-Slip Marina	Marina Dredging & Channel Dredging, RORO Dredge Area
6 Moorings	Private Resident Docks (5)
Beach Club & Beach Cabanas	Amenities (Racket Club/dual purpose helipad)
Spa & Garden	Back-of-House Area (Waste, Electricity)
Retail & Provisioning Stores	Nature Preserve & Trails
Helipad (infrequent)	Service Dock
Arrival dock	Beach Improvements (Upland)

4.2 Home Construction

Exuma Fund 2 Ltd will construct homes using techniques advised by the project engineer and according to geotechnical investigations performed by a qualified engineer. A letter and section drawings by Engineer of Record, Integrated Building Services, are appended to this EIA for reference. All residences along the windward dune will be constructed fifty (50) feet from the crest of the dune; this pertains to lots 30, 31, 32, 33, and 34.

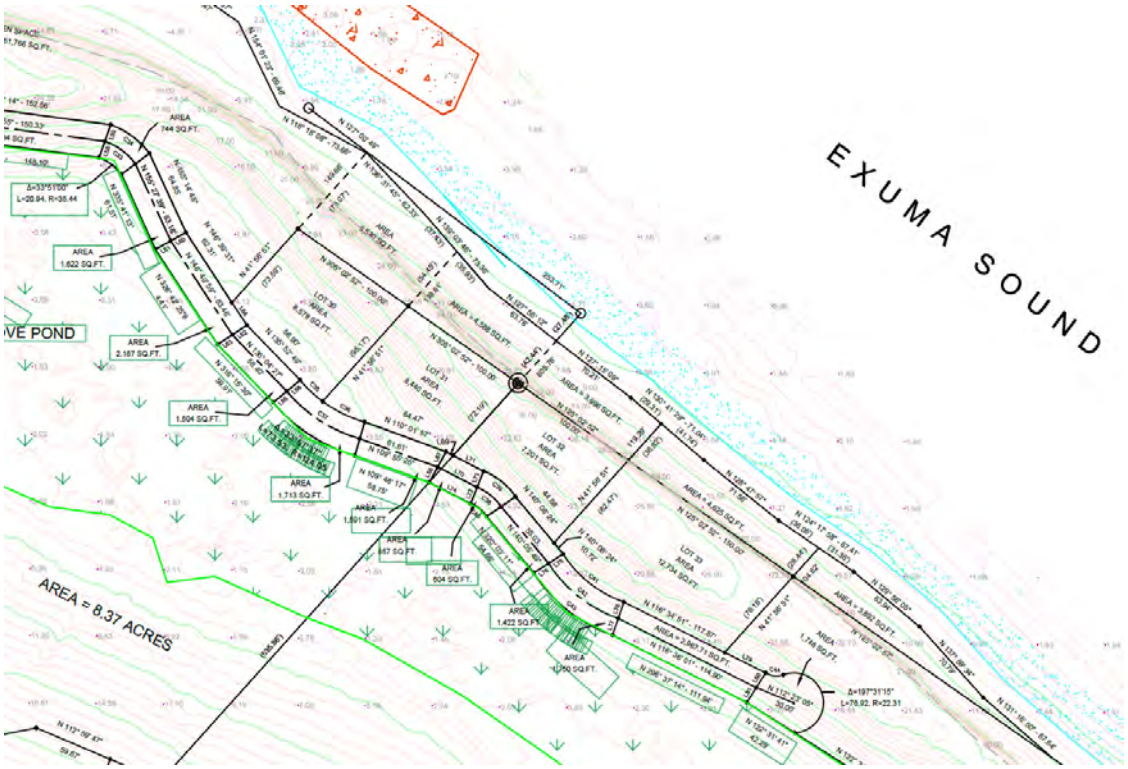


Figure 4-1 Lots 30-34 Correlating to 50 ft Dune Crest Setback

4.3 Transportation

Transportation to the Exuma Fund 2, Ltd is development is currently via the sea by public and/or private charter from the Georgetown Public Dock and/or Peace and Plenty Hotel. The vessel stops at the Kahari Resort dock within the lagoon.

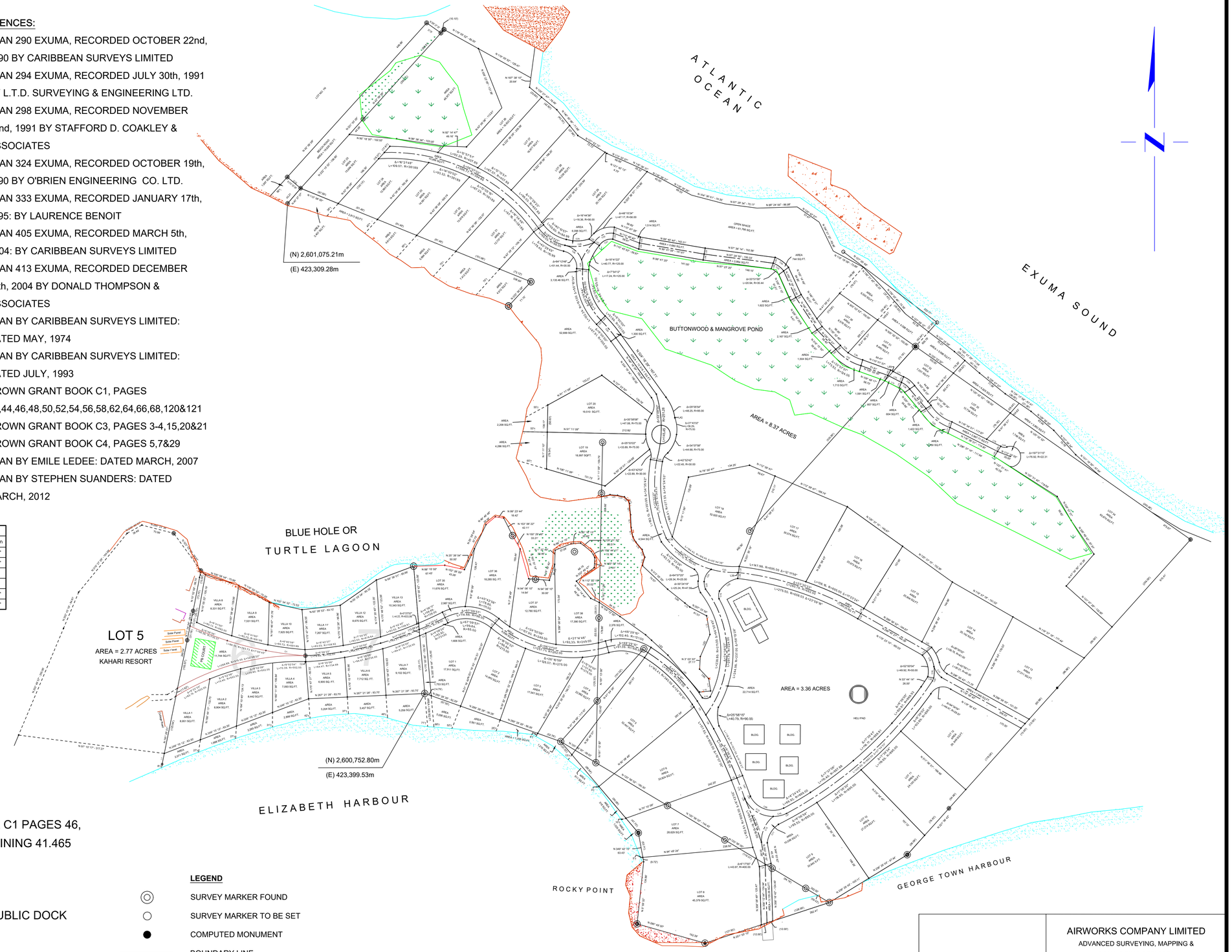
Figure 4-2 Access to Exuma Fund 2, Ltd is via a shallow navigational channel

Line Table			Line Table			Line Table		
Line #	Length	Direction	Line #	Length	Direction	Line #	Length	Direction
L1	23.74'	N 11° 26' 10"	L16	20.59'	N 319° 46' 28"	L31	13.00'	N 49° 57' 24"
L2	13.00'	N 152° 54' 39"	L17	13.27'	N 330° 32' 52"	L32	13.00'	N 49° 57' 24"
L3	13.00'	N 152° 54' 39"	L18	20.62'	N 349° 07' 06"	L33	24.06'	N 299° 56' 52"
L4	13.00'	N 40° 04' 47"	L19	27.40'	N 357° 27' 54"	L34	13.00'	N 210° 21' 37"
L5	13.00'	N 40° 04' 37"	L20	24.41'	N 354° 08' 34"	L35	13.00'	N 30° 21' 51"
L6	13.00'	N 74° 18' 38"	L21	6.45'	N 343° 12' 18"	L36	13.00'	N 186° 46' 22"
L7	13.00'	N 74° 18' 35"	L22	12.15'	N 312° 54' 47"	L37	13.00'	N 186° 46' 22"
L8	13.00'	N 67° 58' 33"	L23	15.28'	N 282° 23' 46"	L38	2.80'	N 92° 18' 55"
L9	13.00'	N 67° 58' 34"	L24	16.17'	N 274° 48' 06"	L39	0.39'	N 233° 51' 25"
L10	24.23'	N 84° 29' 21"	L25	18.94'	N 258° 19' 27"	L40	13.00'	N 99° 51' 38"
L11	26.96'	N 350° 57' 01"	L26	2.31'	N 336° 55' 12"	L41	13.00'	N 99° 51' 37"
L12	41.21'	N 350° 05' 14"	L27	1.18'	N 243° 34' 03"	L42	0.91'	N 165° 50' 25"
L13	13.41'	N 308° 40' 43"	L28	0.64'	N 336° 55' 01"	L43	13.00'	N 225° 16' 34"
L14	18.87'	N 16° 40' 06"	L29	6.82'	N 22° 52' 22"	L44	13.00'	N 225° 16' 34"
L15	17.69'	N 340° 39' 14"	L30	13.00'	N 281° 57' 28"	L45	13.00'	N 275° 26' 29"
Line Table			Line Table			Line Table		
Line #	Length	Direction	Line #	Length	Direction	Line #	Length	Direction
L46	13.00'	N 275° 26' 29"	L61	13.00'	N 240° 54' 06"	L76	13.00'	N 237° 23' 11"
L47	13.00'	N 54° 13' 35"	L62	13.00'	N 236° 42' 25"	L77	13.00'	N 19° 17' 13"
L48	13.00'	N 54° 13' 32"	L63	13.00'	N 236° 42' 25"	L78	13.00'	N 19° 17' 13"
L49	18.83'	N 42° 06' 06"	L64	20.20'	N 146° 39' 31"	L79	34.03'	N 116° 34' 52"
L50	13.00'	N 122° 16' 34"	L65	13.00'	N 50° 00' 42"	L80	13.00'	N 32° 23' 05"
L51	13.00'	N 122° 16' 34"	L66	13.00'	N 50° 00' 44"	L81	13.00'	N 32° 23' 05"
L52	13.00'	N 187° 16' 34"	L67	13.00'	N 208° 41' 24"			
L53	13.00'	N 187° 16' 34"	L68	13.00'	N 208° 41' 24"			
L54	13.00'	N 7° 01' 08"	L69	6.05'	N 297° 28' 17"			
L55	13.00'	N 7° 01' 08"	L70	33.07'	N 117° 21' 23"			
L56	13.00'	N 189° 41' 25"	L71	25.39'	N 297° 28' 17"			
L57	13.00'	N 189° 41' 25"	L72	13.00'	N 201° 33' 00"			
L58	13.00'	N 199° 36' 50"	L73	13.00'	N 201° 33' 00"			
L59	13.00'	N 199° 36' 49"	L74	34.68'	N 117° 15' 07"			
L60	13.00'	N 240° 54' 06"	L75	13.00'	N 237° 23' 11"			

Curve Table					Curve Table					Curve Table				
Curve #	Length	Radius	Delta	Chord Direction	Curve #	Length	Radius	Delta	Chord Direction	Curve #	Length	Radius	Delta	Chord Direction
C1	86.13	705.08	006.9992	N 97° 24' 20"	C22	16.79	34.56	027.8248	N 169° 42' 37"	C42	67.29	101.20	038.0994	N 128° 20' 12"
C2	1.36	502.00	000.1550	N 88° 46' 56"	C23	56.71	182.00	017.8524	N 96° 47' 04"	C43	75.94	114.20	038.0994	N 128° 20' 12"
C3	14.10	731.00	001.1055	N 67° 36' 13"	C24	49.95	318.00	009.0000	N 319° 46' 34"	C44	13.71	15.00	052.3531	N 96° 12' 29"
C4	29.07	249.00	006.6886	N 126° 43' 57"	C25	20.37	47.99	024.3209	N 353° 07' 10"	C45	29.00	68.00	024.4340	N 77° 39' 26"
C5	15.60	249.00	003.5889	N 75° 30' 46"	C26	49.87	47.99	059.5319	N 311° 11' 35"	C46	84.28	55.00	087.7942	N 109° 20' 14"
C6	80.39	95.00	048.4861	N 277° 57' 41"	C27	47.06	110.00	024.5144	N 215° 50' 46"	C47	47.36	1031.00	002.6319	N 339° 17' 30"
C7	6.77	340.00	001.1402	N 327° 16' 45"	C28	64.72	98.00	037.8367	N 84° 09' 03"					
C8	34.51	1018.00	001.9422	N 330° 23' 55"	C29	50.10	85.00	033.7697	N 89° 08' 29"					
C9	35.07	1018.00	001.9736	N 328° 21' 58"	C30	6.65	407.89	000.9338	N 323° 45' 30"					
C10	18.14	14.45	071.9232	N 83° 04' 51"	C31	34.00	30.23	064.4415	N 244° 48' 34"					
C11	48.09	54.96	050.1364	N 211° 18' 34"	C32	48.78	43.00	065.0000	N 244° 46' 34"					
C12	63.43	68.00	053.4450	N 204° 38' 53"	C33	28.62	48.44	033.8500	N 306° 32' 19"					
C13	75.20	68.00	063.3603	N 121° 33' 15"	C34	36.30	61.44	033.8500	N 306° 32' 19"					
C15	46.76	1018.00	002.6319	N 339° 17' 30"	C35	23.04	98.05	013.4606	N 133° 16' 53"					
C16	24.94	68.00	021.0140	N 1° 27' 03"	C36	35.08	98.05	020.4997	N 116° 18' 05"					
C17	28.82	53.45	030.8908	N 145° 23' 37"	C37	65.82	111.05	033.9603	N 123° 01' 54"					
C18	36.78	68.00	030.9872	N 335° 27' 01"	C38	23.21	38.88	034.2044	N 308° 39' 08"					
C19	16.83	25.00	038.5661	N 183° 01' 22"	C39	30.97	51.88	034.2044	N 308° 39' 08"					
C20	49.42	62.00	045.6675	N 235° 15' 56"	C40	15.45	25.88	034.2044	N 308° 39' 08"					
C21	31.67	34.56	052.5058	N 209° 52' 33"	C41	58.65	88.20	038.0994	N 128° 20' 12"					

REFERENCES:

1. PLAN 290 EXUMA, RECORDED OCTOBER 22nd, 1990 BY CARIBBEAN SURVEYS LIMITED
2. PLAN 294 EXUMA, RECORDED JULY 30th, 1991 BY L.T.D. SURVEYING & ENGINEERING LTD.
3. PLAN 298 EXUMA, RECORDED NOVEMBER 22nd, 1991 BY STAFFORD D. COAKLEY & ASSOCIATES
4. PLAN 324 EXUMA, RECORDED OCTOBER 19th, 1990 BY O'BRIEN ENGINEERING CO. LTD.
5. PLAN 333 EXUMA, RECORDED JANUARY 17th, 1995: BY LAURENCE BENOIT
6. PLAN 405 EXUMA, RECORDED MARCH 5th, 2004: BY CARIBBEAN SURVEYS LIMITED
7. PLAN 413 EXUMA, RECORDED DECEMBER 10th, 2004 BY DONALD THOMPSON & ASSOCIATES
8. PLAN BY CARIBBEAN SURVEYS LIMITED: DATED MAY, 1974
9. PLAN BY CARIBBEAN SURVEYS LIMITED: DATED JULY, 1993
10. CROWN GRANT BOOK C1, PAGES 24,44,46,48,50,52,54,56,58,62,64,66,68,120&121
11. CROWN GRANT BOOK C3, PAGES 3-4,15,20&21
12. CROWN GRANT BOOK C4, PAGES 5,7&29
13. PLAN BY EMILE LEDEE: DATED MARCH, 2007
14. PLAN BY STEPHEN SUANDERS: DATED MARCH, 2012



SURVEY PLAN

SHOWING

ELIZABETH HARBOUR SUBDIVISION BEING CROWN GRANTS BOOK C1 PAGES 46, 50 , 120 & 121, BOOK C3 PAGE 20 & BOOK C4 PAGES 5 & 7 CONTAINING 41.465 ACRES & THE SURROUNDING AREA

SITUATE

AT "STOCKING ISLAND"

APPROXIMATELY 1.7 MILES NORTHWEST OF GEORGE TOWN PUBLIC DOCK

EXUMA - THE BAHAMAS

PREPARED AT THE INSTANCE OF HARBAUGH DEVELOPERS

DATE: APRIL 22ND, 2025

100ft. 0ft. 100ft. 200ft. 300ft. 400ft. 500ft.

SCALE: 1 inch = 100 feet

LEGEND

- SURVEY MARKER FOUND
- SURVEY MARKER TO BE SET
- COMPUTED MONUMENT
- BOUNDARY LINE
- HIGH WATER LINE
- SANDY BEACH
- ROCKY SHORELINE
- MANGROVE
- PICKLE BALL COURT

NOTES:

GRID CONNECTION WAS MADE TO

CS. EX16 & EX17

CT. SCALE FACTOR = 0.999676

C:\Users\wholland\Downloads\Airworks Logo (1).png

AIRWORKS COMPANY LIMITED
ADVANCED SURVEYING, MAPPING & CONSULTING SERVICES

#74 FIRE TRAIL ROAD WEST, NASSAU, BAHAMAS

CELL (242) 376-1275
EMAIL: bahamageomatics@hotmail.com

Plan by : EMILE J. LEDEE

SURVEY COMPLETION DATE: MAY 6TH, 2025

5 Alternatives

Alternatives were reviewed for the placement and construction of the windward home sites. Considerations for the environment are apparent on the Master Plan with wetland areas being largely preserved. The preferred alternative has an increased setback from the dune crest to fifty (50) ft. Situated behind the dune, the homes do not interfere with the low-lying buttonwood formation and preserve this wetland feature. Home lots range from ½ acre to 1 acre.

With regards to the RO/RO location, alternative locations within the lagoon area were reviewed and dismissed due to the limitation of access by a large barge. The Contractor notes that project construction and materials require a 192 ft. barge with access only available at this location to offload goods. Initial RORO designs were amended to include a breakwater to protect the ironshore; the most recent RORO, April 2025, design is included within this EIA.

5.1 No Action Alternative

The “no action alternative” pertains to the site-specific environmental impacts if no activity relative to the proposed project occurs. The site would remain as is, undeveloped, and would continue to be influenced by natural environmental processes.

6 Physical and Biological Baseline

6.1 General Climate of The Bahamas

The climate of The Bahamas is considered sub-tropical; it lies in a transition zone between the temperate and tropical zone. The archipelago spans 450 miles in longitudinal extent from 21°N to 27.5°N. The northern Bahamas experiences cooler winters and higher amounts of rainfall compared to the southern Bahamas, where annual temperatures deviate less, and the climate is markedly drier. The climate of The Bahamas is influenced by the sea, particularly, the Gulf Stream, which lies between Florida and the Great Bahama Bank.[5]

Table 6-1 Average High and Low Air Temperature for Nassau (in degrees Fahrenheit)

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

New Providence can expect 57.1 inches of rain and 137 rain days[6]. Rainfall is highest between the months of May and November, with peaks during June and October. Generally, prevailing winds are from the northeast, with a rotation to the southeast during the summer months, May to September. In winter, wind may shift to the northwest due to cold fronts emanating from North America. According to The Bahamas Department of Meteorology, the average wind speed is 8 knots.

6.2 Geology

The Bahamas archipelago exists on a partially exposed carbonate platform between the Atlantic Ocean and the North American Plate. The platform surface geology is composed mostly of oolitic limestones. Pleistocene limestones, Holocene sands and marshland sediments extend to a depth of more than 4 miles below the surface. Fourteen marine banks make up the surface plateaus, the largest being the Great Bahama Bank, followed by the Little Bahama Bank. New Providence forms part of the Great Bahama Bank.

Carbonate geology is highly porous and subject to atmospheric erosion, leading to the formation of karst solution systems, including vast networks of subterranean caverns and blue holes. Rainfall and surface discharges quickly infiltrate the permeable limestone. Most surface runoff drains into the porous ground or brackish tidal creeks; The Bahamas has no freshwater rivers. In general, the landscape of The Bahamas is flat, with undulating ridges averaging 30 to 45 m (meters) in height. Cat Island has the highest point of elevation, 206 ft, at Mount Alvernia. Given these physical properties, The Bahamas is subject to storm surge and wave action during tropical cyclone events.

No subterranean karst formations were observed.

5 Sealey, Neil E. Bahamian Landscapes. 3rd Edition. 2006
6 Ibid.

6.3 Topography

The most prominent topographical feature of the property is the eastern facing dune which rises to a crest of 20+ft. above the sea. Relatively narrow in width, the leeward side of the dune vegetated by *Cocothrinax argentata,* precipitously declines until it reaches the silver buttonwood dominated wetland area. An interior limestone ridge formation along a north/south axis separates the buttonwood dominated depression from the tidal creek. Of note, the interior ridge formation has a distinct area of exposed natural limestone rock with no substrate for vegetation to take root.

Figure 6-1 Drone aerial facing northwest across the tidal creek and open flood plain

Figure 6-2 Drone aerial facing southwest showcasing the frontal dune in the foreground and the interior limestone ridge with exposed rock

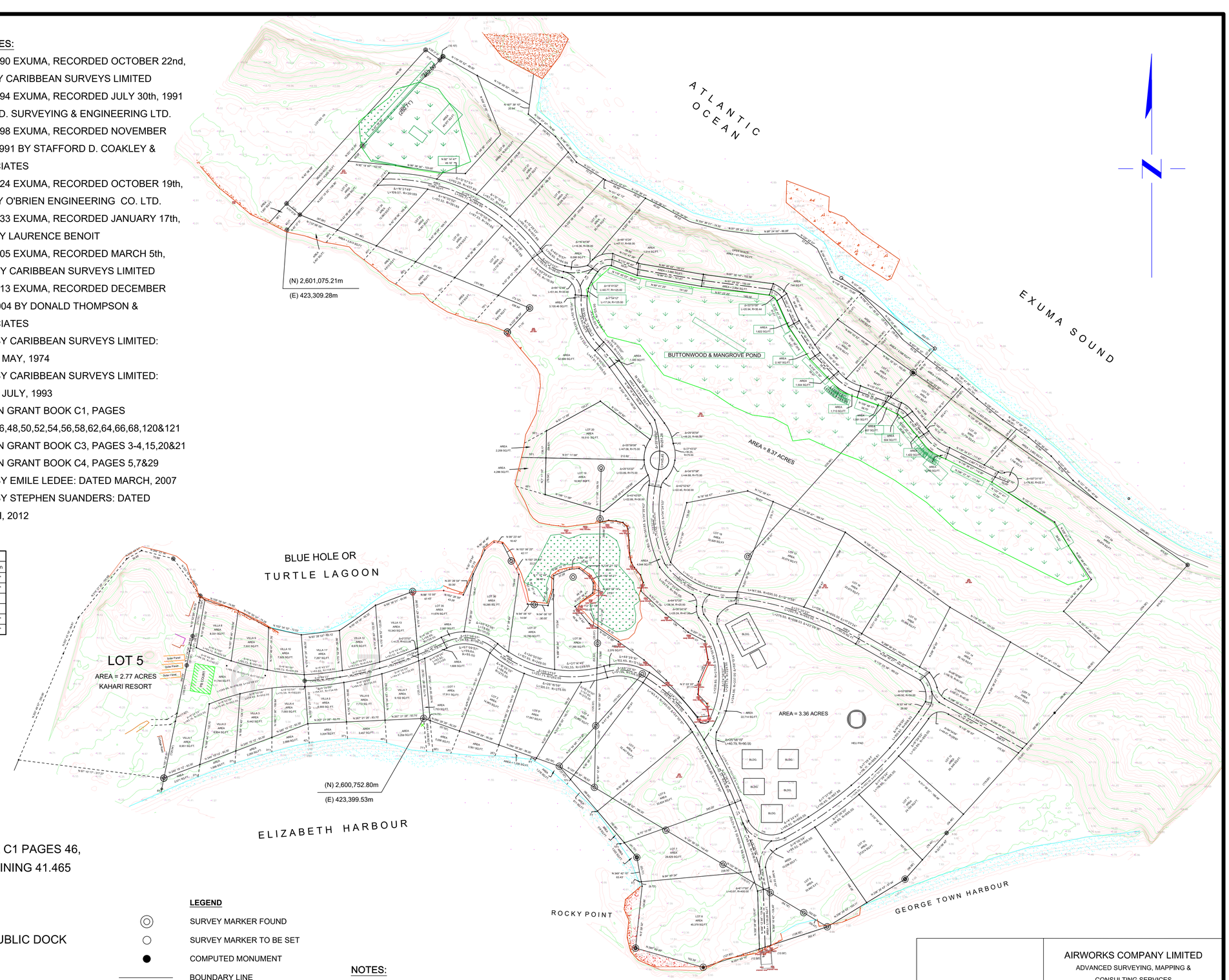
See next page for topographic survey.

Line Table			Line Table			Line Table		
Line #	Length	Direction	Line #	Length	Direction	Line #	Length	Direction
L1	23.74'	N 11° 26' 10"	L16	20.59'	N 319° 46' 28"	L31	13.00'	N 49° 57' 24"
L2	13.00'	N 152° 54' 39"	L17	13.27'	N 330° 32' 52"	L32	13.00'	N 49° 57' 24"
L3	13.00'	N 152° 54' 39"	L18	20.62'	N 349° 07' 06"	L33	24.06'	N 299° 56' 52"
L4	13.00'	N 40° 04' 47"	L19	27.40'	N 357° 27' 54"	L34	13.00'	N 210° 21' 37"
L5	13.00'	N 40° 04' 37"	L20	24.41'	N 354° 08' 34"	L35	13.00'	N 30° 21' 51"
L6	13.00'	N 74° 18' 38"	L21	6.45'	N 343° 12' 18"	L36	13.00'	N 186° 46' 22"
L7	13.00'	N 74° 18' 35"	L22	12.15'	N 312° 54' 47"	L37	13.00'	N 186° 46' 22"
L8	13.00'	N 67° 58' 33"	L23	15.28'	N 282° 23' 46"	L38	2.80'	N 92° 18' 55"
L9	13.00'	N 67° 58' 34"	L24	16.17'	N 274° 48' 06"	L39	0.39'	N 233° 51' 25"
L10	24.23'	N 84° 29' 21"	L25	18.94'	N 258° 19' 27"	L40	13.00'	N 99° 51' 38"
L11	26.96'	N 350° 57' 01"	L26	2.31'	N 336° 55' 12"	L41	13.00'	N 99° 51' 37"
L12	41.21'	N 350° 05' 14"	L27	1.18'	N 243° 34' 03"	L42	0.91'	N 165° 50' 25"
L13	13.41'	N 308° 40' 43"	L28	0.64'	N 336° 55' 01"	L43	13.00'	N 225° 16' 34"
L14	18.87'	N 16° 40' 06"	L29	6.82'	N 22° 52' 22"	L44	13.00'	N 225° 16' 34"
L15	17.69'	N 340° 39' 14"	L30	13.00'	N 281° 57' 28"	L45	13.00'	N 275° 26' 29"
Line Table			Line Table			Line Table		
Line #	Length	Direction	Line #	Length	Direction	Line #	Length	Direction
L46	13.00'	N 275° 26' 29"	L61	13.00'	N 240° 54' 06"	L76	13.00'	N 237° 23' 11"
L47	13.00'	N 54° 13' 35"	L62	13.00'	N 236° 42' 25"	L77	13.00'	N 19° 17' 13"
L48	13.00'	N 54° 13' 32"	L63	13.00'	N 236° 42' 25"	L78	13.00'	N 19° 17' 13"
L49	18.83'	N 42° 06' 06"	L64	20.20'	N 146° 39' 31"	L79	34.03'	N 116° 34' 52"
L50	13.00'	N 122° 16' 34"	L65	13.00'	N 50° 00' 42"	L80	13.00'	N 32° 23' 05"
L51	13.00'	N 122° 16' 34"	L66	13.00'	N 50° 00' 44"	L81	13.00'	N 32° 23' 05"
L52	13.00'	N 187° 16' 34"	L67	13.00'	N 208° 41' 24"			
L53	13.00'	N 187° 16' 34"	L68	13.00'	N 208° 41' 24"			
L54	13.00'	N 7° 01' 08"	L69	6.05'	N 297° 28' 17"			
L55	13.00'	N 7° 01' 08"	L70	33.07'	N 117° 21' 23"			
L56	13.00'	N 189° 41' 25"	L71	25.39'	N 297° 28' 17"			
L57	13.00'	N 189° 41' 25"	L72	13.00'	N 201° 33' 00"			
L58	13.00'	N 199° 36' 50"	L73	13.00'	N 201° 33' 00"			
L59	13.00'	N 199° 36' 49"	L74	34.68'	N 117° 15' 07"			
L60	13.00'	N 240° 54' 06"	L75	13.00'	N 237° 23' 11"			

Curve Table					Curve Table					Curve Table				
Curve #	Length	Radius	Delta	Chord Direction	Curve #	Length	Radius	Delta	Chord Direction	Curve #	Length	Radius	Delta	Chord Direction
C1	86.13	705.08	006.9992	N 97° 24' 20"	C22	16.79	34.56	027.8248	N 169° 42' 37"	C42	67.29	101.20	038.0994	N 128° 20' 12"
C2	1.36	502.00	000.1550	N 88° 46' 56"	C23	56.71	182.00	017.8524	N 96° 47' 04"	C43	75.94	114.20	038.0994	N 128° 20' 12"
C3	14.10	731.00	001.1055	N 67° 36' 13"	C24	49.95	318.00	009.0000	N 319° 46' 34"	C44	13.71	15.00	052.3531	N 96° 12' 29"
C4	29.07	249.00	006.6886	N 126° 43' 57"	C25	20.37	47.99	024.3209	N 353° 07' 10"	C45	29.00	68.00	024.4340	N 77° 39' 26"
C5	15.60	249.00	003.5889	N 75° 30' 46"	C26	49.87	47.99	059.5319	N 311° 11' 35"	C46	84.28	55.00	087.7942	N 109° 20' 14"
C6	80.39	95.00	048.4861	N 277° 57' 41"	C27	47.06	110.00	024.5144	N 215° 50' 46"	C47	47.36	1031.00	002.6319	N 339° 17' 30"
C7	6.77	340.00	001.1402	N 327° 16' 45"	C28	64.72	98.00	037.8367	N 84° 09' 03"					
C8	34.51	1018.00	001.9422	N 330° 23' 55"	C29	50.10	85.00	033.7697	N 89° 08' 29"					
C9	35.07	1018.00	001.9736	N 328° 21' 58"	C30	6.65	407.89	000.9338	N 323° 45' 30"					
C10	18.14	14.45	071.9232	N 83° 04' 51"	C31	34.00	30.23	064.4415	N 244° 46' 34"					
C11	48.09	54.96	050.1364	N 211° 18' 34"	C32	48.78	43.00	065.0000	N 244° 46' 34"					
C12	63.43	68.00	053.4450	N 204° 38' 53"	C33	28.62	48.44	033.8500	N 306° 32' 19"					
C13	75.20	68.00	063.3603	N 121° 33' 15"	C34	36.30	61.44	033.8500	N 306° 32' 19"					
C15	46.76	1018.00	002.6319	N 339° 17' 30"	C35	23.04	98.05	013.4606	N 133° 16' 53"					
C16	24.94	68.00	021.0140	N 1° 27' 03"	C36	35.08	98.05	020.4997	N 116° 18' 05"					
C17	28.82	53.45	030.8908	N 145° 23' 37"	C37	65.82	111.05	033.9603	N 123° 01' 54"					
C18	36.78	68.00	030.9572	N 335° 27' 01"	C38	23.21	38.88	034.2044	N 308° 39' 08"					
C19	16.83	25.00	038.5661	N 183° 01' 22"	C39	30.97	51.88	034.2044	N 308° 39' 08"					
C20	49.42	62.00	045.6675	N 235° 15' 56"	C40	15.45	25.88	034.2044	N 308° 39' 08"					
C21	31.67	34.56	052.5058	N 209° 52' 33"	C41	58.65	88.20	038.0994	N 128° 20' 12"					

REFERENCES:

1. PLAN 290 EXUMA, RECORDED OCTOBER 22nd, 1990 BY CARIBBEAN SURVEYS LIMITED
2. PLAN 294 EXUMA, RECORDED JULY 30th, 1991 BY L.T.D. SURVEYING & ENGINEERING LTD.
3. PLAN 298 EXUMA, RECORDED NOVEMBER 22nd, 1991 BY STAFFORD D. COAKLEY & ASSOCIATES
4. PLAN 324 EXUMA, RECORDED OCTOBER 19th, 1990 BY O'BRIEN ENGINEERING CO. LTD.
5. PLAN 333 EXUMA, RECORDED JANUARY 17th, 1995: BY LAURENCE BENOIT
6. PLAN 405 EXUMA, RECORDED MARCH 5th, 2004: BY CARIBBEAN SURVEYS LIMITED
7. PLAN 413 EXUMA, RECORDED DECEMBER 10th, 2004 BY DONALD THOMPSON & ASSOCIATES
8. PLAN BY CARIBBEAN SURVEYS LIMITED: DATED MAY, 1974
9. PLAN BY CARIBBEAN SURVEYS LIMITED: DATED JULY, 1993
10. CROWN GRANT BOOK C1, PAGES 24,44,46,48,50,52,54,56,58,62,64,66,68,120&121
11. CROWN GRANT BOOK C3, PAGES 3-4,15,20&21
12. CROWN GRANT BOOK C4, PAGES 5,7&29
13. PLAN BY EMILE LEDEE: DATED MARCH, 2007
14. PLAN BY STEPHEN SUANDERS: DATED MARCH, 2012



SURVEY PLAN

SHOWING

ELIZABETH HARBOUR SUBDIVISION BEING CROWN GRANTS BOOK C1 PAGES 46, 50 , 120 & 121, BOOK C3 PAGE 20 & BOOK C4 PAGES 5 & 7 CONTAINING 41.465 ACRES & THE SURROUNDING AREA

SITUATE

AT "STOCKING ISLAND"

APPROXIMATELY 1.7 MILES NORTHWEST OF GEORGE TOWN PUBLIC DOCK

EXUMA - THE BAHAMAS

PREPARED AT THE INSTANCE OF HARBAUGH DEVELOPERS

DATE: APRIL 22ND, 2025

100ft. 0ft. 100ft. 200ft. 300ft. 400ft. 500ft.

SCALE: 1 inch = 100 feet

LEGEND

- SURVEY MARKER FOUND
- SURVEY MARKER TO BE SET
- COMPUTED MONUMENT
- BOUNDARY LINE
- HIGH WATER LINE
- SANDY BEACH
- ROCKY SHORELINE
- MANGROVE
- PICKLE BALL COURT

NOTES:

GRID CONNECTION WAS MADE TO

CS. EX16 & EX17

CT. SCALE FACTOR = 0.999676

CONTOUR INTERVALS = 1 FOOT

ELEVATIONS REFERENCE TO MEAN SEA LEVEL

C:\Users\aholland\Downloads\Airworks Logo（1）.png

AIRWORKS COMPANY LIMITED
ADVANCED SURVEYING, MAPPING & CONSULTING SERVICES

#74 FIRE TRAIL ROAD WEST, NASSAU, BAHAMAS

CELL （242） 376-1275
EMAIL: bahamageomatics@hotmail.com

Plan by : EMILE J. LEDEE

SURVEY COMPLETION DATE: MAY 6TH, 2025

6.4 Soil Profile

The soil profile of Stocking Island varies depending on the location. Coastal areas are dominated by fine sand whereas inland areas are a mix of loamy and sandy substrates which transitions to a layer of rich hummus over limestone rock in the DBEF.

Figure 6-3 Soil and terrain comprising a mix of sands, a rich humus layer, or a blend of the two or iron shore rock.

6.5 Hydrological and Hydrogeological Resources

In The Bahamas, groundwater comprises the fresh, brackish, saline and hypersaline waters found in the near and deep subsurface and in the lakes and ponds that intercept the surface. The Bahamas has no fresh surface water and therefore, no freshwater lakes, rivers, or creeks. There are no known freshwater resources on the project site for Exuma Fund 2, Ltd.

Freshwater resources in The Bahamas originate from rainfall only and accumulate in Ghyben-Hertzberg lenses. The Ghyben-Hertzberg lens consists of three lateral zones: 1) freshwater where chloride ranges from 90 to 400 parts per million (ppm); 2) a transition zone (brackish), approximately 1 to 2 m thick where chlorides increase rapidly from 400 to 1200 ppm; and 3) a saline zone where chlorides rise above 1,200 ppm. Freshwater is less dense than salt water, thus sits above the saline zone, separated by a brief mixing layer of brackish water.

On average, the freshwater lens occurs at a depth of 2 to 5ft below the surface. Ninety percent of freshwater lens resources in The Bahamas are within 5 ft of the surface. Given the proximity of fresh water to the surface and the high porosity of limestone, over-extraction and pollution may lead to depletion, saltwater intrusion, and/or contamination, impairing the fragile layer of freshwater over salt. Threats to groundwater resources include the following.

- **Saltwater Intrusion**. Saltwater intrusion to groundwater may occur due to 1) storm surge generated by tropical disturbances; 2) sea level rise due to climate change; and 3) over-pumping/extraction of freshwater aquifers.
- **Development/Building Features.** Canals and marinas have the potential to disturb subsurface freshwater lens by allowing the sea to connect at the inland surface.
- **Climate Change.** Based on the United Nations Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report and the Coupled Model Intercomparison Project 5 (CMIP5), climate change will alter existing rainfall patterns in The Bahamas. Climatology data suggest that The Bahamas region will incur a 3 percent decrease in monthly rainfall averages, with an increase of intensity of rainfall events between October and February. Overall, total rainfall is expected to decrease, placing additional pressure on freshwater resources.
- **Contamination.** Groundwater is susceptible to contamination from untreated sewage, industrial wastes, and leaking fuels; this vulnerability is particularly true for New Providence. New Providence is the most populated island and has the highest population density.

6.5.1 *Groundwater Resources – Exuma*

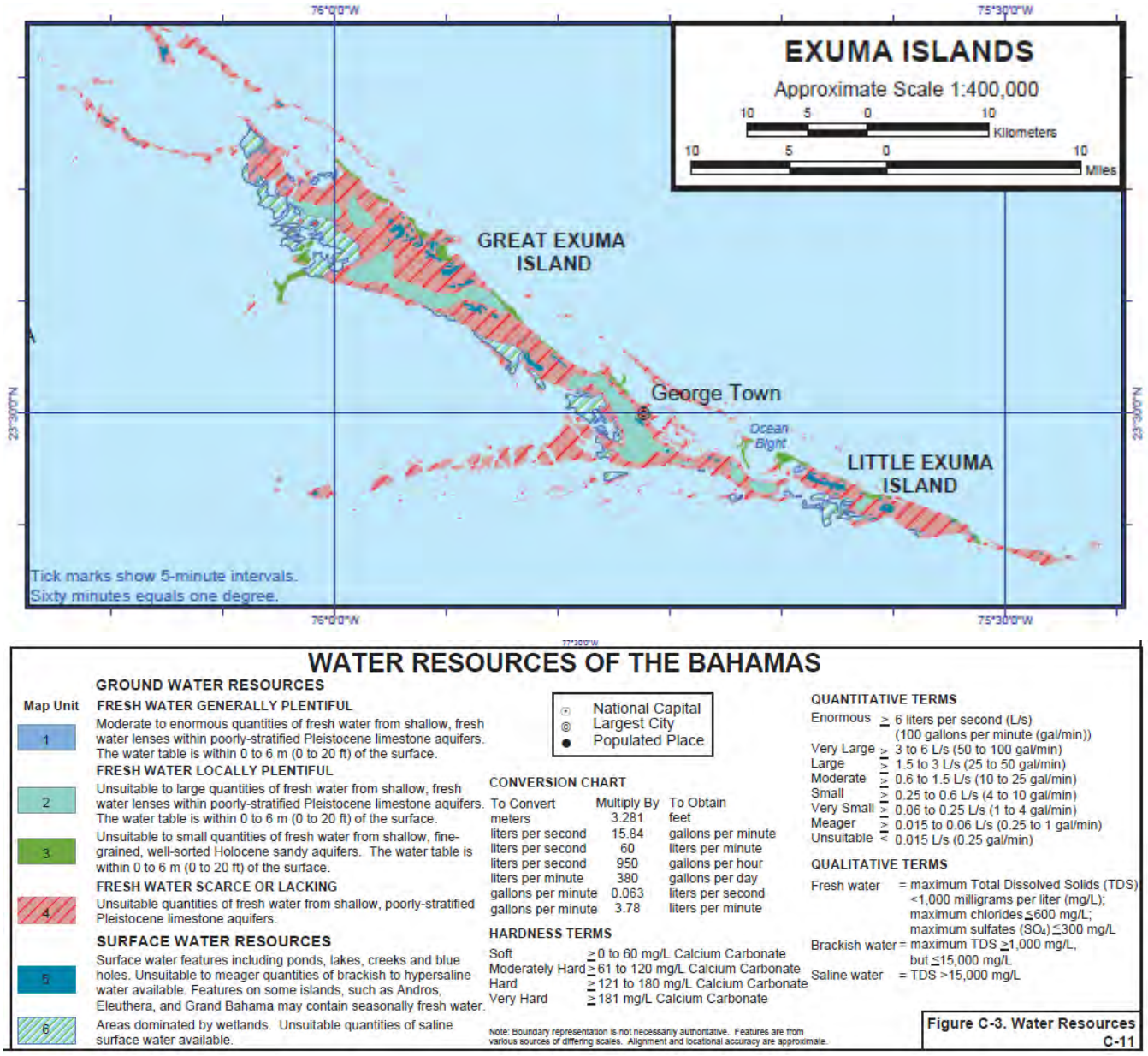


Figure 6-4 USACE Water Resources of The Bahamas, Exuma

6.6 General Coastal Profile

The windward coast boasts a sandy beach seaward of a high relief frontal dune that is vegetated with infrequent individuals of Casuarina sp. A coastal lagoon abuts the property's northern perimeter which is exhibits a low relief sandy beach, mangrove wetland creek, and ironshore. The leeward coast (Elizabeth Harbour) supports two (2) crescent sandy beaches separated by a rounded ironshore point.

6.7 Coastal Resources – Bathymetric Surveys

Coastal data including a bathymetric survey were collected by Applied Technology & Management (ATM), a Geosyntec Company culminating in a bathymetric survey report dated April 4, 2024. Access to the project site is via a narrow and shallow navigational channel into a sheltered deep-water lagoon. While the interior lagoon reaches depths in excess of twelve (12) feet below mean lower low water (MLLW), the channel has merely two (2) feet at MLLW severely restricting access.

- Channel Maintenance Dredging. Proposed improvements to the channel include dredging to a navigational controlling depth of -6ft MLLW at a width of 40ft. With a side slope of 1:3, the channel width at the surface would be between 65 and 75 feet depending on the location. Total dredge quantity is approximately 8,400 cubic yards. All dredging activities will adhere best management practices to monitor and manage turbidity. Channel maintenance dredging may be performed prior to construction start and will be filed under a separate CEC.

- Marina Dredging. Marina dredging will yield approximately 300 cubic yards of material to be placed on beaches and elsewhere for elevation purposes. As the existing navigational channel will be dredged to -4ft MLLW and the marina has a maximum 50ft in length capacity, the type of vessels berthing at the marina will be limited to vessels able to safely ingress and egress the access channel and available berths. Please see next page.

- RORO Dredging. Extending southwest, the proposed RORO location necessitates dredging to -6ft MLLW to accommodate barges laden with construction materials. Dredge volume is estimated at 660 cubic yards. The RORO is located immediately to the south of the site. Please see associated schematic on next page.

Figure 6-5 RORO Location

STOCKING ISLAND
BATHYMETRIC SURVEY
APRIL 4, 2024

SURVEYOR'S NOTES

1. FIELD SURVEYS COMPLETED BY APPLIED TECHNOLOGY & MANAGEMENT ON MARCH 22, 2024.
2. HORIZONTAL GRID BASED ON THE UNIVERSAL TRANSVERSE MERCATOR (UTM) ZONE 18 NORTH, WGS84, IN INTERNATIONAL FEET CONVERTED TO UNIVERSAL TRANSVERSE MERCATOR (UTM) ZONE 18, NAD83, IN INTERNATIONAL FEET.
3. A TRIMBLE MARINE RTK ROVER GPS UNIT, UTILIZING FUGRO MARINESTAR DGPS SATELLITE POSITIONING SERVICE, WAS USED FOR SURVEY POSITIONING.
4. ELEVATIONS ARE IN FEET, REFERENCED TO MLLW; BASED ON A SHORT TERM TIDE STUDY ADJUSTED TO LONG TERM TIDAL DATUMS.
5. SOUNDINGS WERE MADE WITH AN ODOM HYDROTRAC SINGLE BEAM ECHOSOUNDER OPERATING AT 200 kHz AND HAVE BEEN CORRECTED FOR MEASURED TIDAL VARIATIONS. TIDE CORRECTED SOUNDINGS ARE SHOWN RELATIVE TO MLLW, IN FEET.
6. THIS SURVEY WAS PREPARED FOR THE EXCLUSIVE USE OF THE CLIENT(S) SHOWN HEREON.
7. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES INDICATED ABOVE AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS AT THAT TIME. THIS MAP NOT INTENDED FOR NAVIGATIONAL PURPOSES.
8. LANDS SHOWN HEREON WERE NOT ABSTRACTED FOR RIGHTS-OF WAY, EASEMENTS OF RECORD, ABANDONMENTS, ZONING SETBACKS, DEED RESTRICTIONS OR OWNERSHIP.

Stocking Island Sediment Probes		
3/20/2024		
#	Probe Depth (ft)	Notes
P1	4+	all sand, no rock
P2	4+	all sand, no rock
P3	4+	all sand, no rock
P4	4+	all sand, no rock
P5	4+	all sand, no rock
P6	4+	all sand, no rock
P7	6+	all sand, no rock
P8	6	sand over rock
P9	6	sand over rock
P10	7	all sand, no rock
P11	5.3	all sand, no rock
Additional Notes: Probes were done by hand, shoving a #3 rebar into the bottom, assisting with small sledge hammer on some probes		

ABBREVIATIONS

MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988
NTS = NOT TO SCALE
GPS = GLOBAL POSITIONING SYSTEM
RTK = REAL TIME KINEMATIC
kHz = KILOHERTZ
MLLW = MEAN LOWER LOW WATER
NGS = NATIONAL GEODETIC SURVEY
PID = PERMANENT IDENTIFICATION NUMBER
FDEP = FLORIDA DEPARTMENT OF ENVIRONMENTAL PROCTECTION
FDOT = FLORIDA DEPARTMENT OF TRANSPORTATION
FPRN = FLORIDA PERMANENT-REFERENCE STATION NETWORK

PROJECT LOCATION

INDEX OF SHEETS	
SHEET #	TITLE
1	Cover Sheet / Location Map
2	Probe Locations
3	Stocking Island Entrance Channel Bathymetric Points
4	Stocking Island Basin Bathymetric Points
5	Stocking Island Bathymetric Contours
6	Stocking Island Elevation Map
7	Barge Landing Bathymetric Points
8	Barge Landing Bathymetric Contours
9	Barge Landing Elevation Map

PREPARED BY:

ATM
A Geosyntec Company

APPLIED TECHNOLOGY & MANAGEMENT,
A GEOSYNTEC COMPANY
2056 Vista Parkway, Suite 125
West Palm Beach, FL. 33411
(321)-799-2332

N

0 150

Scale in Feet

NOTES:

1. FIELD SURVEY COMPLETED BY ATM DATED MARCH 22ND, 2024
2. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.
3. HORIZONTAL DATUM IS BASED ON UTM ZONE 18, CENTRAL MERIDIAN 75D W, NAD83 DATUM, IN INTL FT
4. AERIAL IMAGE SOURCE: BING MAPS

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
PROBE LOCATIONS

APRIL 4, 2024
SHEET 2

C:\Users\ethan.ross\OneDrive - Geosyntec\Desktop\Exuma Survey\Exuma Survey.dwg Probe 4/4/24

N

0 150

Scale in Feet

NOTES:

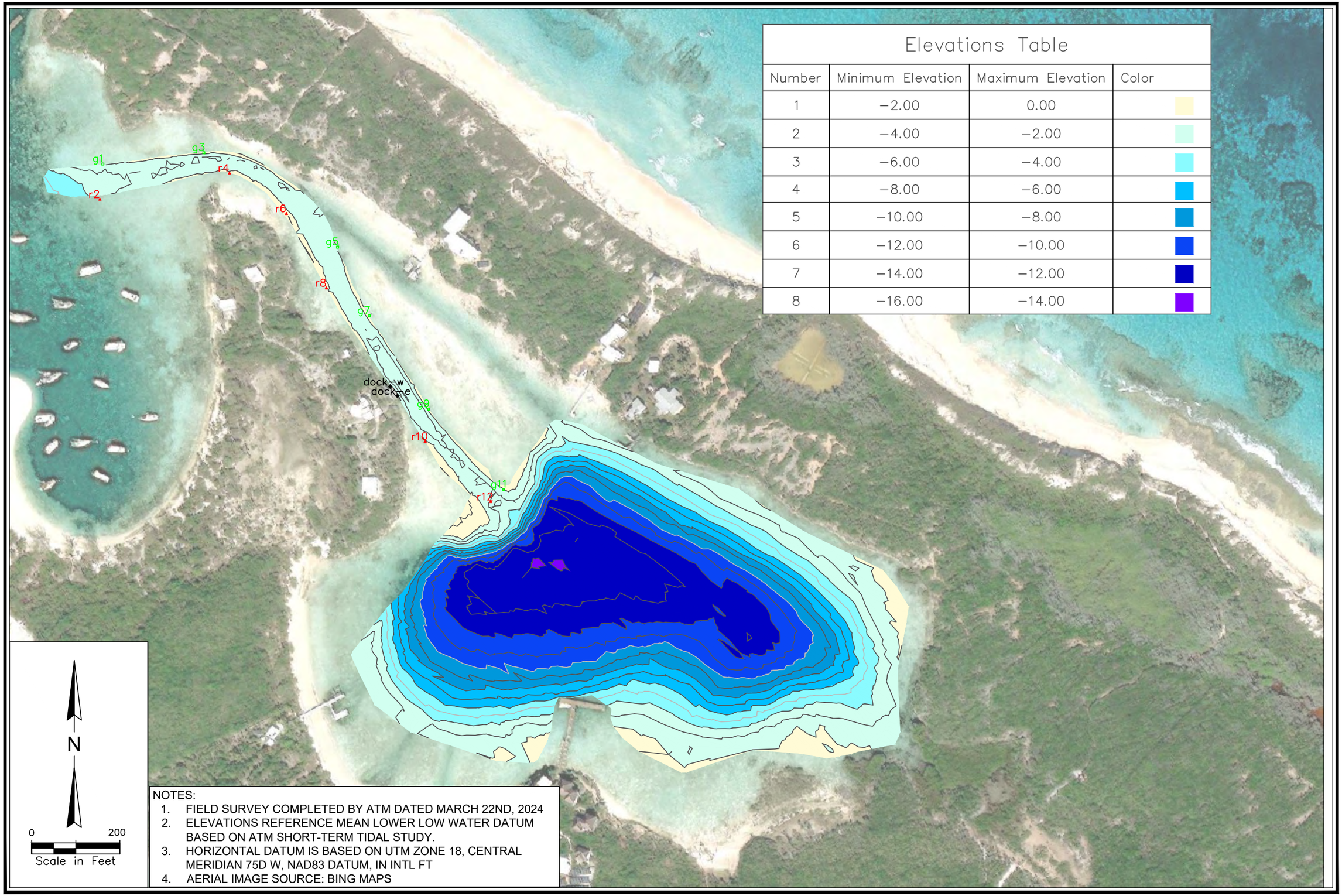
1. FIELD SURVEY COMPLETED BY ATM DATED MARCH 22ND, 2024
2. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.
3. HORIZONTAL DATUM IS BASED ON UTM ZONE 18, CENTRAL MERIDIAN 75D W, NAD83 DATUM, IN INTL FT
4. AERIAL IMAGE SOURCE: BING MAPS

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
BATHYMETRIC CONTOURS

APRIL 4, 2024
SHEET 5

C:\Users\ethan.ross\OneDrive - Geosyntec\Desktop\Exuma Survey\Exuma Survey.dwg SI Contours 4/4/24



Elevations Table

Number	Minimum Elevation	Maximum Elevation	Color
1	−2.00	0.00	
2	−4.00	−2.00	
3	−6.00	−4.00	
4	−8.00	−6.00	
5	−10.00	−8.00	
6	−12.00	−10.00	
7	−14.00	−12.00	
8	−16.00	−14.00	

N

0 200

Scale in Feet

NOTES:

1. FIELD SURVEY COMPLETED BY ATM DATED MARCH 22ND, 2024
2. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.
3. HORIZONTAL DATUM IS BASED ON UTM ZONE 18, CENTRAL MERIDIAN 75D W, NAD83 DATUM, IN INTL FT
4. AERIAL IMAGE SOURCE: BING MAPS

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
ELEVATION MAP

APRIL 4, 2024
SHEET 6

C:\Users\ethan.ross\OneDrive - Geosyntec\Desktop\Exuma Survey\Exuma Survey.dwg SI Elev 4/4/24

N

0 75

Scale in Feet

NOTES:

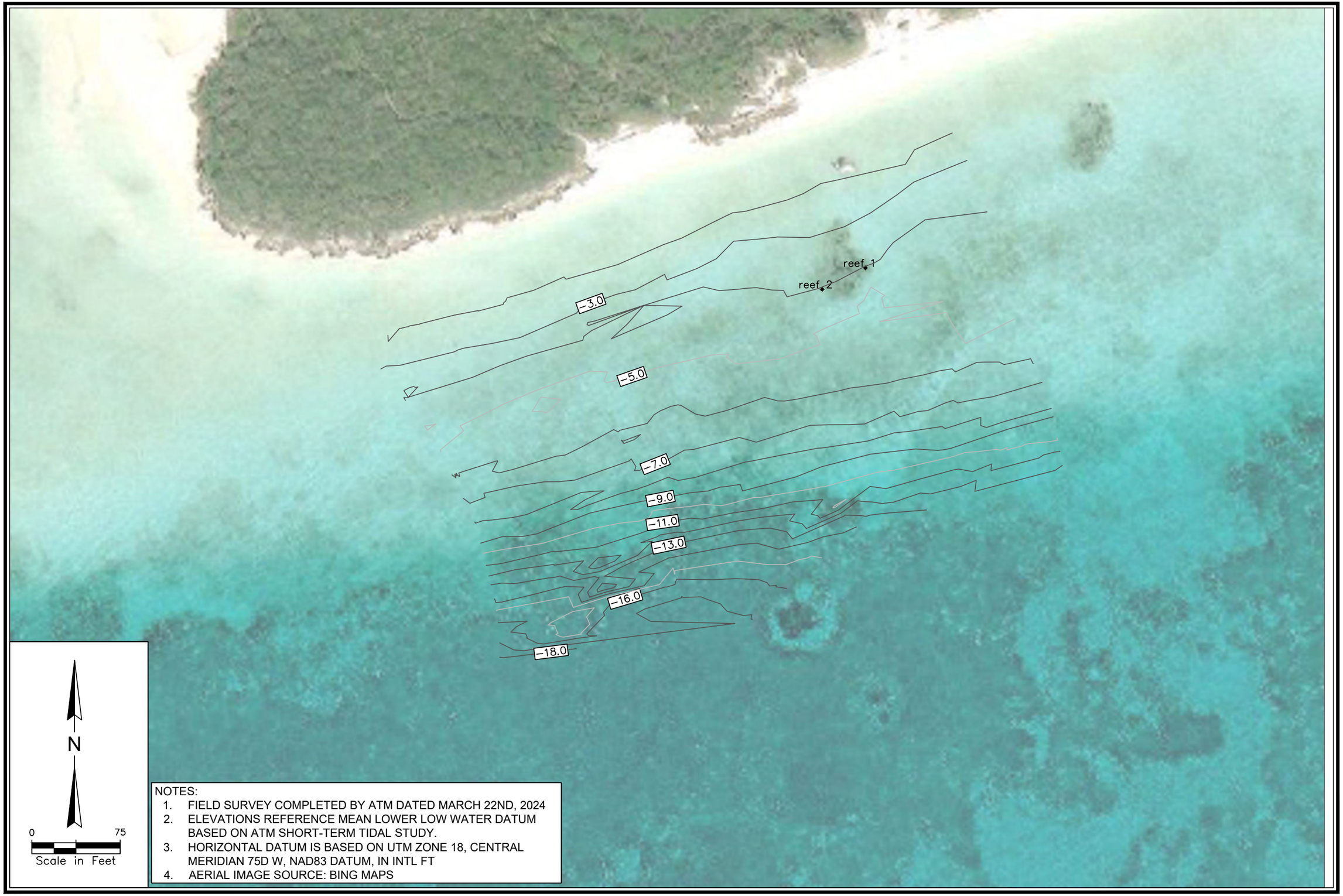
1. FIELD SURVEY COMPLETED BY ATM DATED MARCH 22ND, 2024
2. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.
3. HORIZONTAL DATUM IS BASED ON UTM ZONE 18, CENTRAL MERIDIAN 75D W, NAD83 DATUM, IN INTL FT
4. AERIAL IMAGE SOURCE: BING MAPS

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
BARGE LANDING BATHYMETRIC POINTS

APRIL 4, 2024
SHEET 7

C:\Users\ethan.ross\OneDrive - Geosyntec\Desktop\Exuma Survey\Exuma Survey.dwg SI Barge Points 4/4/24



NOTES:

1. FIELD SURVEY COMPLETED BY ATM DATED MARCH 22ND, 2024
2. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.
3. HORIZONTAL DATUM IS BASED ON UTM ZONE 18, CENTRAL MERIDIAN 75D W, NAD83 DATUM, IN INTL FT
4. AERIAL IMAGE SOURCE: BING MAPS

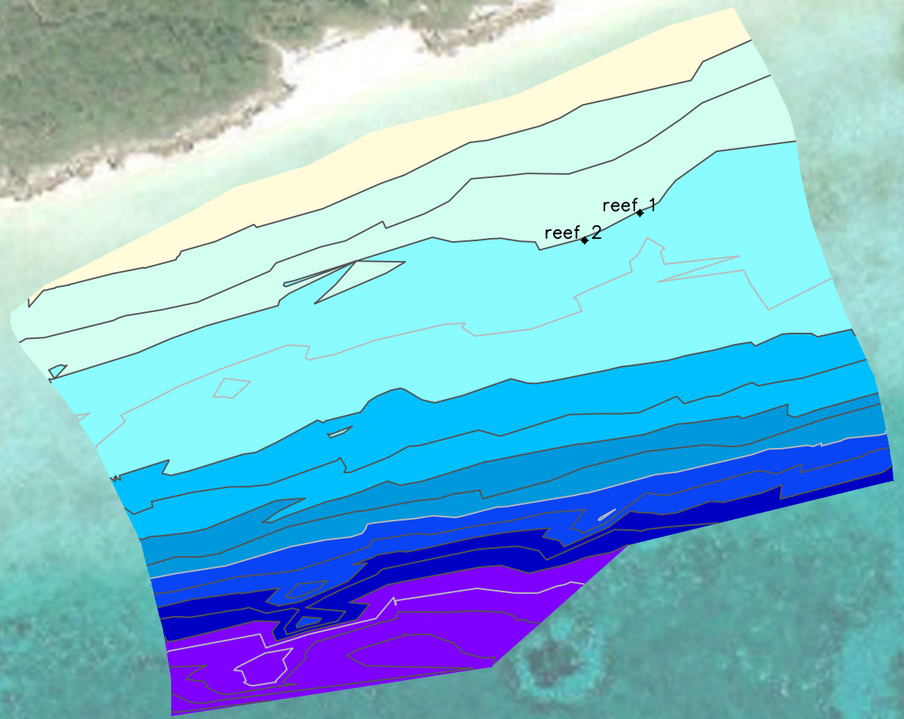
ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
BARGE LANDING BATHYMETRIC CONTOURS

APRIL 4, 2024
SHEET 8

C:\Users\ethan.ross\OneDrive - Geosyntec\Desktop\Exuma Survey\Exuma Survey.dwg SI Barge Contours 4/4/24

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	−2.00	0.00	
2	−4.00	−2.00	
3	−6.00	−4.00	
4	−8.00	−6.00	
5	−10.00	−8.00	
6	−12.00	−10.00	
7	−14.00	−12.00	
8	−20.00	−14.00	



N

0 100

Scale in Feet

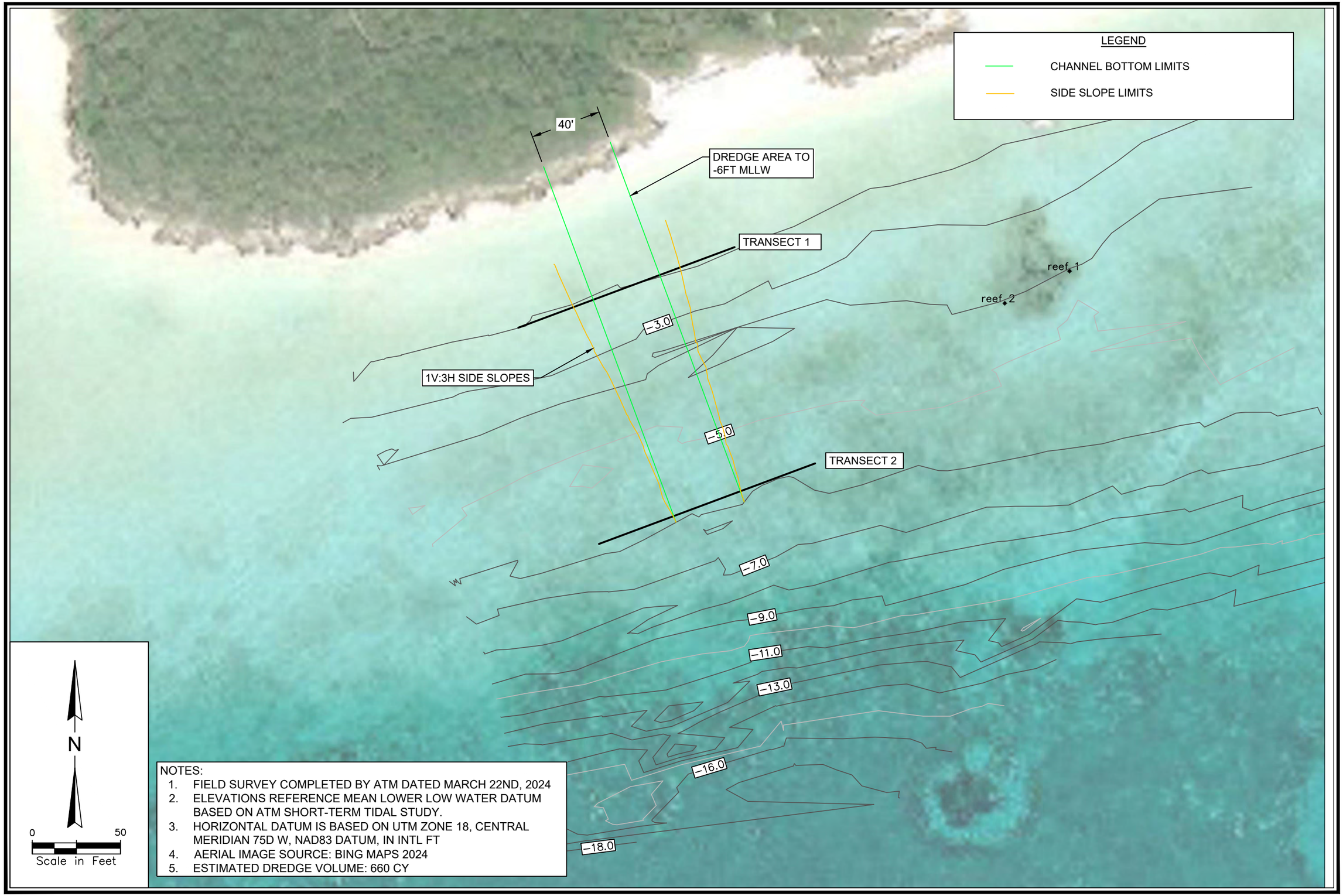
NOTES:
1. FIELD SURVEY COMPLETED BY ATM DATED MARCH 22ND, 2024
2. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.
3. HORIZONTAL DATUM IS BASED ON UTM ZONE 18, CENTRAL MERIDIAN 75D W, NAD83 DATUM, IN INTL FT
4. AERIAL IMAGE SOURCE: BING MAPS

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
BARGE LANDING ELEVATION MAP

APRIL 4, 2024
SHEET 9

C:\Users\ethan.ross\OneDrive - Geosyntec\Desktop\Exuma Survey\Exuma Survey.dwg S1 Barge Elev 4/4/24



NOTES:

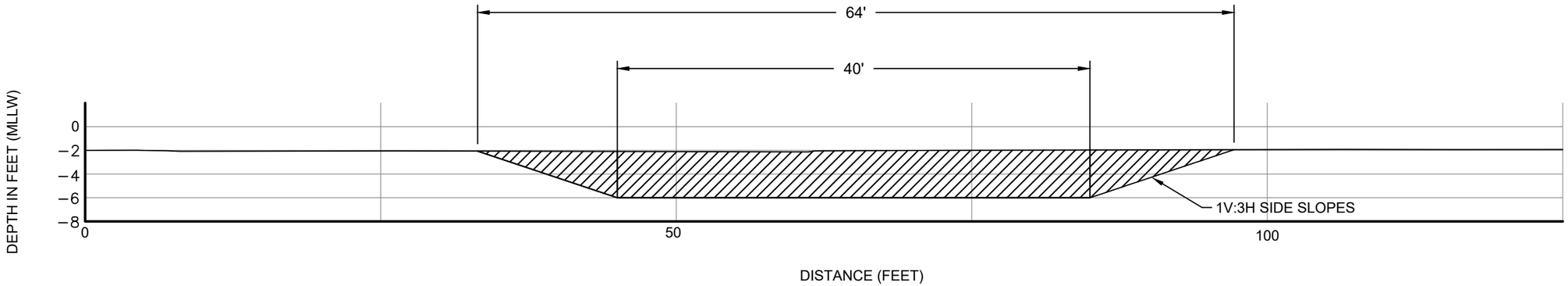
1. FIELD SURVEY COMPLETED BY ATM DATED MARCH 22ND, 2024
2. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.
3. HORIZONTAL DATUM IS BASED ON UTM ZONE 18, CENTRAL MERIDIAN 75D W, NAD83 DATUM, IN INTL FT
4. AERIAL IMAGE SOURCE: BING MAPS 2024
5. ESTIMATED DREDGE VOLUME: 660 CY

ATM
A Geosyntec Company

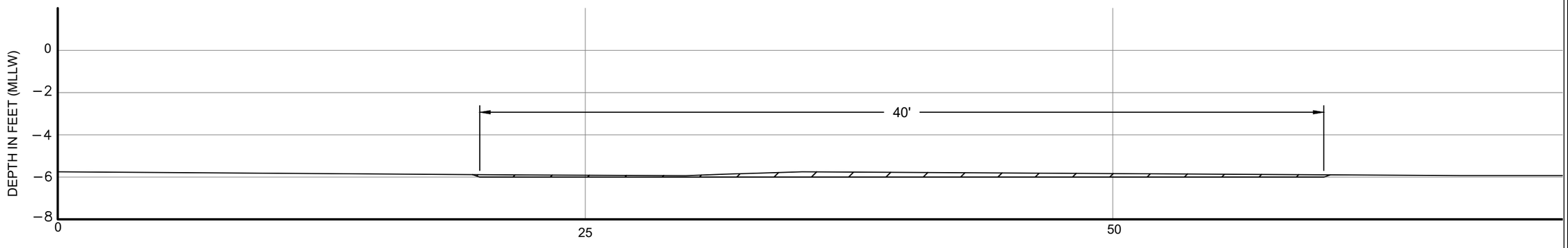
STOCKING ISLAND, EXUMA, BAHAMAS
SOUTH SIDE DREDGE CHANNEL PLAN VIEW

MAY 30, 2024
SHEET 1

\\staugustine-01\Groups\St Augustine Shares\Shared\PROJECTS\323-4036 BS Stocking Island Baseline Mapping\Exuma Dredge Plan_052924.dwg Barge Dredge Plan 5/30/24



TRANSECT 1
SCALE 1:10



TRANSECT 2
SCALE 1:5

NOTES:

1. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.

LEGEND

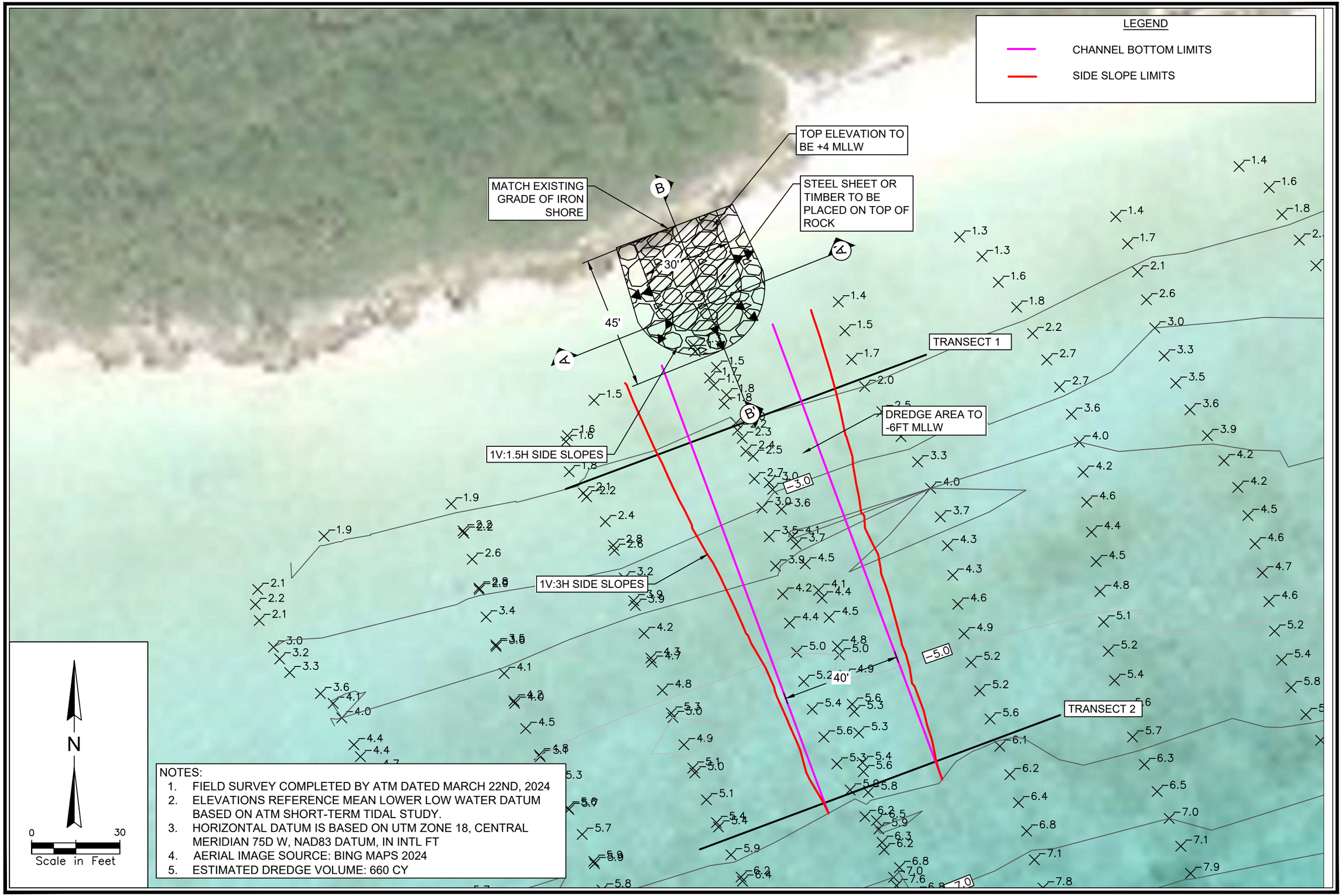
DREDGE AREA (WITHIN SURVEY LIMITS)

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
SOUTH SIDE DREDGE CROSS SECTIONS

MAY 30, 2024
SHEET 2

\\staugustine-01\Groups\St Augustine Shares\Shared\PROJECTS\323-4036 BS Stocking Island Baseline Mapping\Exuma Dredge Plan_052924.dwg Barge Dredge XSEC 5/30/24



NOTES:

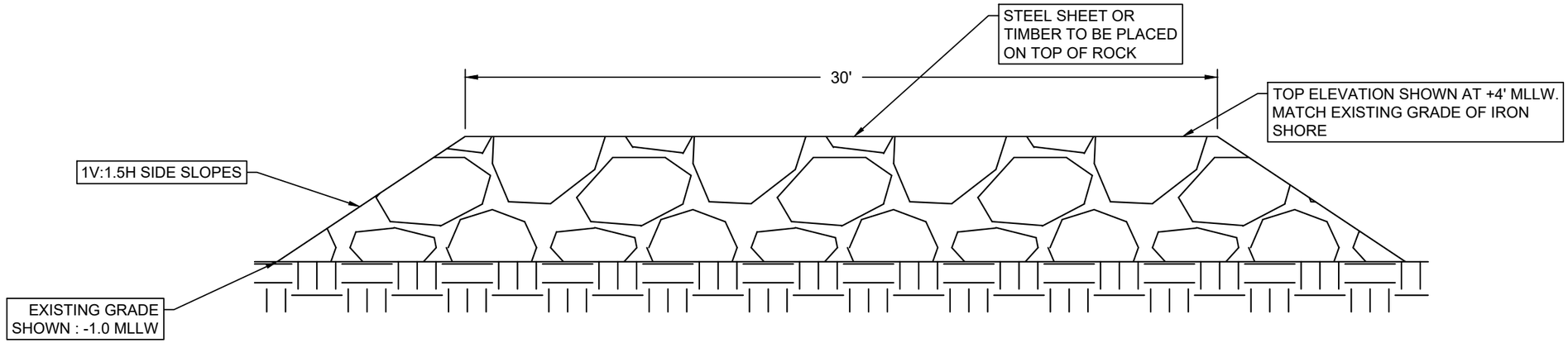
1. FIELD SURVEY COMPLETED BY ATM DATED MARCH 22ND, 2024
2. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.
3. HORIZONTAL DATUM IS BASED ON UTM ZONE 18, CENTRAL MERIDIAN 75D W, NAD83 DATUM, IN INTL FT
4. AERIAL IMAGE SOURCE: BING MAPS 2024
5. ESTIMATED DREDGE VOLUME: 660 CY

ATM
A Geosyntec Company

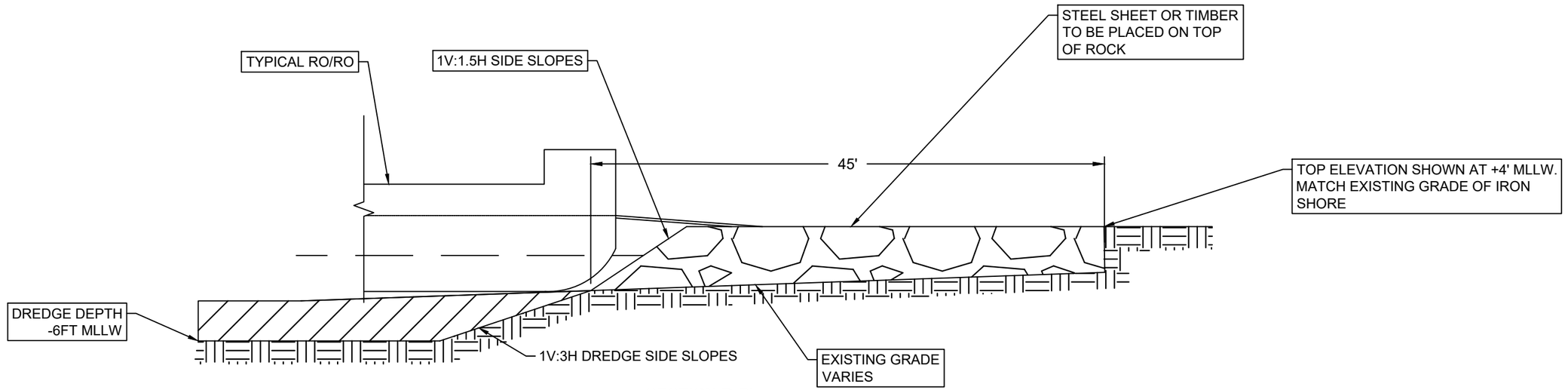
STOCKING ISLAND, EXUMA, BAHAMAS
TEMPORARY RO/RO GROIN PLAN VIEW

MARCH 28, 2025
SHEET 1

\\staugustine-01\Groups\St Augustine Shares\Shared\PROJECTS\23-4036 BS Stocking Island Baseline Mapping\Exuma Dredge Plan_032825.dwg Barge RoRo Plan 3/28/25



SECTION A-A'
SCALE 1:5



SECTION B-B'
SCALE 1:10

NOTES:

1. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.

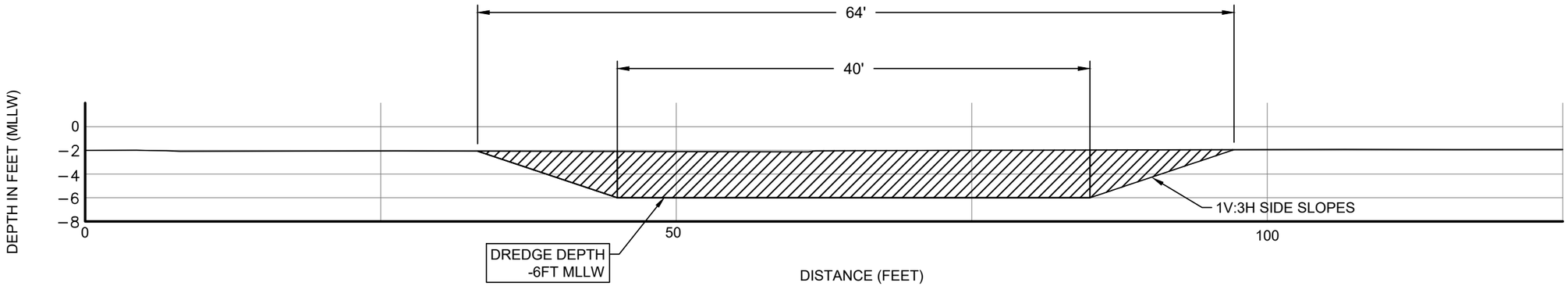
LEGEND

DREDGE AREA (WITHIN SURVEY LIMITS)

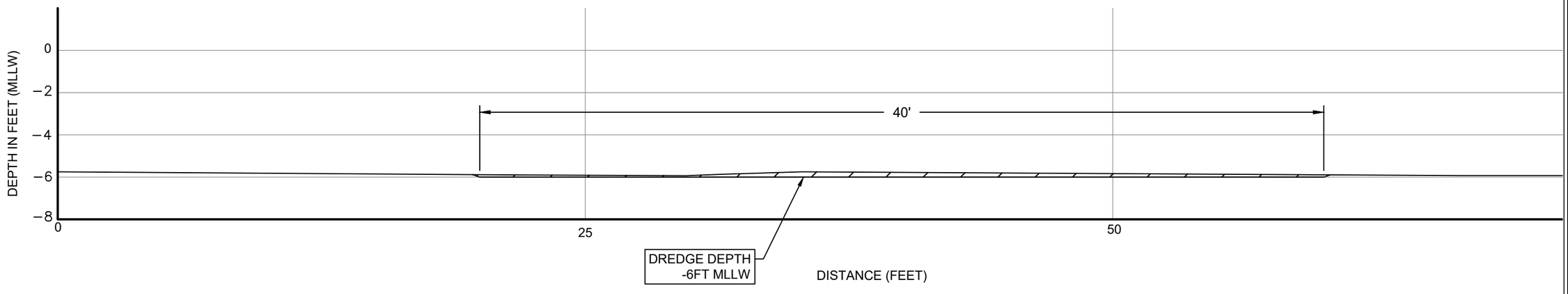
ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
TEMPORARY RO/RO GROIN CROSS SECTIONS

MARCH 28, 2025
SHEET 2



TRANSECT 1
SCALE 1:10



TRANSECT 2
SCALE 1:5

NOTES:

1. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.

LEGEND

DREDGE AREA (WITHIN SURVEY LIMITS)

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
DREDGE CROSS SECTIONS

MARCH 28, 2025
SHEET 3

\\staugustine-01\Groups\St Augustine Shares\Shared\PROJECTS\23-4038 BS Stocking Island Baseline Mapping\Exuma Dredge Plan_032825.dwg Barge Dredge XSEC 3/28/25

Slip Mix	
Size	Number
30	16
50	16
Total	32

PROPOSED PRIVATE DOCKS (SEE SHEET 2)

PROPOSED CHANNEL MARKERS (SEE SHEET 4)

70'
4xB
50'LOA

PROPOSED CHANNEL

PROPOSED MARINA DOCK

PROPOSED MARINA DREDGE AREA (SEE SHEET 3)

8' (TYP.)

5' (TYP.)

50' (TYP.)

27' (TYP.)

30' (TYP.)

38' (TYP.)

32' (TYP.)

3' (TYP.)

108'

363'

50

50

50/30

50/30

30

30

-2.0

-4.0

-6.0

-8.0

-10.0

-12.0

-10.0

-8.0

-6.0

N

0 150

Scale in Feet

NOTES:

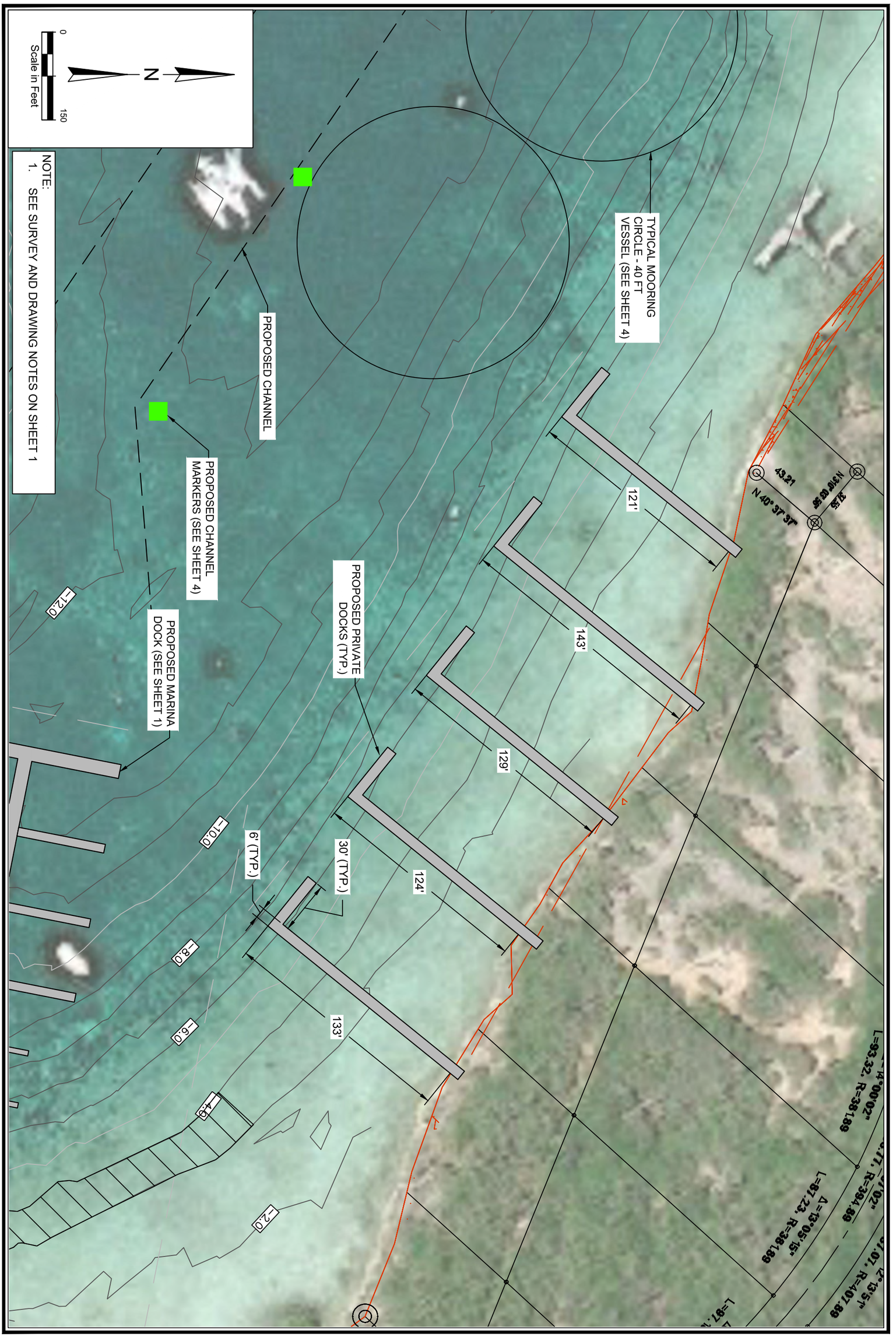
1. FIELD SURVEY COMPLETED BY ATM DATED MARCH 22ND, 2024
2. ELEVATIONS REFERENCE MEAN LOWER LOW WATER DATUM BASED ON ATM SHORT-TERM TIDAL STUDY.
3. HORIZONTAL DATUM IS BASED ON UTM ZONE 18, CENTRAL MERIDIAN 75D W, NAD83 DATUM, IN INTL FT
4. AERIAL IMAGE SOURCE: BING MAPS 2024
5. PARCEL MAP PROVIDED BY AIRWORKS COMPANY LIMITED COMPLETED MAY 6, 2025
6. EXISTING DEPTH CONTOURS LIMIT DRAFT OF INDICATED VESSEL SIZE THAT CAN ACCESS THE MARINA DOCK.
7. MARINA OPERATIONS SHALL MAINTAIN SUFFICIENT CLEARANCE WHERE SAV OR OTHER RESOURCES ARE PRESENT.

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
MARINA CONCEPT

JULY 25, 2025
SHEET 1

\\staugustine-01\Groups\St Augustine Shares\Shared\PROJECTS\23-4036 BS Stocking Island Baseline Mapping\CAD\Stocking Island Marina_Concept Plans_072425.dwg Marina Plan 7/25/25

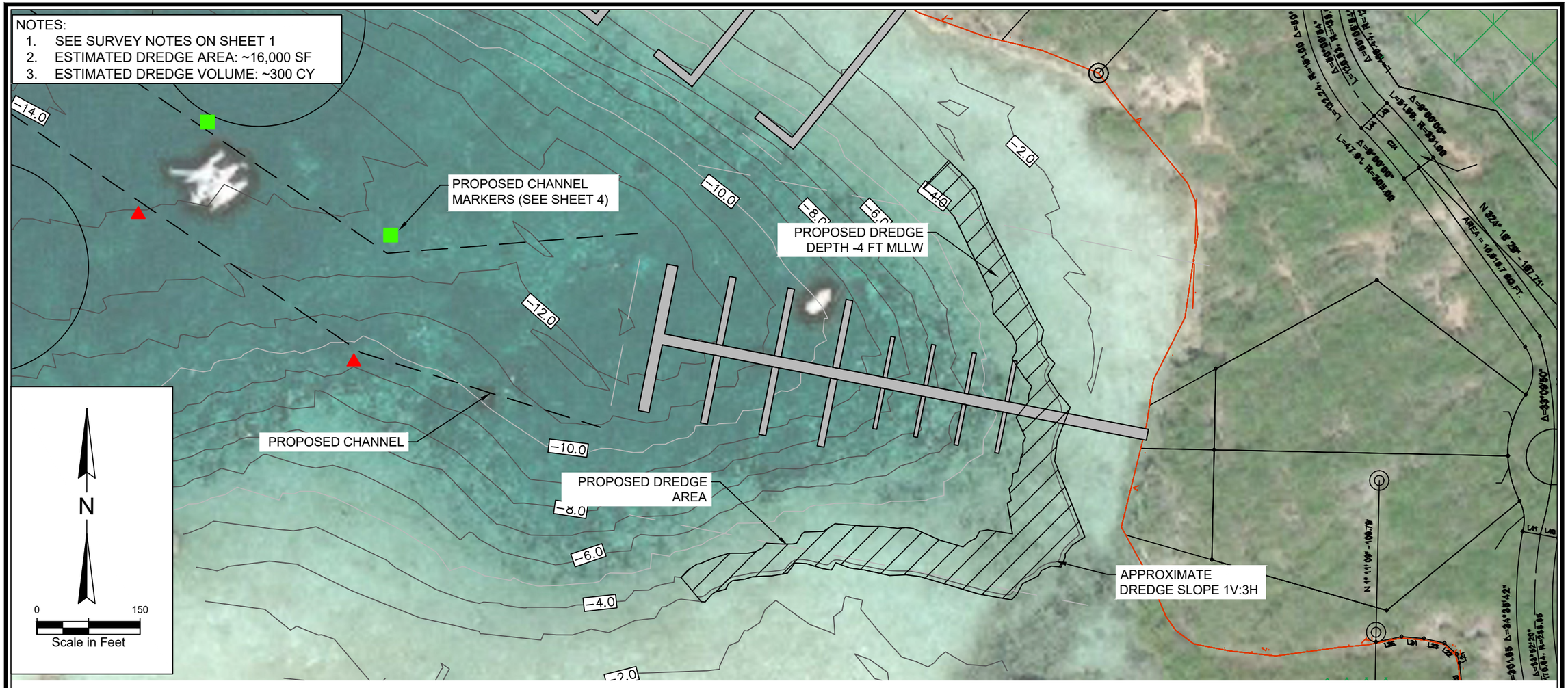


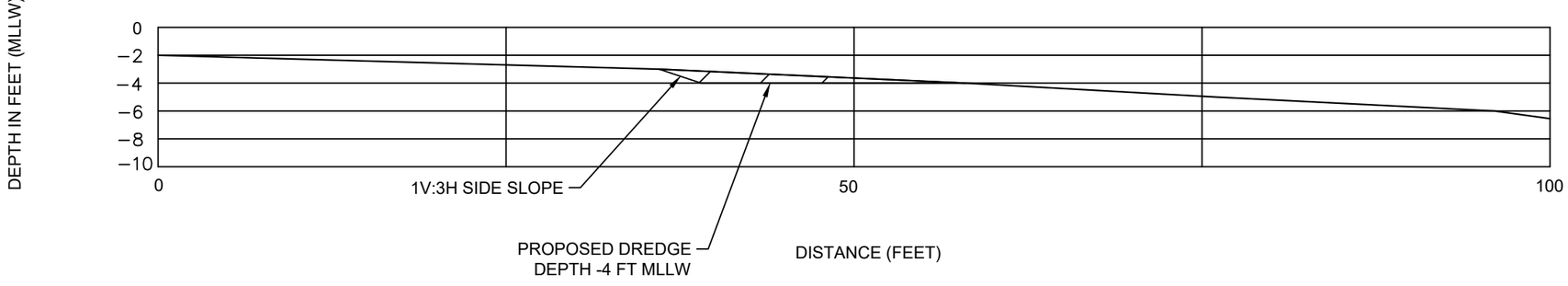
STOCKING ISLAND, EXUMA, BAHAMAS
PROPOSED PRIVATE DOCKS

JULY 25, 2025
SHEET 2

ATM
A Geosyntec Company

NOTES:
1. SEE SURVEY NOTES ON SHEET 1
2. ESTIMATED DREDGE AREA: ~16,000 SF
3. ESTIMATED DREDGE VOLUME: ~300 CY



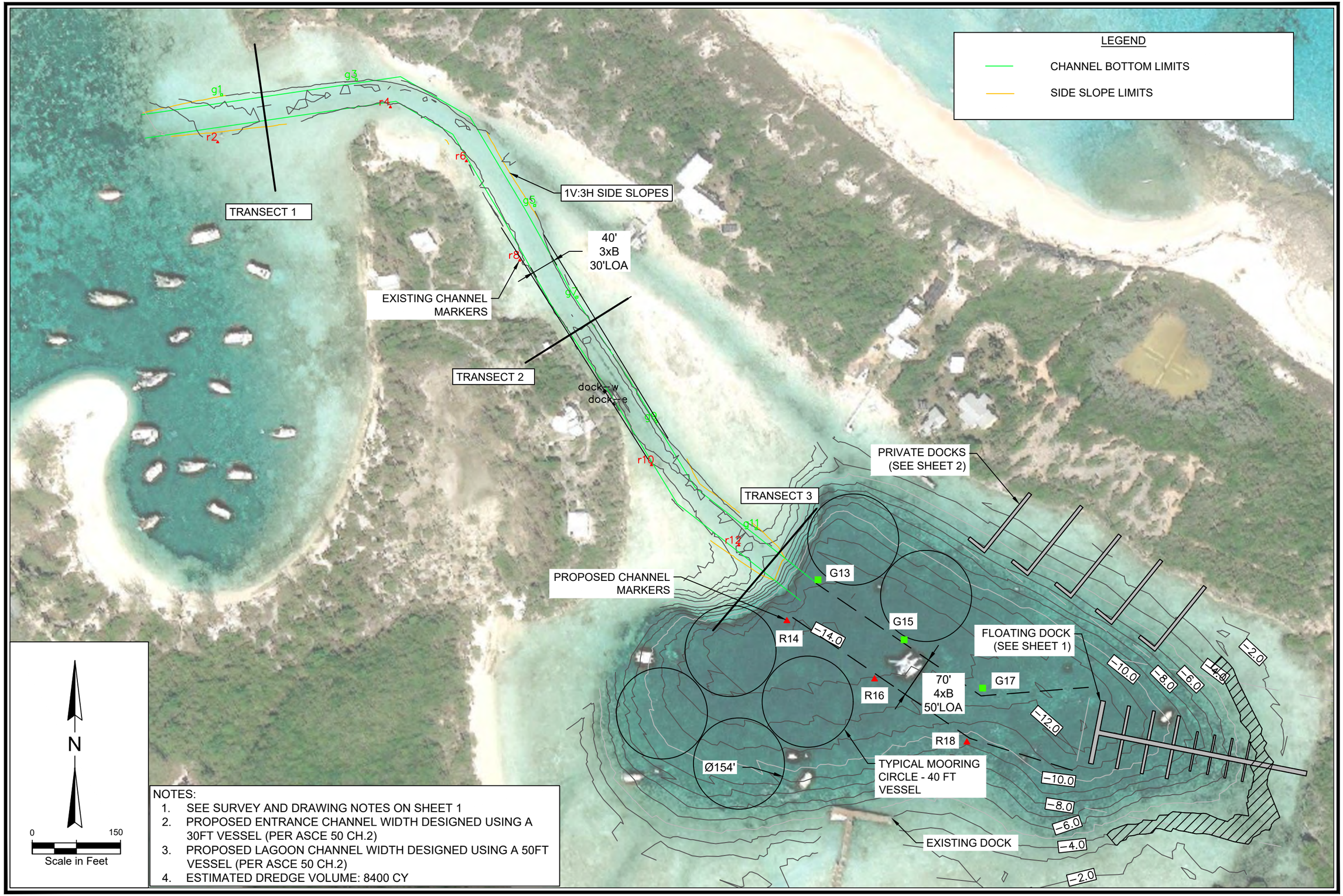


TYPICAL CROSS SECTION
SCALE 1:10

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
PROPOSED MARINA DREDGE PLAN

JULY 25, 2025
SHEET 3



NOTES:

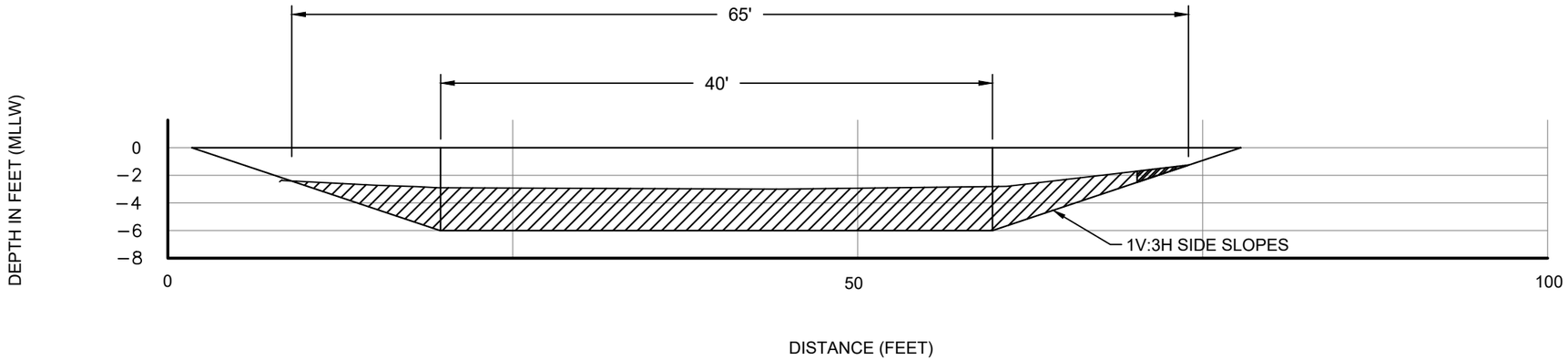
1. SEE SURVEY AND DRAWING NOTES ON SHEET 1
2. PROPOSED ENTRANCE CHANNEL WIDTH DESIGNED USING A 30FT VESSEL (PER ASCE 50 CH.2)
3. PROPOSED LAGOON CHANNEL WIDTH DESIGNED USING A 50FT VESSEL (PER ASCE 50 CH.2)
4. ESTIMATED DREDGE VOLUME: 8400 CY

ATM
A Geosyntec Company

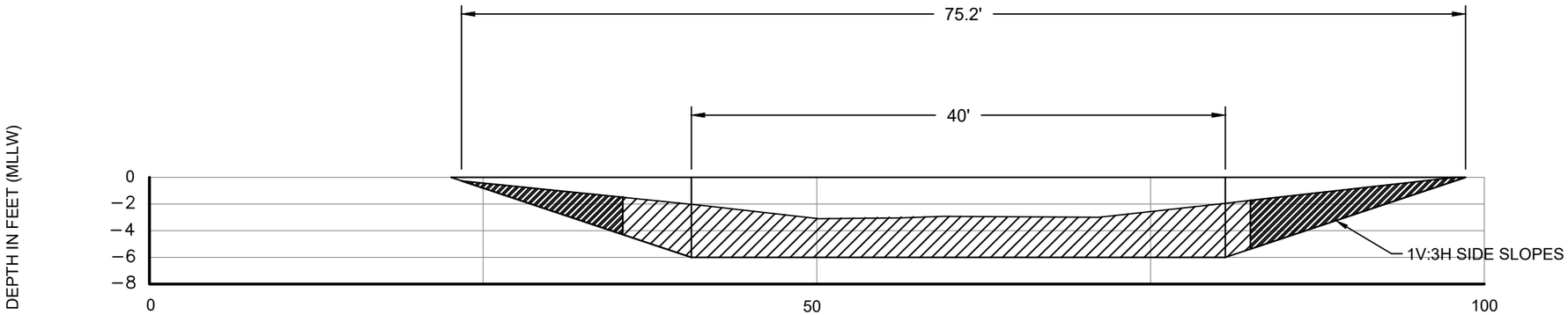
STOCKING ISLAND, EXUMA, BAHAMAS
DREDGE CHANNEL PLAN VIEW

JULY 25, 2025
SHEET 4

\\staugustine-01\Groups\St Augustine Shares\Shared\PROJECTS\323-4036 BS Stocking Island Baseline Mapping\CAD\Stocking Island Marina_Concept Plans_072425.dwg Dredge Plan 7/25/25



TRANSECT 1
SCALE 1:10



TRANSECT 2
SCALE 1:10

NOTE:
1. ESTIMATED DREDGE VOLUME: 8400 CY

LEGEND

DREDGE AREA (WITHIN SURVEY LIMITS)

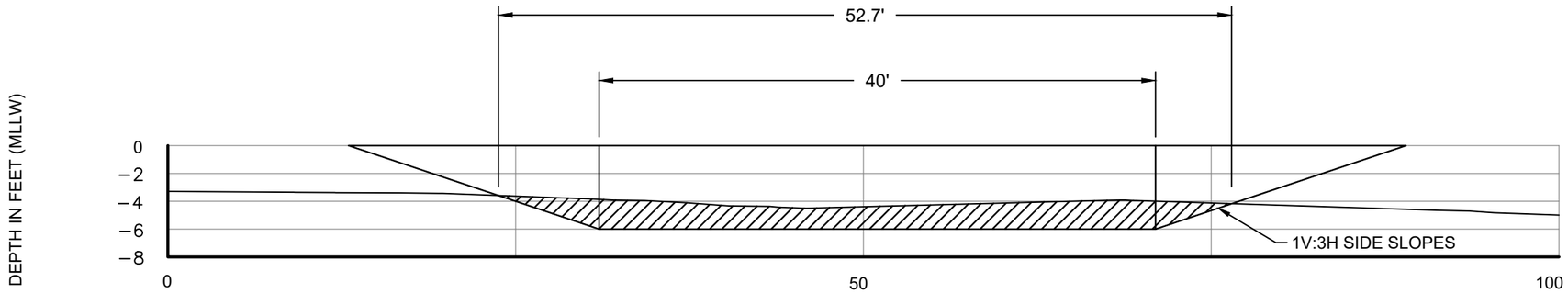
DREDGE AREA (OUTSIDE SURVEY LIMITS)

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
DREDGE CROSS SECTIONS

JULY 25, 2025
SHEET 5

\\staugustine-01\Groups\St Augustine Shares\Shared\PROJECTS\23-4036 BS Stocking Island Baseline Mapping\CAD\Stocking Island Marina_Concept Plans_072425.dwg Dredge XSEC 7/25/25



TRANSECT 3
SCALE 1:10

LEGEND

DREDGE AREA (WITHIN SURVEY LIMITS)

DREDGE AREA (OUTSIDE SURVEY LIMITS)

NOTE:
1. ESTIMATED DREDGE VOLUME: 8400 CY

ATM
A Geosyntec Company

STOCKING ISLAND, EXUMA, BAHAMAS
DREDGE CROSS SECTIONS

JULY 25, 2025
SHEET 6

\\staugustine-01\Groups\St Augustine Shares\Shared\PROJECTS\23-4036 BS Stocking Island Baseline Mapping\CAD\Stocking Island Marina_Concept Plans_072425.dwg Dredge XSEC (2) 7/25/25

6.8 Climate Change

Climate change will contribute to greater climate variability where changes may occur to precipitation patterns, increase in frequency and intensity of storm events, extreme heat, global sea level rise, and alteration of wave patterns, leading to shoreline erosion. Given this climate variability, engineering and building designs should plan for a scenario for future high anthropogenic greenhouse gas emissions.

Based on the IPCC Fifth Assessment Report and the CMIP5, climate change will alter existing rainfall patterns in The Bahamas. Climatology data suggest that The Bahamas region will incur a 3 percent decrease in monthly rainfall averages, with an increase of intensity of rainfall events between October and February. Overall, total rainfall is expected to decrease, placing additional pressure on freshwater resources.

6.8.1 *Climate Change & Stocking Island, Exuma*

Potable water demand will be met via a reverse osmosis plant and energy demand generated in part by renewable energy sources such as solar. All structures will be built in accordance with The Bahamas Building Code to withstand tropical disturbances. The developer will maintain limited building footprints to encourage preservation of the existing vegetation to maintain biodiversity and limit desertification. Where mature trees are unavoidable, relocation potential will be evaluated.

6.9 Hurricanes

The Bahamas is situated in the hurricane zone. Hurricane season begins June 1 and ends November 30, although tropical cyclones may form outside this period. According to the coastal dataset of the NOAA Coastal Service Center, 71 tropical disturbances (tropical storms and hurricanes) have come within 60 nautical miles of Stocking Island between 1859 and 2020 (Figure 7-7).[7]

In 2016, Hurricane Matthew, a dangerous Category 4, passed to the west of New Providence, sparing it a direct hit; however, western New Providence experienced sustained periods of hurricane force winds and the southern and eastern coastal areas of the island incurred a storm surge that caused coastal flooding. Storm surges up to 8 ft inundated the southern coastal area of New Providence and Grand Bahama.

Hurricane Dorian, one of the strongest hurricanes on record, made landfall at Elbow Cay, Abaco, in September 2019, with sustained winds of 160 knots. Although more than 90 nautical miles away, New Providence received high winds and rains over several days.

7 Hurricane history tracker and database can be found at this link: http://coast.noaa.gov/hurricanes/

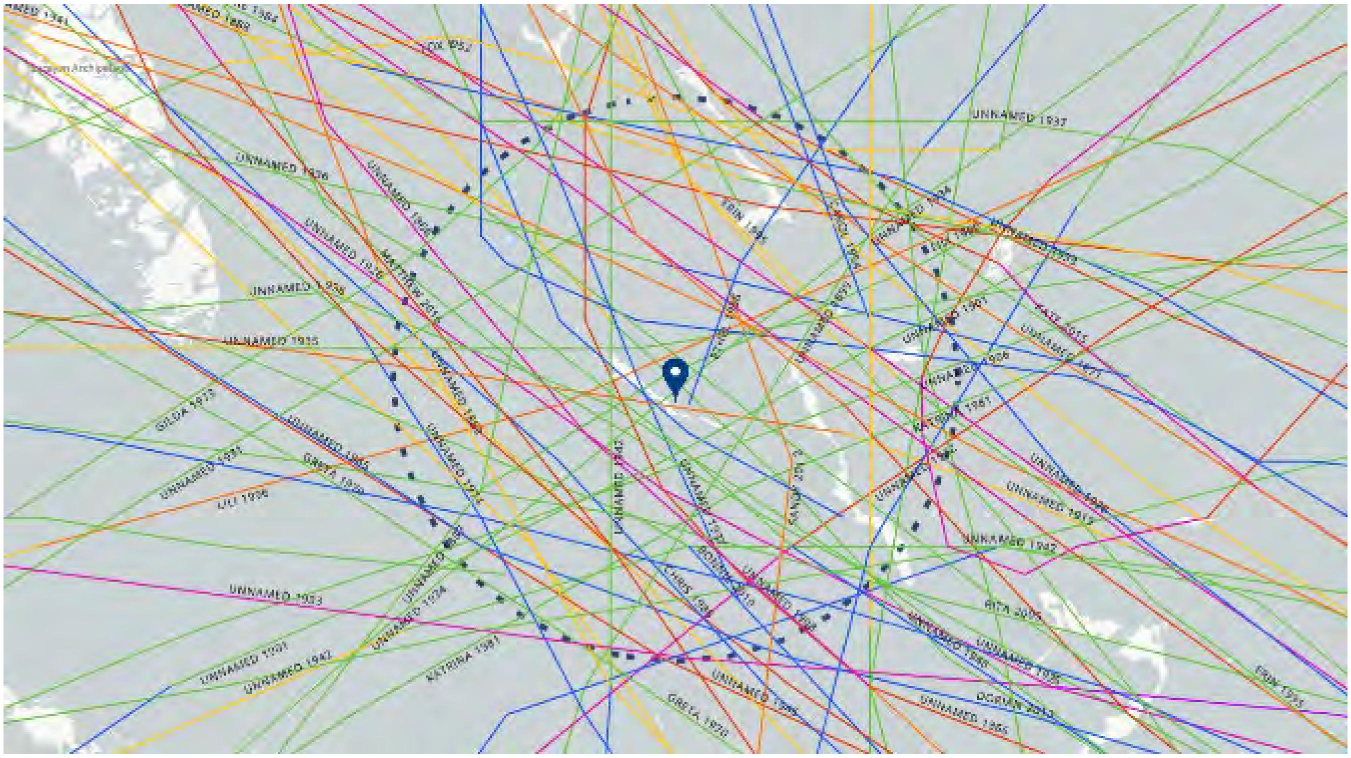


Figure 6-6 NOAA Historical Hurricanes within 60 Nautical Miles of Stocking Island, Exuma

6.10 General Terrestrial Profile

Stocking Island is exposed to high-wave action conditions as a direct result of the Exuma Sound. There is an elevated largely undisturbed dune ridge system that ranges from approximately twenty-five (25) to Thirty (30) feet above mean sea level and consists of predominantly soft oolitic sands. The leeward side of Stocking Island borders the calmer and more protected Elizabeth Harbour. Overall, the property is predominantly coppice with pockets of mangrove and wetland species in lower elevation areas. As expected, DBEF displayed the densest and most diverse botanical composition. Very few invasives species were observed on site.

6.11 Botanical Assessment

Botanical surveys were performed on site from March 18th to 20th, 2024. Four (4) distinct vegetation profiles were observed:

1) **Coastal (Dune) Zone**
2) **Human Altered**
3) **Dry Broad leaf Forest (DBEF)**
4) **Wetland/Mangrove (Seasonal Pond Area)**

6.11.1 *Methodology*

The survey primarily focused on trees and shrubs as well as any herbaceous plants of significant cultural or ecological importance. Once that had been completed the most ideal location was selected to perform a more detailed analysis of the site utilizing the point-centered quarter method. Data were collected by walking

methodically along transect lines evenly distributed throughout the proposed project site, followed by random sample points and points of further interest. Aerial photography was used to map the various kinds of vegetation, with ground surveys verifying the maps by walking along the shoreline and around the vegetation's perimeter utilizing already cut survey paths where present.

In order to find variations in vegetation cover that would indicate differences in vegetation classes, a drone was utilized. Vegetation species were then confirmed by walking along existing trails. Vascular plant species were recorded and used to create a floral list. All vegetation within visual range to a maximum of 10 feet was recorded.

6.11.1.1 Point-centered quarter (PCQ)

Several methods are available for sampling forest groups; however, the Point-centered quarter (PCQ) is deemed to be an effective and rapid method used to gather information on the density, frequency, and coverage of plant species found in a forest environment. This method was utilized to study the forest cover in more detail. The information collected utilizing the PCQ method provides an estimate to the number of individual trees encountered, how often a certain tree occurs and how common the tree is compared to other trees. Compared to the standard plot analysis, the point-centered quarter method is more efficient. Tree count is calculated by fixed-area plot sampling, where a small portion of the total area of the forest is examined. In this small subsample, the density is determined directly by counting and identifying each tree. The ratio between size of the subplot and the overall forest size is then used to determine the density for the entire forest.

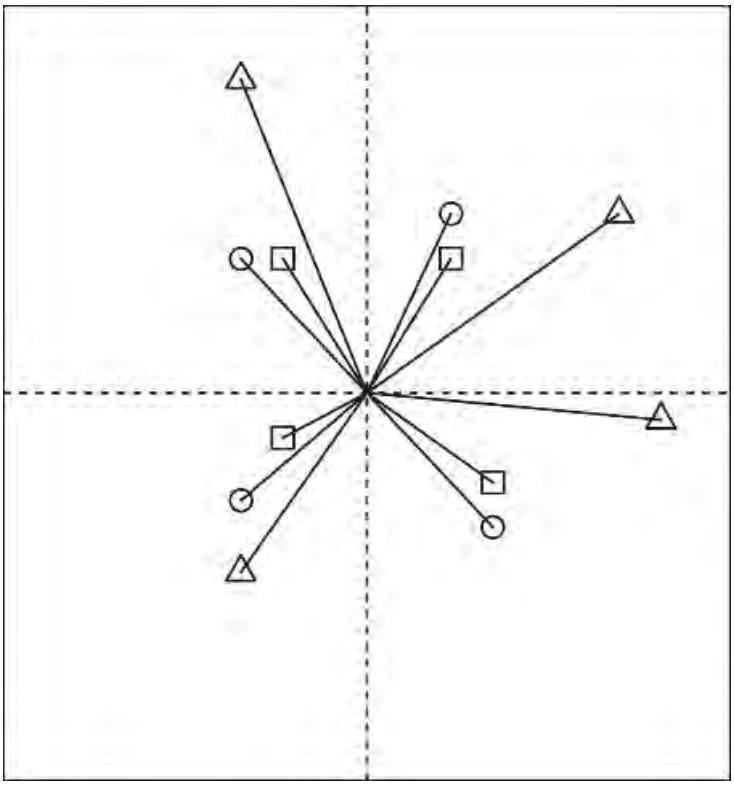


Figure 6-7 Sample diagram detailing the Point-centered quarter (PCQ) methodology utilized for the botanical study. Each shape represents a plant, to a distance of 10 feet in a 360-degree rotation.

6.11.2 *Terrestrial Ecosystems Identified*

Stocking Island consists of four main zones with very few invasive species observed within the project area. During the biological assessment. A total of forty-four (44) different species were recorded on site. Of these, twenty-eight (28) were native species, thirteen (13) were protected species, and three (3) were invasive species listed on the National Invasive Species Strategy (2013).

6.11.2.1 Coastal (Dune) Zone

Coastal dune zones are influenced by both marine and terrestrial influences and factors and often act as transitional areas or ecotones. When sufficient natural organic matter accumulates behind an established dune or recently forming dune, vegetation is able to take hold, grow and become established. Coastal vegetation found within dune zones is low growing and shrubby due to low nutrient soil, droughty conditions, and high salt exposure. Additionally, high winds and salt spray often prune the top layers of the trees and shrubs growing on the dunes and result in salt-pruned, windswept canopies, that is typically observed within these habitats. The Coastal Dune zone consists of mainly shrub & vine like species and phase one pioneering vegetation that is highly salt-tolerant, such as succulent annuals, grasses, perennial vines, and a few shrubs.

Elsewhere, ironshore protrudes the sandy substrate and is shaped by a combination of rain, wind, acidic rainwater, or eroded by constant wave action. and sea spray into what resemble the jagged like structure that distinguish it.

Figure 6-8 Aerial drone Imagery showcasing the dune system on the ocean side of Stocking Island

Figure 6-9 Dune with Invasive Casuarina sp. along Exuma Sound

Figure 6-10 Ironshore location for RORO, leeward side of Stocking Island

6.11.2.2 Human Altered

The " human-altered" refers to areas of land that has been significantly modified or impacted by human activities. The Exuma Fund 2, Ltd. site is relatively undeveloped with the exception of the frequented and well-maintained nature trail.

Figure 6-11 A mix of aerial and on the ground imagery showcasing the current level of upland human impacts within the proposed project area, which consists of a regularly maintained 'nature trail' walk, that is raised in some portions as presented above.

Figure 6-12 Aerial of Buttonwood Formation and Boardwalk

6.11.2.3 Dry Broad-Leaved Evergreen Formation

DBEF vegetation is comprised of high-density small diameter trees and a dense canopy. The DBEF the most dominant vegetation cover of the property where vegetation reaches an average height of approximately fifteen to twenty feet (15-20 ft). The vegetation in the area exhibits healthy forest crown cover and has good stand class. In some areas the coppice is very dense and diverse with a thick and overgrown understory. The DBEF vegetation class exhibited typical characteristics as can be expected, and showed no signs of stress or diseases, with some more developed trees having a tree trunk diameter of approximately 15-20 inches, and a height of 20-25 feet, which indicates they are approaching the beginning stages of secondary phase growth/ developing into Blackland coppice habitat.

Figure 6-13 Aerial Images above detailing the typical DBEF forest habitat area observed within the Proposed Project area on Stocking Island.

6.11.2.4 Wetland & Mangrove Area

A tidal creek enters the property at the southern portion of the lagoon. Extending south beyond the creek's fringing mangroves is a dry unvegetated open area that appears to be a flood plain and/or drainage basin. This area experiences flooding frequent enough to prevent establishment of upland vegetation.

Elsewhere, the buttonwood formation may have been formed by the surface dissolution of bedrock (limestone begins to be eroded away by acid rain which causes cavities, and eventually turn into larger depressions that hold water, and is periodically filled in by sea water or rainwater). This formation exhibits mature silver buttonwoods interspersed by mangrove species easily accessed by a raised wooden platform.

Figure 6-14 Open flood plain extending south of tidal creek

Figure 6-15 Interior buttonwood formation

Figure 6-16 Aerial Image Depicting Wetland Creek

6.11.3 *Vascular Plant Diversity*

Any plant listed in the table below was observed using the Point-centered quarter (PCQ) methodology and combined for the whole site and then presented in the table below, to give a general finding for the project area. A total of forty-four (44) different species were recorded on site. Of these, twenty-eight (28) were native species, thirteen (13) were protected species, and three (3) were (highly) invasive species.

Table 6-2 Vascular Plant Diversity

#	Common Name	Scientific Name	Status
1	Bahama Century Plant	*Agave bahamana*	Protected
2	Sisal	*Agave sisalana*	Native
3	Bay Lavender	*Ambrosia gnaphalodes*	Native
4	White torch	*Amyris elemifera*	Native
5	Lice Root	*Angadenia sagraei*	Native
6	Pond Apple	*Annona glabra*	Native
7	Black Mangrove	*Avicennia germinans*	Protected
8	Strongback	*Bourreria ovata*	Protected
9	Seven Year Pond Apple	*Casasia clusifolia*	Native

10	Love Vine	*Cassytha filiformis*	Native
11	Australian Pine	*Casuarina equisetifolia*	Invasive
12	Sea Grape	*Coccoloba uvifera*	Native
13	Silver Top Palm	*Coccothrinax argentata*	Protected
14	Coconut Palm	*Cocos nucifera*	Native
15	Buttonwood	*Conocarpus erectus*	Protected
16	Silver Buttonwood	*Conocarpus erectus var. sericeus*	Protected
17	Granny Bush	*Croton linearis*	Native
18	Bermuda Grass	*Cynodon dactylon*	Invasive
19	Spanish Stopper	*Eugenia foetida*	Native
20	Ratwood	*Erythroxylum rotundifolium*	Native
21	Butterbough	*Exothea paniculata*	Native
22	Lignum Vitae	*Guaiacum sanctum*	Protected
23	Small Leaf Blolly	*Guapira discolor*	Protected
24	Crabwood	*Gymnanthes lucidus*	Native
25	Logwood	*Haematoxylum campechiamum*	Native
26	Railroad Vine	*Ipomoea pes-caprae*	Protected
27	Joe wood	*Jacquinia keyensis*	Native
28	White Mangrove	*Laguncularia racemose*	Protected
29	Thatch Palm	*Leucothrinax morrisii*	Native
30	Wild Tamarind	*Lysiloma latisiliquum*	Native
31	Wild Dilly	*Manilkara jaimiqui*	Native
32	Poison wood	*Metopium Toxiferum*	Native
33	Buccaneer Palm	*Pseudophoenix sargentii*	Native
34	Red Mangrove	*Rhizophora mangle*	Protected
35	Sabal Palm	*Sabal palmetto*	Protected

36	Saltwort	*Salsola soda*	Native
37	White Ink Berry	*Scaevola taccada*	Invasive
38	Sea Purslane	*Sesuvium portulacastrum*	Native
39	Mastic	*Sideroxylon foetidissimum*	Protected
40	Bay Cedar	*Suriana maritima*	Native
41	Bay Lavender	*Tournefortia gnaphalodes*	Native
42	Sea Oats	*Uniola paniculata*	Native
43	Cinnecord	*Vachellia choriophylla*	Native
44	Wedelia	*Wedelia bahamensis*	Native

6.11.4 *Invasive Species*

Three (3) invasive species were found on site. The following recommendations were made in accordance with the "The Bahamas national invasive species strategy 2013."

1. **Australian Pine** (*Casuarina equisetifolia*)
   Distribution: Along the property edge,
   Recommendation: Complete eradication & continued removal of seedlings that arise

2. **White Ink Berry** (*Scaevola taccada*)
   Distribution: Large shrubs located along the dune ridge edge; dominates coastline
   Recommendation: Complete eradication & continued removal of seedlings that arise and replacement with the native variant.

3. **Bermuda Grass (***Cynodon dactylon)*
   Distribution: Predominately located across the path edge, and in areas of clear vegetation.
   Recommendation: Monitor and Control

6.11.5 *Protected Tree Species*

Thirteen (13) protected species listed in the Forestry Declaration of Protected Trees Order (2021) were identified on-site:

1. **Bahama Century Plant** (*Agave bahamana)*
   - Found within the DBEF coppice habitat, in one location.
   - Will be replanted prior to any activities commencing.

2. **Black Mangrove** *(Avicennia germinans)*
   - Located on the edge of the lagoon area.
   - Limited to select areas, near the wetland areas.

3. **Strongback** *(Bourreria ovata)*
   - Located in the DBEF habitat within the proposed project area.

- Located sporadically in limited numbers.
- Some smaller more juvenile species will be sought to be relocated and incorporated into final landscaping.

4. **Silver Top Palm** (*Coccothrinax argentata)*
   - Distributed throughout project site in random clusters.
   - ranges in size and maturity throughout the property.
   - Some smaller more juvenile species will be sought to be relocated and incorporated into final landscaping.

5. **Buttonwood** *(Conocarpus erectus)*
   - Located on the edge of pond areas along flood plains
   - Found across all areas of site, near the wetland areas and in the DBEF habitat.
   - Some smaller more juvenile species will be sought to be relocated and incorporated into final landscaping.

6. **Silver Buttonwood** *(Conocarpus erectus var. sericeus)*
   - Located on the edge of pond areas along flood plains
   - Found across all areas of site, near the wetland areas and in the DBEF habitat.
   - Some smaller more juvenile species will be sought to be relocated and incorporated into final landscaping.

7. **Lignum Vitae** *(Guaiacum sanctum)*
   - Located in the DBEF habitat within the proposed project area.
   - Located sporadically in limited numbers.
   - Some smaller more juvenile species will be sought to be relocated and incorporated into final landscaping.

8. **Small Leaf Blolly** (*Guapira discolor)*
   - Small trees scattered throughout the DBEF habitat
   - Located sporadically in limited numbers.

9. **Railroad Vine** *(Ipomoea pes-caprae)*
   - Located along the dune zone.

10. **White Mangrove** (Laguncularia racemose)
    - Located on the edge of the lagoon area.
    - Limited to select areas, near the wetland areas.

11. Red Mangrove *(Rhizophora mangle)*
    - Located on the edge of the lagoon area.
    - Limited to select areas, near the wetland areas.

12. **Sabal Palm** *(Sabal palmetto)*
   - Distributed throughout project site in random clusters.
   - ranges in size and maturity throughout the property.
   - Some smaller more juvenile species will be sought to be relocated and incorporated into final landscaping.

13. Mastic (*Sideroxylon foetidissimum)*

- Located in the DBEF habitat within the proposed project area.
- Located sporadically in limited numbers.
- Some smaller more juvenile species will be sought to be relocated and incorporated into final landscaping.

6.11.6 *Botanical Discussion*

The purpose of the Botanical Assessment survey was to collect data and list the various vegetation types, determine floristic diversity, identify the presence and abundance of invasive species, and conduct a protected species count within the project zone. The DBEF habitat covers the greatest percentage of the project site area where the average height of the vegetation is approximately (15) fifteen to twenty-five (25) feet. The vegetation in the area exhibits healthy forest crown cover and has good stands class. Invasive species are more prevalent towards the edge and along the coast.

6.11.7 *Vegetation Map*

Please see next page.

Figure 6-17 Vegetation Map detailing the different vegetative zones identified on Stocking Island as was observed comparable with the Aerial imagery posted below.

6.12 Avian Assessment

An avian survey was conducted to identify the presence, abundance, and habitat utilization of avian species within the proposed project site and surrounding areas. During the Avian Observation, there was isolated thunderstorms, which may have reduced the number of avian species observed. The survey areas ranged across all the different eco-tones observed on site, and any other potential areas thought to be a viable avian habitat.

6.12.1 *Avian Methodology*

An Avian Observation was conducted March 18-20, 2024. Avifauna were assessed and recorded by conducting area searches and walking transects along the proposed project area and along the coastline and in the DBEF eco-tone. Transects and area searches were restricted due to time constraints and accessibility with some areas proving to be impenetrable due to the thick vegetation, however all species identified visually or through bird call were recorded and compiled for final abundance estimates.

6.12.2 *Habitat Utilization*

During the observation, species were observed mainly in the DBEF and mangrove areas with both habitats being very dense and providing the best shade cover and location of food source. It is worth mentioning that conducting thorough surveys in this area was very challenging due to the uneven terrain located throughout the coppice forest area and thick vegetation. Several Avian species were observed as flyovers, mainly the Laughing gulls, and Osprey. There were no shorebirds recorded along the high tide line mark, however footprints were observed within the dune zone.

6.12.3 *Avifauna Observed & Species Diversity*

A total of six (6) avian species were recorded during the surveys. Presented below is the total count of species that were recorded in all sites surveyed.

Table Key:
Range Status
BPR = Breeding Permanent Resident
BSR = Breeding Summer Resident
NWR = Non-Breeding Winter Resident
ES = Endemic species
ESS = Endemic subspecies
TS = Transient
INT = Introduced

Table 6-3 Avifauna Observed

Common name	*Scientific name*	Total number	Range
Pigeons, Doves	***Columbiformes***		
Mourning dove	*Zenaida macroura*	2	BPR
Common ground dove	*Columbina passerina*	4	BPR
Gulls, Sandpipers, Stilts	***Charadriiformes***		
Green Heron	*Butorides virescens*	1	BPR
Laughing Gull	*Leucophaeus atricilla*	3	BPR

Perching Birds	***Passeriformes***		
Bananaquit	*Coereba flaveola bahamensis*	2	BPR, ESS
Pandion			
Osprey	*Pandion haliaetus*	1	BPR

6.12.4 *Range*

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

- **Breeding Permanent Resident:** Breeding Permanent Resident (BPR) species refers to the resident species that live and breed year-round throughout the Bahama Islands.

- **Breeding Summer Resident:** Breeding Summer Resident species refer to species that migrate to The Bahamas during the summer months and reproduce.

- **Non-Breeding Winter Resident:** Non-Breeding Winter Resident species refer to species that migrate to The Bahamas during the fall and winter months. They do not reproduce in The Bahamas.

- **Endemic Species:** Endemic species are birds that exist only in The Bahamas.

- **Endemic Subspecies:** Endemic subspecies are variations of a species that exist only in The Bahamas, but are not yet recognized as its own full species.

- **Transient:** Transient species are birds that make brief stopovers in The Bahamas during migrations.

- **Introduced:** A species that was introduced to the region, mainly via humans.

6.12.5 *Conservation Status*

6.12.5.1 Protected Species

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

6.12.5.2 Endangered Species

None of the species recorded are classed as endangered.

6.12.5.3 Bird species of IUCN Concern

Birds listed as “Least Concern on the IUCN Red List are not included in this list. No IUCN listed birds were observed.

6.12.6 *Recommendations*

Below are a few recommendations to improve the site for birds and to minimize impact on native bird life:

I. **Remove Invasive Species** – Several invasive species were recorded on the site during the surveys. Invasive species include Casuarina and Scaevola. Invasive plants outcompete native biodiversity and can negatively impact coastlines and terrestrial communities, impacting local food sources and nesting habitats. Removal of invasive plants encourages growth of native fruiting trees.

II. **Plant Native Plants** – Native plants provide food and habitat for birds. By planting native species of plants, it can significantly improve the habitat and availability of food resources for birds.

III. **Preserve old growth trees on developed property –** There were several large, old growth trees on Stocking Island, within the DBEF habitat, old growth trees provide a significant shelter source for wintering migrants and resident birds, with most observations coming in and around the older more mature tree species.

6.13 Marine Survey Assessment

Biological investigations performed between March 18th and March 20th, 2024 included a marine benthic habitat assessment. This assessment was conducted in the lagoon and the proposed dock area, and RORO to identify and describe marine habitats and the presence and abundance of marine flora and fauna.

6.13.1 *Methodology*

Snorkel gear and vessel were utilized to perform a ‘roving diver’ method along the proposed dredge area with a focus on the sea floor, and any specific sites of interest. The survey was from the beach to approximately 40ft out into the sea with a vessel utilized to cover more area. Substrate type, fauna, and flora species were recorded during the assessment using a go pro underwater camera in addition to AGRRA identification principles being utilized but not the protocol.

General visual observations were made for the surveyed area which are presented in figures. Data collected during the benthic assessment included substrate type, reef/coral type, and general biotic cover. Still photographs and video were collected to document environmental conditions, substrate, and dominant biota observed in the survey area. Photos collected during the marine survey were also used to support identification of observed biota including corals, seagrasses, macroalgae, sponges, crustaceans, and fishes. Water samples were also taken to establish baseline water quality.

The surveys were completed in two (2) phases.

1. Phase I involved:
    a. reconnaissance of the entire survey area to identify and,
    b. to delineate marine resources such as seagrass and coral reef habitats, and,
    c. use of a drone to capture videos and photographs of the seabed.

2. Phase II was conducted to further study the:
    a. marine resources identified in the first stage in more depth and detail, where appropriate particular attention was given to identifying the presence of stony coral loss disease (SCTLD) where suitable & applicable.
    b. identify sites and suitable areas to relocate corals, if any, and juvenile species identified.

6.13.2 *General Observations – Marine*

Weather conditions were the following: blue sky with intermittent cloud cover, winds at approximately 10-15 knots, slip chop with no swells. Sea currents at the time of assessment was light on a changing tide, from peak low to high tide. Visibility in the marine environment was a seven, based on a range of one to ten with one being zero visibility, and ten being clearly visible. Depth ranged approximately between two (2) feet to ten (10) feet.

6.13.3 *Marine Benthic Surveys - Results*

The offshore benthic environment consists of fine soft oolitic sand with coral reefs located within the lagoon area or proposed landing site. The marine survey identified two (2) distinct habitats within the footprint of the dock and the adjacent beach area with the observed habitats including:

- Soft oolitic Sand Substrate
- Intermittent Seaweed (Sargassum patches)

Sandy bottom is the predominant substrate with small patches of Turtle Grass (*Thalassia testudinum)* and Manatee grass *(Syringodium filiforme)*; no hard or soft corals were observed within the project area. The assessed area had a limited but notable abundance and diversity of marine flora and fauna.

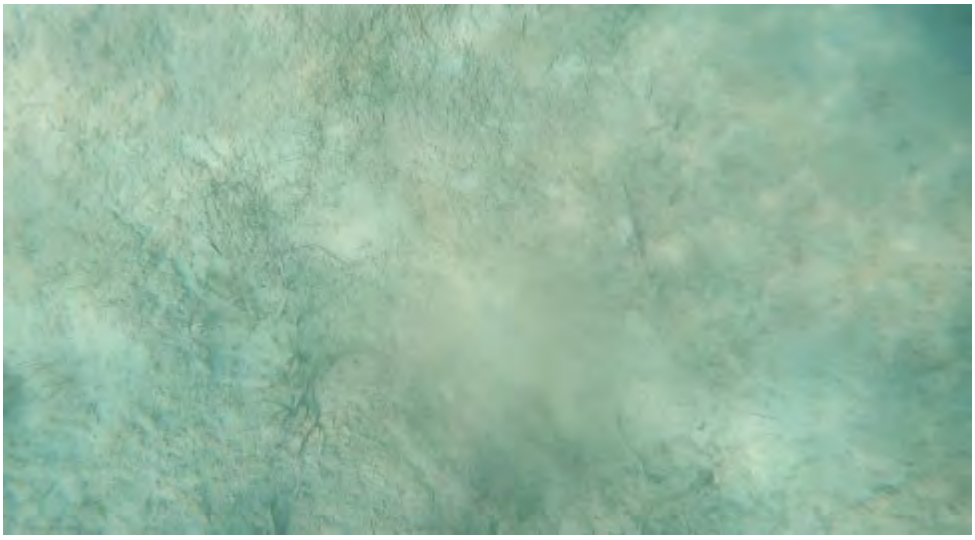


Figure 6-18 The sea floor consist of a fine soft sand, with an estimated two percent mix of Turtle Grass (Thalassia testudinum) and Manatee grass (Syringodium filiforme)) Coral Conditions

6.13.3.1 Marine Species & Recommendations

Sparse patches of seagrasses, the absence of hard and soft corals, and lack of commercially important fish denote a habitat that has incurred some historical disturbance and on-going potential degradation of water quality. The extremely shallow navigational channel at low tide restricts tidal exchange which may improve following maintenance dredging of the channel. Nevertheless, while the marine benthic survey did not identify ecologically significant or sensitive resources, turbidity controls and marine construction best management practices will be employed during construction.

6.13.4 *Water Quality*

The Water quality testing and results represents the initial marine environmental findings that aim to document the baseline conditions of the seabed, while establishing baseline Turbidity, Ph, Salinity, Electrical Conductivity (Ec) Ms/Cm and Temperature readings across the site.

6.13.4.1 Weather Conditions and General Observations

The weather conditions over the period of the assessment included isolated storms with gusts between five to twenty-five (5 – 25) mph. The survey was conducted on a falling tide, from high to low with water depth averaging between one (1) to three (3) feet naturally and approximately three feet (5ft) in the dredged areas. Air temperature ranged from 85 to 90 °F, with several passing showers impacting work of the survey period. Sea water temperature averaged 82 to 90 °F. A relatively shallow shelf surrounds Stocking Island and offers the island some protection from deep water offshore waves, however the site is still prone to storm surges and consistent wave action. Wave heights during the survey were below three (3) feet with winds out of the southeast to south-southeast.

6.13.4.2 Methodology of Water Quality Survey

The survey baseline report methodology was designed as a rapid survey using a combination of in-situ and ex-situ methods, combined with an on-site marine and nearshore terrestrial survey. The shoreline surveys used a combination of water and iron shore observations across the immediate area to assess the current site condition and any potential impacts. The marine and coastal surveys were conducted from the shoreline to approximately 75ft seaward utilizing a vessel. It is worth noting that Stocking Island at the time of the observation was experiencing significant marine traffic, most notably sail boats anchored and regular water taxis.

The marine survey was completed in two (2) phases; Phase I involved reconnaissance of the entire survey area (potential dredge zone and landing site) with the use of a drone to capture videos and photographs of the seabed from an aerial perspective and to further identify and delineate potential marine resources such as seagrass and coral reef habitats.

Phase II was conducted to further study the marine resources (if any) identified in the first stage in more depth and detail, and, in water analysis to further study any areas highlighted from the drone flyover and look at the site in more detail utilizing a marine vessel.

The substrate type, fauna, and flora species were recorded during the assessment using a Go Pro camera. Also, general visual observations were made for the surveyed area which are presented in photographs and figures of the sites visited. Still photographs and video were collected to document environmental conditions, substrate, and dominant biota observed in the survey area. Photos collected during the field survey were also used to support identification of observed biota including corals, seagrasses, macroalgae, sponges, and fish if anywhere present or observed.

Additionally, water samples were collected from separate locations at varying locations to be analyzed further to determine the conditions of the site around the and in the dredge zone with the objective of determining if there have been any changes to the site, while aiming to simultaneously establish baseline readings. The main method of water sampling collection was utilizing a plastic sampling container to collect water samples at a depth of approximately 3 feet below the water surface across all sample points. Data collected during the marine assessment included substrate type, reef/coral type, general biotic cover and water samples to determine Turbidity, Ph, Salinity, Electrical Conductivity (Ec) Ms/Cm and Temperature readings across the marine environment.

6.13.5 *Equipment Used*

The marine survey utilized a:

- Boat
- Drone fly over and review of satellite imagery.
- In situ Marine on foot survey of both the marine and near shore environment.
- Underwater Camera (Go pro)
- Sper Scientific 860040 Turbidity Meter
- Digital 5-in-1 Meter IP67 Waterproof tester for Hydroponics. includes pH, TDS, EC, Salinity%, Salinity ppm, and Temp Turbidity, Ph, Salinity, Electrical Conductivity (Ec) Ms/Cm and Temperature
- Water sample container

Figure 6-19 Sper Scientific 860040 Turbidity Meter

Figure 6-20 Digital 5-in-1 Meter IP67 Waterproof tester for Hydroponics

6.13.5.1 Sampling

Turbidity, pH, Salinity, Electrical Conductivity (Ec) Ms/Cm and Temperature

The water quality parameters tested include turbidity, pH salinity, electrical conductivity (Ec) Ms/Cm and temperature. These parameters aid in determining baseline levels to provide a strong indication for the overall conditions of the site.

Figure 6-21 Orthomosiac showing five (5) locations where all water samples were collected. Water sample points vary from the proposed dredge location in the lagoon (1-3) to the proposed equipment landing site (4 & 5)

6.13.5.2 Sampling Results

Table 6-4 Table Showcasing the readings for all the water samples and sites.

Location	Depth (feet)	Turbidity (ntu)	pH	Electrical Conductivity (Ms/cm)	Temperature (C)	Salinity (ppt)
1	3	0.37	7.78	56.8	28.5	28.4
2	3	0.13	7.8	56.5	28.9	31
3	3	0.27	7.75	58.0	28.3	29.2
4	3	0.19	7.9	57.5	27.6	28.5

5	*3*	*0.21*	*7.8*	*57.1*	*28.0*	*28.5*

The table above presents the water sampling results collected over the baseline study and provides the corresponding site location and the water depth at which the sample was collected. All five (5) samples collected were tested within one (1) minute of collection, to reduce risk of contamination and ensure highest accurate readings possible. Based on the figures all the site readings are fairly similar. Results are provided in graphics below.

6.13.5.2.1 Turbidity Rates

Turbidity is the determination of how transparent a liquid or water body source is. It is an optical characteristic of water and is a measurement of the amount of light that is scattered by material in the water when a light is shined through the water sample.

All turbidity water samples were collected at a depth of approx. 3 feet below the water surface using the Sper Scientific 860040 Turbidity Meter on a falling tide between 12 noon and 2pm. Winds and seas of 2-5 feet offshore where observed in the area, however samples were still collected. The table below presents the turbidity sampling results collected over the five different sites.

All Turbidity sample readings were less than one (1) Nephelometric Turbidity units (NTU) even with rough conditions in swells of two to five (2-5) feet, immediately after an isolated thunderstorm, in an active waterway and strong tidal currents with a changing tide. Turbidity readings are well below the national permitted amount of 27 ntu's, and where consistent across all testing points, with NTU's found to be less than one (1) NTU.

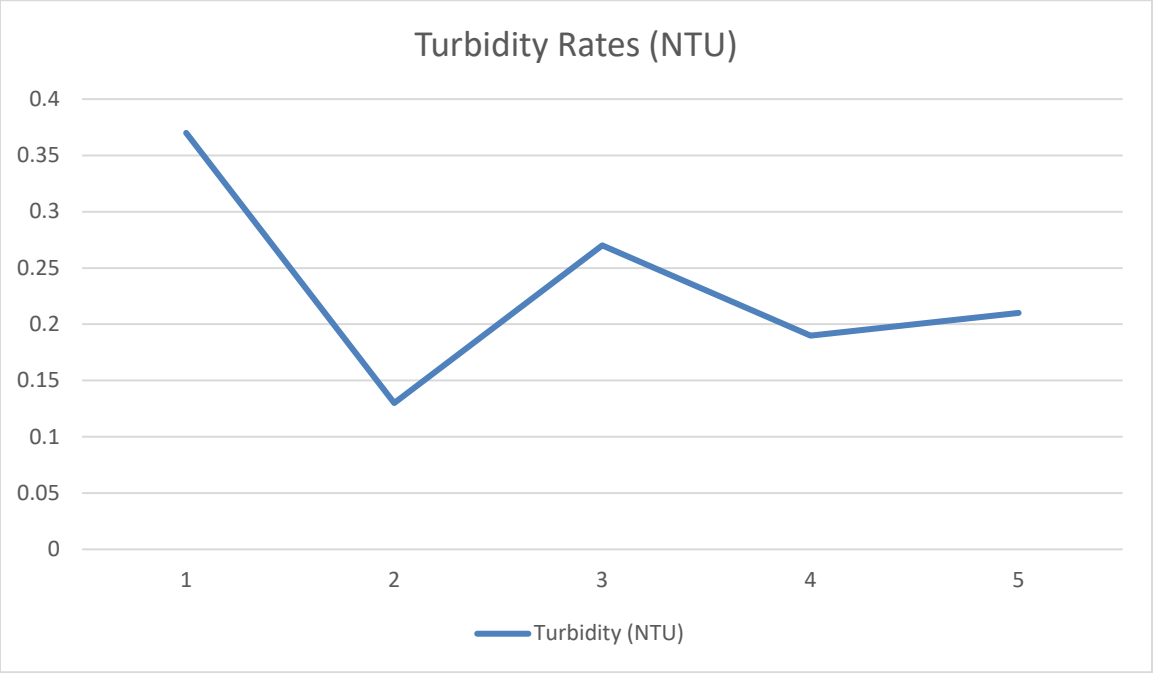


Figure 6-22 Graph detailing the turbidity rates observed across all the sampling sites, based on the graph above the turbidity readings are consistent with no spikes or outliers across the readings, indicating that the turbidity levels are consistent across the whole site

6.13.5.2.2 pH

The pH of ocean water is a measure of its acidity or alkalinity. It's an important parameter because it affects the chemistry and health of marine ecosystems. The pH scale ranges from 0 to 14, with 7 being neutral. Values below 7 indicate acidity, while values above 7 indicate alkalinity.

The average pH of the ocean's surface waters is around 8.1, making it slightly alkaline. However, due to factors like increased carbon dioxide (CO2) levels from human activities, the oceans are becoming more acidic in a process known as ocean acidification. This is particularly significant for marine life with calcium carbonate shells or skeletons, such as corals and some types of plankton, as acidic conditions can affect their ability to build and maintain these structures. Monitoring ocean pH is crucial for understanding these changes and their potential impacts on marine ecosystems.

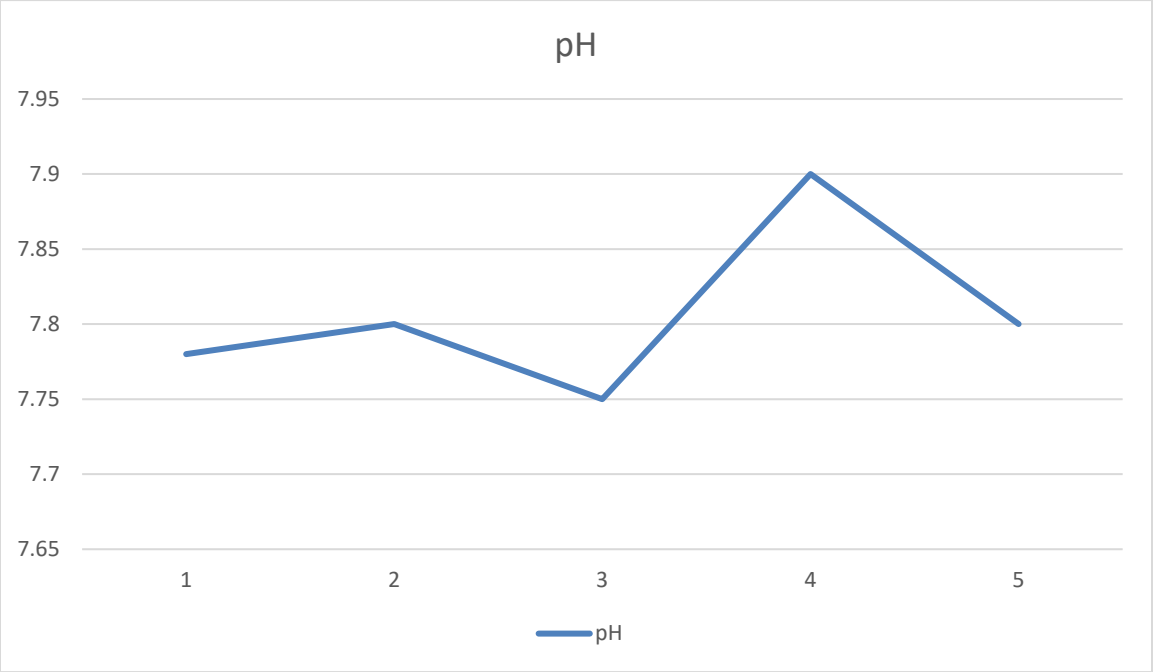


Figure 6-23 As shown in the graph the pH of all the sample sites were close to the typical pH range that can be expected for a seawater environment, as well as being consistent across all testing sites which further indicates the pH of all five testing points where consistent across all sites and are in line with typical figures found across The Bahamian archipelago.

6.13.5.2.3 Electrical Conductivity

Electrical Conductivity (EC) is used to determine the overall salinity of a water source. Salinity refers to the concentration of dissolved salts and other ions in the water. Since saltwater is a good conductor of electricity due to the presence of ions, measuring the electrical conductivity of seawater can provide valuable information about its salt content. Electrical Conductivity is a way to determine the ability of water to pass an electrical current, because dissolved salts and other inorganic chemicals conduct electrical current, conductivity increases as salinity increases.

Conductivity measurements are used to gauge salinity via EC or ms/cm rates and is crucial for understanding ocean circulation patterns, studying marine ecosystems, and monitoring changes in ocean health and climate. The typical rate of sea water in the Caribbean can vary depending on factors such as temperature, location, and depth, however, on average, the electrical conductivity of seawater is approximately fifty-five (55) Siemens per meter (S/m) or mS/cm (milliSiemens per centimeter), which is equivalent to a salinity of around fifty five (55) parts per thousand (ppt).

It is worth mentioning that values can vary due to local conditions and factors like freshwater inputs from rainwater or rivers, evaporation rates, ocean current speed and sediment deposition.

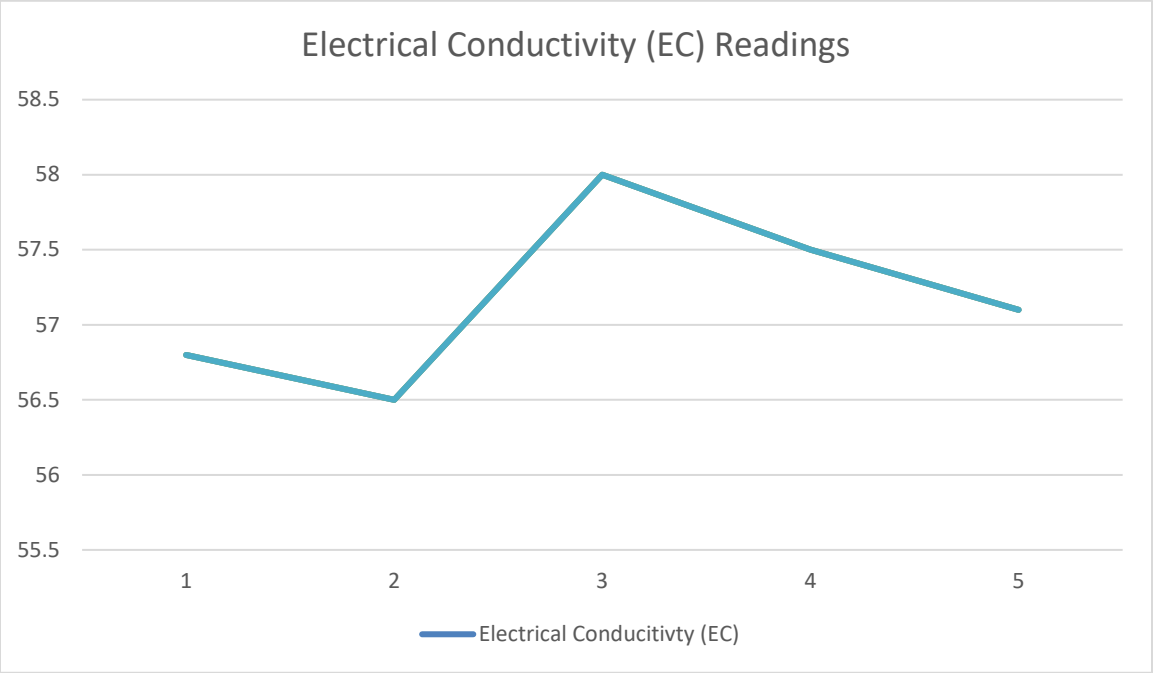


Figure 6-24 Based on the graph above, the EC readings are all consistent with each other with no outliers or anomalies, furthermore the figures are in line with typical seawater ms/cm rates that can be expected for this type of environment.

6.13.5.2.4 Temperature

The temperature of ocean water varies based on several factors, including location, depth, time of year, and ocean currents. In the Bahamas, the average summer surface temperature of the ocean is around 30 degrees Celsius (88 degrees Fahrenheit). However, this can vary significantly from one region to another. The ocean's temperature found in the testing sites shows a consistent temperature range with no outliers or anomalies. The water temperature was slightly warmer than the expected average, however the temperature was still in line with expected figures.

The overall water temperature in the area was above the expected average coming in at 30-32 °C or 88-90 °f, which is typically above average, however in the summer of 2023, there has been recorded breaking water temperatures experienced in the Atlantic, with the figures falling in line with the new high-water temperatures. Water temperature was consistent across all five of the testing points.

Ocean temperatures play a crucial role in regulating climate, influencing weather patterns, and affecting marine ecosystems. They also have a significant impact on ocean currents and the redistribution of heat around the planet. Monitoring ocean temperatures helps scientists understand climate change, sea level rise, and the health of marine ecosystems.

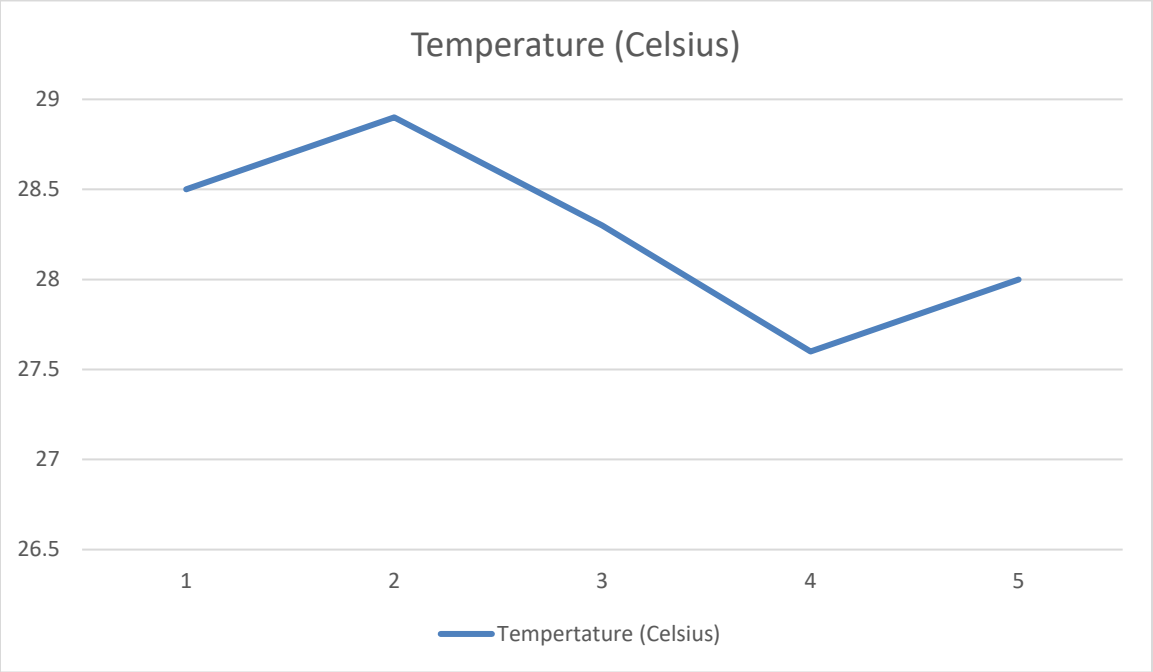


Figure 6-25 Graph showing the range of temperature found across all the testing points, which are all of a similar range and in line with expected figures even though water temperature is exceeding the historical yearly average. This further indicates that the dredge exercise has had no impact to the surrounding area by significantly raising or lowering the ambient water temperature.

6.13.5.2.5 Salinity (ppt)

Ocean salinity refers to the concentration of dissolved salts in seawater, usually expressed in parts per thousand (ppt) or as a percentage. Salinity is a critical factor in oceanography and marine biology because it affects various aspects of the ocean's physical and biological processes such as determining seawater density. Higher salinity increases water density, which affects ocean circulation patterns. Variations in salinity drive the global ocean circulation, which, in turn, influences climate patterns.

Maintaining healthy salinity levels is important for the overall health of marine ecosystems. Abrupt changes in salinity can stress marine organisms and disrupt ecosystems.

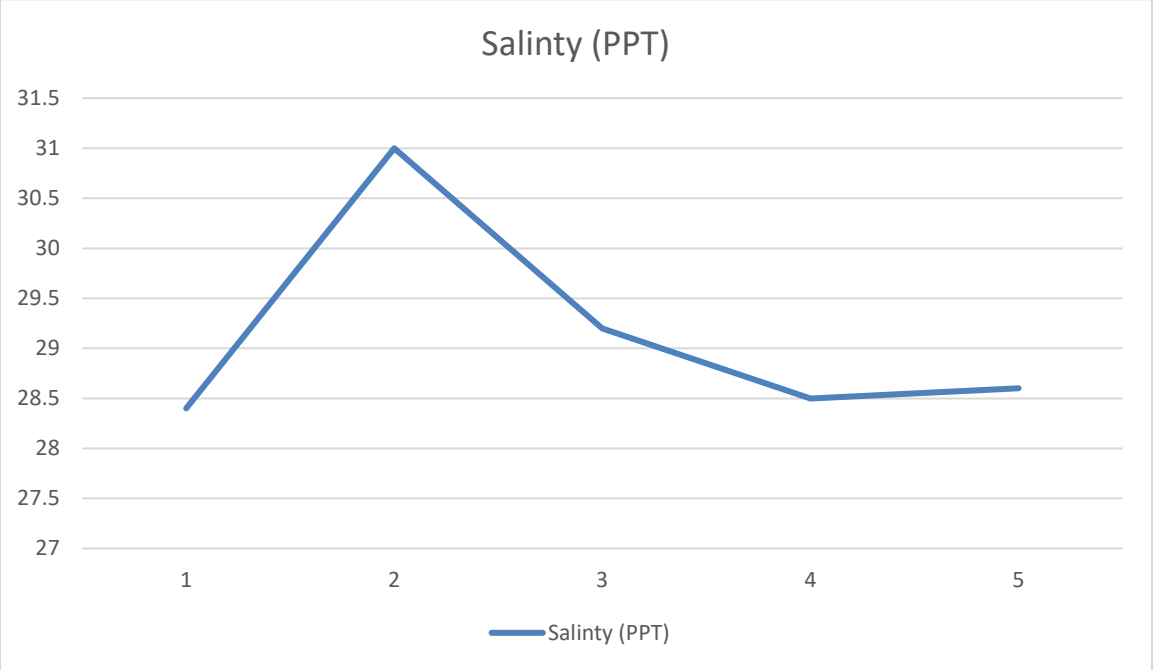


Figure 6-26 As shown in the graph the Salinity of all sample sites were consistent with each other, with no large outlier with figures in line with typical figures found across The Bahamian archipelago.

6.13.5.3 Microbiology Results

With the seasonal influx of several hundred vessels in Elizabeth Harbour, water quality tests were performed to gauge the presence of total coliforms, fecal coliforms, and E. Coli. Three (3) samples were taken on March 20th by grab: one (1) in the interior lagoon, one (1) in the channel, and one in Elizabeth Harbour. All samples contained total coliforms and *E. coli* with lowest levels measured in the more open waters of Elizabeth Harbour. Samples were kept on ice and transported to ADKA Laboratories on March 21st. Zero colonies grew for DEHS, FDEP, and WHO Water Guidelines MCL. The presence of *E. coli* does denote some degradation of existing water quality. Testing locations and results are provided below:

Figure 6-27Water Sample Locations, ADKA Test Samples, March 20, 2024

adka
Laboratories & Consultants Ltd. & Environmental Services
East Street North
opposite Police Headquarters
P.O. Box N-1555 • Nassau, Bahamas
Telephone: (242) 325-3808 / 328-6966
Fax: 328-6951
Email: mail@adkalaboratories.com

Doc No: Form 0001
Revision: 5

DATE: ..... March 27th, 2024
LAB SAMPLE NO:..... S-24-2621-3
SAMPLE OF:..... Water Analysis
SAMPLE RECEIVED DATE: ..... March 21st, 2024
SAMPLE COLLECTION DATE:..... Unknown
SAMPLE START DATE: ..... March 21st, 2024/13:03
REPORTED TO ..... Waypoint Consulting Ltd
Melissa Alexiou
Exuma, Bahamas

INDUSTRIAL MICROBIOLOGY TEST CERTIFICATE

RESULTS	(1) CFU/ 100mL	(2) CFU/ 100mL	(3) CFU/ 100mL	DEHS/FDEP/WHO Water Guideline MCL	METHODS
TOTAL COLIFORM	T	T	600	0 colonies	9222 B
FECAL COLIFORM	0	0	0	0 colonies	9222 D
E-COLI	57	184	34	0 colonies	EPA 1604
ANALYST INITIAL	M.S.	M.S.	M.S.		

FIELD SAMPLING PARAMETERS

PARAMETERS	(1)	(2)	(3)	Ideal Range (ppm)
CHLORINE (Cl)	N/A	N/A	N/A	0.5-3.0
SAMPLE METHOD	Grab	Grab	Grab	

DEHS: Department of Environmental Health Service (NAS)
FDEP: Florida Department of Environmental Protection
WHO: World Health Organization
T-TOO NUMEROUS TO COUNT

SAMPLE I.D.

1) Water Sample #1
2) Water Sample #2
3) Water Sample #3

Table 6-5 Water Quality - Microbiology Test Certificate, ADKA, March 20, 2024

6.14 Air Quality and Ambient Noises

During construction, the activity of heavy machinery will cause an unavoidable increase in noise. This will result in a short-term deterioration of sound quality. BMPs for noise attenuation will be outlined in the EMP. Worker safety can, for example, follow the U.S. Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits (REL). The NIOSH REL for occupation

noise exposure is 85 decibels, a-weighted, as an 8-hour time-weighted average (85 dBA as an 8-hr TWA) using a 3-dB exchange rate. Exposures at or above this level are considered hazardous.

7 Socio-Economic Overview

7.1 Population

The Bahamas is an archipelagic nation comprising 700 islands and cays situated over 100,000 square miles of the Atlantic Ocean. Located east of Florida and north of Cuba, The Bahamas has a population of 399,314 persons, of which 70 percent reside on New Providence. According to the Preliminary Census 2022, Exuma and the Cays experienced population growth (5.27 percent) between 2010 and 2022, with its population increasing from 6,928 to 7,293 persons representing 1.83% of the overall population of The Bahamas. Comparatively, 296,522 persons reside on New Providence, the most populated island of The Bahamas. Collectively, New Providence, Grand Bahama, and Abaco represent 90 percent of the population. New Providence is the most densely populated island, with a population density of 3,707 persons per square mile versus 65 on Exuma. The population of The Bahamas is projected to increase to 454,060 in 2040.

Stocking Island is located within the constituency of Exuma and Cays represented by Member of Parliament, The Hon. I. Chester Cooper, Deputy Prime Minister of the Commonwealth of The Bahamas.

Table 7-1 Key Demographic and Social Indicators – Exuma and Cays, 2010 versus 2022 Census

Parameter	2010	2022	% Change
Population	6,928	7,293	+ 5.27%
Male	3,468	3,517	+1.41%
Female	3,640	3,776	+9.13%
% Total Bahamas Population	1.97%	1.83%	-7%
Sex Ratio (Males per 100 Females)	0.95	0.93	-2%
Population Density			
Area (Square Miles)	112	112	
Population Density/Square Mile	61.9	65	+3%
Households			
Total Number of Households	2,028	2,348	+14%
Average Household	3.4	3.11	-9%

Table 7-2 Socio-Economic Indicators –Bahamas[89]	
Parameter	Value
Population, 2019	381,000
GDP (US $ millions), 2019	13,579
GDP per capita (US$), 2019	35,664
Life Expectancy at Birth, 2019	73.6
Adult Literacy Rate, 15 and up, 2007	96%
Poverty Rate, 2013	12.8%
Unemployment Rate, May 2019	9.5%
Infant Mortality Rate (per 1,000 live births), 2018	8.3
Human Development Index (rank), 2019	60

7.2 Economic Activities

The Bahamas has incurred two significant disruptions to economic activity since 2019: Hurricane Dorian and COVID-19. The International Monetary Fund (IMF) projects real GDP to contract by -16.2 percent in 2020, followed by a modest rebound of 2 percent in 2021. Real GDP is anticipated to reach pre-pandemic level by 2024.[10] The IMF predicts the 2022 projected real GDP growth to be 8 percent as an annual percent change, with inflation rising by 4.2 percent year over year.[11]

The Bahamas' economic recovery continued into the fourth quarter of 2021 despite the ongoing COVID-19 pandemic. Tourism, particularly gains in the high value-added air segment and resumption of sea traffic, supported economic recovery. According to data from the Ministry of Tourism, total 2021 Quarter 4 visitor arrivals amounted to 1.2 million compared to 54,728 in Quarter 4, 2020[12] with air passengers accounting for 265,604 persons and sea arrivals boasting 889,060 visitors with the return of cruise vessels.

The preliminary results of the December 2019 Labour Force Survey note a labour force of 170,835 persons, with 78.2 percent participation rate in the economy. Unemployment stands at 10.7 percent, up from 9.4 percent in May on New Providence. Of note, the Labour Force Survey December 2019 was conducted in New Providence only, due to Hurricane Dorian's impact on Grand Bahama and Abaco. The community, social, and personal services (which includes civil service, police service, and domestic service) account for 39 percent of the overall workforce

8 Adapted from IMF, The Bahamas – *Request for Purchase Under the Rapid Financing Instrument – Press Release; Staff Report; and Statement by the Executive Director for The Bahamas.* Country Report No. 20/191. June 2020 https://www.imf.org/en/Publications/CR/Issues/2020/06/04/The-Bahamas-Request-for-Purchase-under-the-Rapid-Financing-Instrument-Press-Release-Staff-49489

9 Adapted from IMF, The Bahamas – *IMF Executive Board Concludes 2020 Article IV Consultation with The Bahamas. Press Release:* No. 21/23. January 26, 2021

10 Adapted from IMF, The Bahamas – *IMF Executive Board Concludes 2020 Article IV Consultation with The Bahamas. Press Release:* No. 21/23. January 26, 2021

[11] International Monetary Fund (IMF). At a Glance. 2022. The Bahamas and the IMF

[12] Central Bank of the Bahamas. Quarterly Economic Review (QER). December 2021. Quarterly Economic Review (centralbankbahamas.com)

and constitutes the country's largest employer. Hotels and restaurants follow, with nearly 20 percent of the overall workforce, and wholesale and retail at 7 percent. The Bahamas has a high per capita income of $35,664.

7.3 Climate Change: Social and Sustainability

Due to the geographical location of The Bahamas, with over 80 percent of land mass within 1 m of sea level[13], climate change is a crucial area of concern for the country. As the ocean temperature, ocean acidity, and sea levels rise, the nation experiences intensified and more frequently occurring extreme weather events. In addition to the low altitude of the country, a great number of settlements and developments are situated very close to shorelines, making flooding an extremely tangible threat. The American Meteorological Society suggests there is a strong correlation between climate change and more deadly and destructive storm activity throughout the waters of the Caribbean.

As an island nation, The Bahamas livelihood is deeply dependent on the surrounding ocean. The National Climate Change Policy highlights several detrimental consequences of climate change that affect Bahamians' uncontaminated supply of food and water. These include depletion and pollution of potable groundwater supplies, loss of agricultural land and reduced agricultural productivity from salinity, introduction of alien pests and diseases and increases in the incidence of pests and diseases of crop plants, introduction of insect vectors of diseases of livestock and humankind, contagious diseases and heat-stress-related syndromes[14]. In The Bahamas, the freshwater lenses or aquifers sit atop saltwater and rise and fall with the tides. Sea level rise will directly impact the freshwater lenses, raising them progressively nearer the soil surface, more so in those islands with narrow and thinner aquifers than in those islands with larger and thicker aquifers[15].

Climate change threatens the everyday lives of Bahamian citizens. Sea level rise threatens 36 percent of major tourism properties, 38 percent of airports, 14 percent of road networks, and 90 percent of seaports[16]. These threats place financial constraints and concerns on Bahamian Government officials. As a country, these impacts are most evidently on the core industry of tourism, contributing to more than 60 percent of GDP, with expected losses of $869 to $946 million in 2050.

In addition to threatening The Bahamas water supply and food security, climate change poses a threat to marine life. The increased levels of carbon dioxide (CO_2) in the atmosphere (due to human activity) yield greater quantity of CO_2 dissolving into the ocean. As the ocean absorbs more CO_2, the pH decreases, and the ocean becomes increasingly acidic[17]. Rising sea temperatures and increased ocean acidity play major roles in coastal area erosion and coral reef bleaching, placing negative effects on both terrestrial and marine biodiversity. The loss of coral reefs creates even greater potential for large incoming waves and storm surges and will severely affect infrastructure and communities at the forefront of these locations.

[13] The Bahamas Voluntary National Review on the Sustainable Development Goals to the High Level Political Forum of the United Nations Economic and Social Council, 2018.
[14] Department of Statistics, 2017, The National Food & Nutrition Security Policy And Agenda For Action For The Commonwealth of The Bahamas.
[15] Bahamas National Climate Change Committee, 2005, National Policy for The Adaptation to Climate Change.
[16] The Bahamas Voluntary National Review on the Sustainable Development Goals to the High Level Political Forum of the United Nations Economic and Social Council, 2018.
[17] Smithsonian, 2018, Ocean Acidification.

8 Environmental Laws, National Environmental Policies and International Conventions

Stocking Island is located within the constituency of Exuma & Cays represented by Member of Parliament, The Hon. I. Chester Cooper, Deputy Prime Minister of the Commonwealth of The Bahamas.

8.1 Environmental Laws of The Bahamas

Environmental Law, Regulation, Policy	Subject	Summary
Antiquities, Monuments, and Museum Corporation Act 1998, Chapter 51	To protect antiquities	An Act to provide for the preservation, conservation, restoration, documentation, study and presentation of sites and objects of historical, anthropological, archaeological and paleontological interest, to establish a National Museum, and for matters ancillary thereto or connected therewith.
Antiquities, Monuments, and Museum Regulations, 1999	To establish the National Register of Historic Places and provide application for permits and licences	Regulations to establish the National Register of Historic Places, and provide procedures for application for a permit, application for a licence, fees for permits and renewal application.
Bahamas National Trust Act, 1959 Bahamas National Trust Amendment, 2013 Bahamas National Trust Amendment, 2019	Designation and management responsibility for National Parks	This Act and Amendment founded The Bahamas National Trust and grant it authority for the provision and oversight of National Parks in The Bahamas. The 2019 Amendment expands the duties of The Bahamas National Trust; to revise the constitution of the council; and to expand its authorized capital investments; and for connected purposes.
The Bahamas Protected Areas	A Notice of MPA Maps	A notice by the Ministry of Environment and Housing to the public advising the following maps depict Marine Protected Areas within The Bahamas under the Global Environment Facility (GEF) Full Size Project (FSP).
Biological Resources and Traditional Knowledge Act, 2021	To provide for the regulation and access to biological resources and associated traditional knowledge	An Act to provide for the regulation and access to biological resources, and associated traditional knowledge, sustainable use of its components, prohibiting unlawful genetic and bio-prospecting and gathering and for search for The Bahamas and its people fair and equitable sharing of the benefits arising out of the use of biological resources, traditional knowledge, and to establish the necessary administrative structures and processes for the implementation and enforcement of such principles and for matters connected therewith or incidental thereto.
Conservation and Protection of the Physical Landscape of The Bahamas, 1997 Chapter 260	Excavation, Landfill, Quarrying, Mining,	This Act makes provisions for the regulation of activities including excavation, landfill, quarrying, and mining in The Bahamas for the purpose of conservation of maintenance of the environment.
Environmental Health Services (Collection and Disposal of Wastes) Regulations 2004	To administer and outline waste collection and management facilities	Environmental Health Services (Collection and Disposal of Wastes) Regulations 2004 establish the collection and control of waste including waste facilities and other matters relating to wastes.
Environmental Health Services (Fees and Services) Regulations 2000	To establish fees and services performed by the Department of Environmental Health Services	The Fees and Services regulations outline services and associated fee rates performed by the Department of Environmental Health Services. The Department may provide testing for air quality, water quality, and radioactive materials.

Environmental Law, Regulation, Policy	Subject	Summary
Environmental Health Services Act 1987	To promote and protect the public health and to provide for the conservation and maintenance of the environment	An Act to promote the conservation and maintenance of the environment in the interest of health for proper sanitation in matters of food and drinks, and generally for the provision and control of services, activities, and other matters connected therewith or incidental thereto.
Environmental Planning and Protection Act 2019	To establish the Department of Environmental Planning and Protection	An Act to establish the Department of Environmental Planning and Protection; and to provide for the prevention or control of pollution, the regulation of activities, and the administration, conservation and sustainable use of the environment and for connected purposes. The Act defines procedures for environmental impact assessments and environmental reporting requirements for protection of natural resources.
Environmental Impact Assessment Regulations, 2020	To provide procedures for a Certificate of Environmental Clearance (CEC).	The Regulations provide procedures for the review proposed projects inclusive of monitoring and compliance requirements. The Regulations dictate the requirements for a Certificate of Environmental Clearance (CEC).
Forestry Act of 2010	To protect the forests and make declarations to use	The Act provides for utilization of forest products and non-timber forest products from the forest estate. It sets forth the management and conservation of the forest estate and associated industries.
Forestry (Declaration of Protected Trees) Order, 2021	To declare protected trees	A declaration of protected trees under the Forestry Act for Part I endemic or endangered or threaten protected trees, and Part II cultural or historical and economic protected trees.
Health and Safety at Work Act 2002 Health and Safety at Work Amendment, 2015	To protect human health and safety at work	The purpose of the Act is to secure the health, safety and welfare of persons at work- protect persons other than persons at work against risks to health or safety arising out of or in connection with the activities of persons at work- control the storage and use of explosive or highly flammable or otherwise dangerous substances, and generally preventing the unlawful acquisition, possession and use of such substances.
Planning and Subdivision Act, 2010 Planning and Subdivision Regulations (Application Requirements), 2011	To regulate the built environment	This Act regulates the development of the built environment though physical planning protocols across the archipelago of The Bahamas. The Act stipulates the process for subdivision approval subject to specific conditions with respect to the features of the proposed development or project including the preparation of an Environmental Impact Assessment/Statement.
Plant Protection Act 2016	To protect and promote plant health	An Act to protect and promote plant health; to prevent the introduction and spread of plant diseases and pests and to provide for appropriate phytosanitary measures for their control; to facilitate trade in plants and plant products; and to regulate other matters connected thereto.
Public Works Act 1963	To provide for the physical development of The Bahamas	An Act to provide for the construction, management and development of public works, buildings, and road.
Water and Sewerage Act 1976	To establish the Water and Sewerage Corporation and to control water resources	An Act to establish a Water and Sewerage Corporation for the grant and control of water rights, the protection of water resources, regulating the extraction, use and supply of water, the disposal of sewage and for connected purposes.

Environmental Law, Regulation, Policy	Subject	Summary
Wild Animals Protection Act 1968	To protect wild animals of The Bahamas	The Act provides a listing of protected animal species in The Bahamas
Wild Birds Protection Act 1987 Wild Bird Protection Act (Reserves)	To protect wild birds of The Bahamas	The Act protects the wild birds of The Bahamas and makes provision for the dedication of time periods for the hunting of specific species.

8.2 National Environmental Policies & Recommendations

Relevant National Policies	Subject	Summary
National Policy for the Adaptation to Climate Change 2005	Climate change assessment for the immediate and project adaptation techniques for The Bahamas	The National Policy for the Adaptation to Climate Change outlines a national framework to meet the goals and objectives of the United Nations Framework Convention on Climate Change (UNFCC). The Bahamas is committed to reduce greenhouse gases and address climate change impacts.
National Invasive Species Strategy for The Bahamas, 2013	Identifies and recommends a management framework for the control and eradication of invasive species.	The National Invasive Species Strategy for The Bahamas originally published in 2003, was updated in 2013 as part of the Global Environment Facility funded project, Mitigating the Threats of Invasive Alien Species in the Insular Caribbean (MITIASIC). It sets forth a management framework for the control and eradication of invasive species.
National Biodiversity Strategy and Action Plan, 1999	A plan to maintain biodiversity through sustainable development for a small island developing nation.	The Bahamas Government is committed to conserve biodiversity and to pursue sustainable development. This document highlights the role of biodiversity in the Bahamian social and environmental context and recommends measures to ensure its compatibility with future development.
The Bahamas National Wetland Policy	The goal of the National Wetlands policy is to conserve, manage, and restore wetland wisely in conjunction with sustainable development practices.	The Bahamas National Wetland Policy outlines a national framework to meet the goals and objectives of the Ramsar Convention which The Bahamas signed on June 7, 1997. This policy paper provides direction to the Government for the management of wetlands and to identify wetlands of national importance.

8.3 International Conventions of Relevance

International Convention/Organization	Subject	Summary
Cartagena Convention Ratified: June 24, 2010	An agreement for the protection and development of the marine environment in the wider Caribbean region	The Convention provides a legal framework for cooperation in the wider Caribbean region. Three technical agreements support the Convention which include: - Protocol for Co-Operation in Combating Oil Spills - Protocol for Specially Protected Areas and Wildlife (SPAW) - Protocol Concerning Pollution from Land-based Sources and Activities (LBS)

International Convention/Organization	Subject	Summary
Convention on Biological Diversity Signed: June 12, 1992	To preserve species diversity	The Bahamas is a signatory to the Convention on Biological Diversity which came into force December 1993. It has three main goals: a) The conservation of biological diversityb) The sustainable use of components of biological diversityc) The fair and equitable sharing of the benefits arising out of the utilization of genetic resources
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) Signed: June 7, 1997	This convention provides a framework for the international protection of wetlands as contributors for human resources and moreover, for avifauna which do not adhere to international boundaries.	The Bahamas is a signatory to the Convention on Wetlands of International Importance, also known as the Ramsar Convention. This convention provides a framework for the international protection of wetlands as contributors for human resources and moreover, for avifauna which do not adhere to international boundaries. Ramsar defines wetlands as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters."
Convention to Combat Desertification & Drought Signed: Nov. 10, 2000	To combat desertification and to mitigate the effects of drought	The Convention is a proponent for sustainable development by addressing social and economic issues that directly impact land degradation.
United Nations Framework on Climate Change Signed: June 1992 Kyoto Protocol Signed: April 9, 1999 Paris Agreement Ratified: August 22, 2016; Entered into Force: November 4, 2016	To stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with climate systems	The Bahamas is a signatory to UNFCC which entered into force in March 1994. The UNFCC was the culmination of climate negotiation at the Rio Earth Summit in 1992. This summit established a framework with an aim to stabilize atmospheric greenhouse gas. The Kyoto Protocol was developed under the UNFCC to provide emissions targets and timetables for developed countries. The Paris Agreement as put forth at the Conference of the Parties (COP21) in December 2015. The agreement has not yet come into force as it requires at least 55 parties to have ratified the agreement.

8.4 Government Departments and Local Non-Governmental Organizations

- Ministry of Works
- Ministry of the Environment and Natural Resources
- Forestry Unit
- Department of Environmental Planning and Protection
- Department of Physical Planning
- Department of Environmental Health Services
- Water and Sewerage Corporation
- Bahamas Power & Light
- Port Department

9 Environmental Impact Analysis

9.1 Methodology

Environmental impacts were assessed through a combination of background desktop study, scientific literature, and onsite field assessments. Terrestrial surveys, including botanical and wildlife, and marine surveys were performed to document existing site conditions. The terrestrial survey records observed flora and fauna to identify present vegetation communities. Botanical and wildlife assessments were performed March 18-20th, 2024. Marine benthic surveys were performed March 18-20th, 2024.

9.2 Land Use Impact

The privately owned ~34-acre Exuma Fund 2, Ltd. development on Stocking Island is presently undeveloped save for an existing and well-maintained nature trail. Land use will change from undeveloped to developed for commercial use and residential homes. This development aligns with adjacent land uses including hotels, day-clubs, restaurants, and private homes. Inevitably, the development will bring more people to the area for construction, maintenance, and guest use. The development will service its own back-of-house operations including electricity generation, potable water, and waste management services. The nature trail will be kept largely intact as the master plan avoids impacts to the mangrove wetland creek and buttonwood formation areas.

Figure 9-1 Above: Peace and Plenty Beach Club (left) and Kahari (right), Below: Karhari (left) and Area to be developed (right)

9.3 Aesthetic Impact

Overall, aesthetic impacts are anticipated to be neutral, if slightly negative. Aesthetic impacts are influenced by personal preference. The construction of homes will generate a change to the seascape from a natural coastline to one with visible human occupation when viewed from Elizabeth Harbour and the Exuma Sound. As a low-density development, this transition to constructed homes mitigates overall aesthetic impacts.

Figure 9-2 Seascape from elevated vantage point and tower, Stocking Island, March 2024

9.4 Impacts to the Physical Environment

Impacts to the physical environment are unavoidable in the construction and dredging footprints, however, impacts can be managed and mitigated by employing BMPs during construction and operation.

9.4.1 *Marina & RORO Dredging*

To facilitate the delivery of construction materials, the identified RORO location necessitates dredging to accommodate a barge. An estimated volume of 660 cubic yards of dredged material will be excavated in the area of the RORO and reused for upland purposes. Preliminary probes indicate a sandy bottom substrate. Of note, this dredge area is for construction purposes only with no maintenance dredging anticipated, sand will naturally accumulate in the impacted area over time. A coral head is approximately 200 ft to the southeast of the proposed RORO; with turbidity controls in place no adverse impacts are anticipated.

Marina final design indicates that limited dredging of 300 cubic yards is needed to accommodate shallow draft vessels. This area will be dredged to a depth of -4 MLLW. The size and draft of vessels docking at the marina is dictated by the ability to ingress and egress the to be dredged to -6ft MLLW navigational channel and the -4ft MLLW interior marina slips. The marina is anticipated to accommodate up to 32 vessels. Dredge spoils will be placed upland in the area of the interior lagoon beach for beach renourishment and enhancements. Turbidity controls will be deployed and used for any dredging operations with the lagoon with no long-term adverse impact anticipated. No dredging is required for any private residential docks; these docks were designed to avoid dredging.

Mechanical dredging will move dredge spoils upland for reuse onsite. All dredge operations will adhere to CEC stipulated guidelines and follow international best management practices including turbidity control measures. A dredged materials management plan will be submitted to DEPP for approval prior to start.

9.4.2 *Beach Improvements*

Dredged spoils from the RORO and marina will be used on the property for beach improvements, particularly at the low relief beach within the lagoon. There are no anticipated beach improvements below the high-water mark.

Figure 9-3 Interior lagoon beach for upland renourishment, March 2024

9.4.3 *Erosion and Sediment Impacts*

Erosion and sediment impacts associated with the overall development are largely dependent on adherence to BMPs. Construction activities will require management of land-based pollutants, which fall under an EMP.

Development introduces impervious surfaces, which exacerbate the volume and speed of runoff flow, particularly during storm events with periods of heavy downpours. Runoff is a vehicle for the introduction of land-based pollutants into the natural environment. When practical, drainage will be captured and reused for irrigation purposes; retention ponds may also capture stormwater in certain areas.

The site's topography has naturally formed two drainage areas denoted by low elevation and wetland associated flora including mangrove and buttonwood species. The developer intends to maintain these natural drainage basins with the master plan drawn accordingly. To further manage potential erosion impacts, proposed residences along the windward dune will be constructed from behind the dune and placed on pilings. Elsewhere, native vegetation will be planted where invasive species have been removed to encourage soil/substrate stability.

Residences constructed on lots 30 through 34 will be constructed at minimum distance of fifty (50) ft from the crest of the dune. Please refer to the appendix for additional details.

Figure 9-4 High relief frontal dune facing the Exuma Sound

9.4.4 *Impacts to Shoreline/Nearshore and Coastal Processes*

There are no anticipated impacts to the shoreline and/or coastal processes. The RORO dredge area is not anticipated to impact coastal processes with no maintenance dredging to take place.

9.4.5 *Hydrologic Impacts*

No impacts are anticipated to freshwater resources, if any are present onsite. All potable water production and wastewater treatment options will meet the requirements and specifications of the Water & Sewerage Corporation.

9.5 Biological Impacts

9.5.1 *Upland*

Habitat loss is unavoidable due to necessary clearing for structure construction. Coppice habitat, the DBEF, is the most biodiverse vegetation community in The Bahamas. DBEF is the predominant vegetation community onsite followed by coastal habitat. Thirteen (13) protected tree species were identified during the baseline biological assessments. A permit to harvest a protected tree species, where unavoidable, will be obtained through the Forestry Unit prior to construction start. Mitigation for the loss of upland vegetation may include planting with native vegetation, limiting construction footprints, and removal/control of invasive species. The contractor is experienced with successful native tree relocations in the Exuma Cays.

Figure 9-5 Vegetation on frontal dune crest facing interior ridge

Figure 9-6 Vast expanse of DBEF across the project site, taken from interior ridge tower

9.5.2 *Marine*

Overall impacts, subject to adherence to BMPs, are anticipated to be minimal. The marine environment comprises primarily sandy substrate with sparse seagrasses. Control of sediment during construction of private and marina docks, beach improvements, dredging for the RORO, and all coastal activity, is a priority to avoid adverse impacts

due to turbid sediment laden environments. It would be appropriate to educate guests and mariners about the sensitive marine environment, wetland creeks, and the close proximity of Moriah Harbour Cay National Park.

Environmental considerations for docks pertain to the issue of habitat degradation due to impacts of shading and physical disturbance of sediments. 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 structures away from dense seagrass beds and at heights that allow light penetration dependent on the orientation and daily migration of the sun.

Water quality degradation is a known issue for Elizabeth Harbour with water quality results reporting the presence of *E. coli*. As a low-density development, impacts to water quality are not anticipated with the installation of a new and efficient septic systems meeting specifications of the Ministry of Works. The installation of moorings in Elizabeth Harbour coincides with an effort to also initiate pump-out services to visiting vessels.

9.5.3 *Impacts to Biodiversity*

Biodiversity refers to the irreplaceability and vulnerability of a habitat or community within a specific geographic context. The Bahamas is party to the Convention on Biological Diversity, which recognizes the interconnectedness of climate change and biodiversity.

Threats to biodiversity including the introduction of invasive species, changes in micro-climates, habitat loss and fragmentation, and changes in air and water quality from emissions, effluents, and sedimentation.[18] Small island nations are uniquely vulnerable to the introduction of invasive species. The importation of landscaping material presents opportunity for the introduction of non-native and invasive species, such as the cane toad, notably on New Providence. Invasive species are a nuisance and may be difficult to manage without adequate vigilance and quick eradication efforts.

Removal of invasive species in areas slated for development and replacement by native species will improve and secure the biodiversity on the cay while eliminating the compounding threat of thriving invasive species populations across a small island. Invasive species outside the development footprint will be managed, where feasible. Prior to construction, a permit to Harvest a Protected Tree Species will be filed with the Forestry Unit for mature protected species meeting permit criteria. Protected trees will be avoided and/or transplanted where feasible. It is the developer's intention to relocate trees, where feasible, to a nursery for use in future landscaping. The contractor currently engaged has experience in performing successful tree relocations across The Bahamas, particularly, the Exumas.

Exuma Fund 2, Ltd, can support biodiversity through the use of native landscaping, a biosecurity and invasive species management plan, limited construction footprints, and natural areas accessed by pedestrian pathways such

18 Graham, Watkins et al. Guidance for Assessing and Managing Biodiversity Impacts and Risks in Inter-American Development Bank Supported Operations. IDB-TN-932. November 2015.

as the existing trail and raised boardwalk through the buttonwood formation. Careful master planning with due consideration for wetland areas supports the preservation of biodiversity in sensitive areas; there will be an unavoidable loss of vegetation in areas slated for construction.

Installation of renewable energy technologies, utility management, and master planning based on the natural setting support climate change initiatives to lessen anthropogenic impacts on the climate.

9.5.4 *Sensitive Environmental Features*

A creek fringed by red mangrove flows into the project from the lagoon. The creek terminates at largely open sand flat largely devoid of vegetation save for mangrove saplings and intermittent grasses. Given the dearth of established vegetation, it is anticipated that this area floods during king tides and/or is a vehicle for drainage flow into the lagoon following a rain event. The developer intends to construct a raised golf cart part in this area and/or the installation of culverts to maintain the naturally existing exchange of water in this area. Non-structural project features such as tennis courts may be constructed on the sand plain pending adequate drainage.

Figure 9-7 Mangrove fringed creek and area of dwarfed mangrove, March 2024

Figure 9-8 Open sand flat/flood plain with individual mangrove saplings, March 2024

The approximately 4-acre buttonwood formation will be largely avoided save for construction of a roadway around its western perimeter.

Figure 9-9 Button formation and elevated walkway

9.5.4.1 Habitat Fragmentation & Degradation

Habitat fragmentation is a recognized threat to biodiversity that generally results in reduced ecosystem function and species richness. The extent of fragmentation can be limited by natural corridors, green spaces, and reduced construction clearing footprints. As is typical in the Bahamian terrestrial environment, the DBEF exhibited the greatest species diversification amongst all vegetation cover types. It is expected that some habitat degradation will occur due to the unavoidable loss of habitat associated with building and infrastructure development. It is recommended that the site be left in its natural state until necessary for construction, with a limited building envelope. With implementation of BMPs, particularly wastewater, no impacts are anticipated that would contribute or accelerate the upland or marine habitat degradation.

Figure 9-10 Debris and an invasive Casuarina sp. along the lagoon perimeter, March 2024

9.5.5 *Wildlife Impacts and Avifauna & Bats*

A total of six (6) avifauna species were recorded during the investigation. Species abundance was relatively low, which is unusual given the spring migration period, inclement weather and the time of day may have contributed to the low species abundance. Impacts to avifauna are anticipated to be minimal.

There is no intention to remove protected fauna. Fauna including snakes, crabs, etc., encountered during construction will be caught and moved to similar habitat on the island.

9.6 Fire and Hurricane Risks

The Bahamas lies in the Atlantic hurricane zone and is subject to indirect or direct hurricane landfall from time to time. Moreover, The Bahamas is affected by storm impacts including storm surge and elevated tides due to nearby low-pressure storm systems. The developer will adhere to the Bahamas Building Code and, where possible, use hurricane resistant materials to withstand winds of 150 miles per hour.

Fire is an inherent risk during construction and operation of a development. Roadways should make adequate provision for fire emergency services. Fire-fighting equipment such as fire extinguishers must be available onsite at all times. The inventory of materials shall identify any substances requiring additional specialty fire-fighting equipment. A list emergency numbers should be available onsite at all times.

9.7 Socio-Economic Impacts

While the 2022 Census noted a slowdown in population growth in the Exuma Cays, the population continues to increase. The USD$80 million capital expenditure will contribute directly to employment of Bahamians during construction and operation.

9.7.1 *Labour Impacts*

Employment will follow the guidelines of the Ministry of Labour. It is anticipated that at least 40 permanent construction jobs will be generated. It is the intent of the developer to use greater than 75% Bahamian labour during both the construction and operation of the project.

9.7.2 *Impacts to Neighbouring Communities*

Direct and indirect impacts to neighbouring communities pertain primarily to the influence of the project on Great Exuma, particularly Georgetown, at less than 2 miles by boat across Elizabeth Harbour. The influx of visitors and workers may place increased demand on available social resources, such as medical facilities, food stores, road network, and schools. As transportation options already exist to access Chat N'Chill, Peace and Plenty Beach Club, and the Kahari Resort, the increased volume of visitors to Exuma Fund 2, Ltd. aligns with present uses in the immediate vicinity. The introduction of a residential community on Stocking Island in this area may allow for a more consistent population rather than seasonal fluctuations.

9.7.3 *Cultural Resources*

Relating to antiquity, to date no structures or ruins have been discovered onsite. During clearing exercises, protocols will be in place for the discovery of antiquities, with immediate notification made to the AMMC. Any artefact or structure will be left in place until otherwise indicated by AMMC.

10 Environmental Management

Environmental management is a systematic approach that integrates environmental policy and planning with continuous monitoring of implementation techniques to improve environmental compliance to achieve the goals of sustainable development. Hazards to human health and safety and the environment can be managed through careful planning, vigilance and strong communication during works and continual improvement to the overall environmental management program.

The preferred management approach is to avoid, minimize, and control adverse impacts to human health, safety, and the environment. Where adverse impacts cannot be avoided, BMPs should be employed to mitigate human and environmental harm.

The EMP is a dynamic document with revisions anticipated throughout the various stages of the project. A copy of the EMP will be kept onsite at all times.

10.1 Good Housekeeping Practices

Good housekeeping practices help maintain a safe and healthy workplace by eliminating hazards. While seemingly simple, a well-kept site improves productivity and worker health, thereby aiding in accident and fire prevention. A tidy work site, organized and free of clutter, allows for more effective use of the site.

General guidelines for good housekeeping practices include but are not limited to the following:

- Identification and marking of physical hazards, such as open trenches
- A designated materials storage area with adequate space and organization for supplies
- Preventive maintenance on tools and machinery to reduce the threat of spills and accidents
- A waste management program that provides and frequently empties bins for litter, dumpsters, and a designated area for construction debris
- Daily street cleaning to prevent elevation of dust particles and mud during rainfall events

10.2 Site Safety and Health

Personnel onsite will have access to sanitary conveniences, potable water, and when deemed necessary for the task, appropriate personal protective equipment (PPE). PPE protects the body from safety and health risks at work. Additional PPE will be available for work sites near water or open trenches with standing water and will include ladders, safety harnesses, and training.

PPE may include but is not necessarily limited to the following:

- Steel-toed boots
- Safety vests
- Hard hats
- Gloves
- Eye protection
- Hearing protection

All personnel will undergo an initial site safety and health training, followed by periodic refresher training. Employees should be trained on how to use PPE properly and effectively. PPE shall be inspected and maintained in good condition and if it becomes worn or broken, new PPE shall be distributed and used.

Potable drinking water will be available onsite at all times. Sanitary conveniences will be available for use onsite and regularly emptied.

Adequate lighting will be provided for work that continues during night-time hours.

A first-aid kit and emergency contact list will be available at all times. Hazards such as open trenches and utilities will be marked by caution tape. Security and signage will identify hazards to public safety.

10.3 Materials Storage

Materials stored according to BMPs prevent spills through hazard avoidance. Materials shall be stored in a designated and secured area. Every material requires specific handling procedures because materials differ by composition, size, and weight. Materials shall be handled and stored according to specifications found in the Material Safety Data Sheet (MSDS). MSDSs shall be kept onsite at all times.

Flammable materials will be stored away from ignition sources to prevent fire. The contractor shall have fire extinguishing equipment onsite at all times.

10.4 Waste Management

Waste management identifies a project's waste streams, makes provision for timely and effective removal, and allocates responsibility for waste disposal. General housekeeping should keep the work areas free of litter and construction debris.

All solid waste materials will be placed in a designated dumpster or bin to be emptied on a fixed schedule and disposed of at a facility as directed by DEHS. Sanitary conveniences will be emptied at regular intervals by an approved sewage disposal company. Hazardous materials, if any, will be identified, appropriately stored, and disposed of in coordination with DEHS.

10.5 Protection and Preservation of Natural Resources/Sensitive Environmental Features

Employment of BMPs will minimize adverse impacts to natural resources and ensure viability of sensitive environmental features such as wetlands and nearshore habitats.

- A walkover survey is performed to identify affected protected tree species and subject to permit criteria, to apply for a permit to harvest a protected tree under the purview of the Forestry Unit under the Protected Tree Order 2021, Forestry Act 2010.
- Erosion and sediment control measures will minimize sedimentation impacts and constitute a form of pollution control.
- Spill prevention practices include designated refuelling and fuel storage areas with adequate containment measures, preventive heavy vehicle and machinery maintenance, and onsite spill clean-up kits, and waste management.

10.6 Stormwater

Removal of vegetation and development construction increases the amount of impervious surface areas, which increases the rate of surface water runoff. These high stormwater flow rates can lead to erosion and flooding. Stormwater may be contaminated with oil and grease, metals, particulate matter, and other pollutants released by vehicles. Stormwater may also contain nutrients and herbicides used for the management of vegetation in the right-of-way.

Stormwater management practices slow peak runoff flow, reduce sediment load, and increase infiltration. Infiltration is increased via vegetated swales, filter strips, terracing, detention ponds or basins, infiltration trenches/basins, and constructed wetlands.

General stormwater management practices include the following:

- Methods to reduce/slow peak runoff flow
- Installation of energy dissipation measures
- Regular maintenance of erosion and runoff control measures

10.7 Erosion and Sediment Control

Sediment impacts may occur during heavy storm events where flash flooding may erode surfaces and transfer suspended sediments to another location. Turbid conditions may adversely affect light penetration through the water column, impairing photosynthesis for marine species.

BMPs for erosion and sediment control include but are not limited to the following:

- Dewatering hoses, if any, will be placed away from sensitive environmental features and allow time for suspended sediment to fall out.
- Installation and ongoing maintenance for sediment and erosion control devices such as silt fencing, check dams, and/or mulch berms
- Revegetation and/or otherwise stabilizing of a cleared area

10.8 Prevention of Pollution of Groundwater Resources

Employment of BMPs will minimize adverse impacts to natural resources and ensure viability of sensitive environmental features such as wetlands and nearshore habitats. Erosion and sediment control measures will minimize sedimentation impacts and constitute a form of pollution control.

Spill prevention practices include the following:

- Designated refuelling and fuel storage area; with adequate containment measures (110 percent of capacity)
- Preventive heavy vehicle and machinery maintenance
- A designated wash-down area away from surface waters and sensitive environmental features
- A waste management program
- Onsite spill clean-up kits

10.9 Air Quality and Noise Attenuation

10.9.1 *Air*

The contractor shall implement measures to maintain ambient air quality. Fine sediment may become airborne during the dry season, which typically begins in November and ends in late May. Dust mitigation strategies during construction may include:

- Vehicle speed restrictions
- Site watering, as necessary, during the dry season

It should be noted that due to the isolated nature of the site and there being no adjacent neighbours, air, noise, and dust mitigation will require less mitigative measures than if situated in a densely populated area.

10.9.2 *Noise*

Noise prevention and mitigation begins at the source of noise. Noise reduction at the source prevents extraneous noise output. Noise reduction options may include but are not limited to the following:

- Selecting equipment with lower sound power levels
- Installing suitable mufflers on engine exhaust and compressor components
- Installing acoustic enclosures for equipment casing radiating noise
- Installing vibration isolation for mechanical equipment
- Limiting hours of operation for specific pieces of equipment or operations, especially mobile sources operating through community areas

10.10 Fire and Hurricane Risks

The North Atlantic tropical cyclone season begins June 1 and ends November 30. However, tropical disturbances may form prior to the start and after the close of this time period. The Bahamas lies within the hurricane zone, so it is expected that tropical disturbances, tropical depressions through Category 5 hurricanes, may periodically make landfall. Risks associated with tropical cyclones include storm surge, high winds, and heavy rainfall. All construction will adhere to the Bahamas Building Code. Fire-fighting equipment such as fire extinguishers must be available onsite at all times.

10.11 Environmental Monitoring

Environmental compliance is achieved through frequent and consistent site inspection and strong communication with the contractor. Construction monitoring documents the contractor compliance to the EMP with respect to but not limited to site safety and health, protection of ground water, general housekeeping, hazardous waste disposal, noise and air quality control, and protection of natural resources. The monitoring checklist is the mechanism within the environmental management system to document onsite practices, provide recommendations, and note when corrective action is required.

10.12 Grievance Redress

Grievance redress for employees, neighbours, and adjacent property owners is a management tool to identify, assess, and provide resolution of complaints during a project cycle. Implementing a system of grievance redress early in a project's cycle allows for resolution of minor issues before escalation. Grievance redress mechanisms (GRMs) are a core component of managing project operational risk.

10.13 Draft EMP TOR – Exuma Fund 2, Ltd.

Table of Contents
Environmental Management Plan
Exuma Fund 2, Ltd.
Stocking Island, Exuma, The Bahamas

12.1. Oil Spill Plan
12.2. Hurricane Preparedness Plan
12.3. Hazardous Materials Management & Response

13. Appendix
13.1. Stormwater Management Plan

11 Public Consultation

Public consultation will occur in coordination with the Department of Environmental Planning and Protection in accordance with the Environmental Impact Regulations 2020.

12 Mitigation

Mitigation is achieved through avoidance, minimization, rehabilitation, compensation, or offsetting. Where feasible, avoidance of impacts is pursued as a priority mitigation strategy. Where avoidance is not an option, strategies are presented to mitigate known and unknown impacts.

12.1 Climate Change Mitigation and Adaptation Plan

Climate change will contribute to greater climate variability, where changes may occur to precipitation patterns, increase in frequency and intensity of storm events, extreme heat, global sea level rise, and alteration of wave patterns, leading to shoreline erosion. Given this climate variability, engineering and building designs should plan for a scenario for future high anthropogenic greenhouse gas emissions. The Bahamas' low-lying topography makes it highly susceptible to sea level rise, with 80 percent of The Bahamas' landmass within 1.5 m of sea level. Freshwater resources are even more vulnerable, with 90 percent within 1.5 m.

The Sixth Assessment Report by Working Group II for the IPCC identifies climate change impacts and risks specific to small islands. Key points include ecosystem degradation, severe coral bleaching, infrastructure susceptibility to climate risks, pressures on freshwater resources and drought risk, extreme precipitation and wave impacts, and the vulnerability of communities on small islands to exceed adaptation limits[19].

Sustainable land management can reduce negative impacts of climate change on ecosystems and societies.[20] To mitigate forecasted climate vulnerabilities, Exuma Fund 2, Ltd. proposes the following adaptation techniques as outlined in the following sections.

12.1.1 *Renewable Energy and Energy Consumption*

12.1.2 *Deforestation Mitigation & Prevention of Desertification*

Land degradation is defined by the International Plant Protection Convention (IPPC) as a "negative trend in land condition, caused by direct or indirect human induced processes, including anthropogenic climate change, expressed as a long-term reduction and as loss of at least one of the following: biological productivity, ecological integrity, or value to humans."[21] Land degradation contributes to the effects of desertification, where vegetation cover is decreased, and carbon dioxide is released to the atmosphere. Vegetation removal and replacement with impervious surfaces and black asphalt may result in a heat island effect, where urban temperatures are higher, most notably at night, than compared to surrounding areas that are more vegetated.

Additionally, a native landscaping palette will increase biodiversity through the control, removal, and eradication of invasive species such as the Casuarina. Trees grown in the nursery will be evaluated for replanting potential and overall integration to the design aesthetics and architecture.

[19] IPPC. Sixth Assessment Report. Working Group II. Fact Sheet – Small Islands. 2022
20 IPPC. Climate Change and Land. Summary for Policymakers. 2020
21 IPPC. Climate Change and Land. Summary for Policymakers. 2020

12.1.2.1 Rainfall & Freshwater Resources

Based on the IPCC 5th Assessment Report and the CMIP5, climate change will alter existing rainfall patterns in The Bahamas. Climatology data suggest that The Bahamas region will incur a 3 percent decrease in monthly rainfall averages, with an increased intensity of rainfall events between October and February.

Overall, total rainfall is expected to decrease, placing additional pressure on freshwater resources. Freshwater resources in The Bahamas originate from rainfall only and accumulate in Ghyben-Hertzberg lenses. On average, the freshwater lens occurs at a depth of 2 ft to 5 ft below the surface. Ninety percent of freshwater lens resources in The Bahamas are within 5 ft of the surface. Given the proximity of fresh water to the surface and the high porosity of limestone, over-extraction and pollution may lead to depletion, saltwater intrusion, and/or contamination, impairing the fragile layer of freshwater over salt. Saltwater intrusion to limited freshwater resources is a threat.

12.2 Vegetation Management

12.2.1 *Clearing & Grubbing*

There will be an unavoidable loss of vegetation in areas slated for development. The developer shall take care to ensure that vegetation removal is kept at the minimum required. Clearing and grubbing prepares the site for construction. Clearing removes the above-surface foliage and trees, whereas grubbing removes the roots that remain in the soil. This process requires heavy machinery and adherence to BMPs for sediment and erosion control, prevention of pollution to groundwater resources, and protection of sensitive environmental features.

Construction BMPs:

- Protection of Sensitive Environmental Features.
  - Environmental controls shall be placed along sensitive environmental features such as wetlands and barriers shall be installed around fully mature protected trees, to protect from encroachment, and damage from machinery.
  - The workforce will receive training on protected tree species and the importance of wetland habitat and mangroves.
  - A walkover survey shall be performed prior to the commencement of works. Mature protected trees, if any, in the area of the work site shall be removed only upon receipt of a Permit to Harvest a Protect Tree as permitted by the Forestry Unit.
  - Heavy machinery will undergo routine maintenance to prevent leaks, spills, and/or other mechanical failure that may cause environmental harm.

- Cleared Vegetation.
  - Vegetation that is cleared may be mulched and used for other beneficial purposes. Invasive species should be separated from any mulching operation and disposed of separately.

- Landscaping & Planting
  - All areas cleared for construction should be temporarily stabilized (environmental controls, temporary seeding, etc) until such time that they are ready for final stabilization in order to mitigate sediment and erosion impacts.

12.2.2 *Invasive Species Management*

The Bahamas National Invasive Species Strategy 2013 (NISS) updated policies to mitigate the threat of invasive species via the prevention of introduction as well as the management and eradication of listed species[22]. Invasive species management protects the natural environment, genetic diversity of flora and fauna, ecosystem services, and quality of life. This National Policy is further strengthened in the Environmental Planning and Protection Act, 2019, which defines invasive alien species as "a species that is non-native or alien to the ecosystem under consideration, and its introduction causes or is likely to cause harm to the economy, environment, or human health".

Small Island Developing States (SIDS) like The Bahamas have high native species diversity and endemism counts due mainly to physical isolation from the mainland. This isolation is both a vulnerability and an advantage for invasive species management.[23]

As an archipelagic nation, The Bahamas is uniquely vulnerable to invasive alien species due to multiple invasion border pathways, requiring a complex management approach and the distribution of islands each harboring a site-specific habitat matrix with limited defences to aggressive and opportunistic invaders. Climate change exacerbates this threat, with intensifying storm events resulting in significant habitat degradation and loss, facilitating rapid colonization by alien invaders. Moreover, climatic changes may be conducive for the spread of tropical disease.

Public educational campaigns and media have highlighted several alien species including lionfish, cane toad, Australian pine, and white inkberry. These widely recognizable species threaten native populations through competition of resources, predation, and displacement. Other environmental threats associated with invasive species include the following:

- Loss of genetic diversity
- Introduction of disease
- Change in the physical properties of the environment
- Changes to ecosystem functions
- Changes in nutrient cycles

Invasive species not only threaten the natural environment but also the underlying economy and culture. Competition for subsistence harvesting and degradation of culturally important habitats and resources may also be affected[24]. Economic impacts from invasive species include:

- Loss of biodiversity, rare and endemic species
- Interference with fisheries, agriculture, and silviculture
- Disruption to tourism products
- Damage to infrastructure
- Decreased property value
- Costs of clean up and control

22 Moultrie, S. (2013). *The Bahamas National Invasive Species Strategy 2013*. Nassau: Department of Marine Resources.
23 Bullard, JM. (2013). Critical Situation Analysis of Invasive Alien Species Status and Management, The Bahamas. Nassau. Department of Marine Resources.
24 Moultrie, S. (2013). *The Bahamas National Invasive Species Strategy 2013*. Nassau: Department of Marine Resources.

- Costs of treatment or quarantine
- Health costs and loss of productivity.

12.2.3 *Invasive Species Identified at Exuma Fund 2, Ltd.*

Three (3) invasive species were observed on the site. Table 13-1 lists these species, along with recommendations for management as outlined in the National Invasive Species Strategy for The Bahamas, 2013.

Table 12-1 Invasive Species Recorded on Exuma Fund 2, Ltd., Exuma, The Bahamas		
Botanical Name	Common Name	Management
Casuarina equisetifolia	Australian pine	Control
Bermuda Grass	Bermuda Grass	Monitor
Scaevola taccada	Hawaiian seagrape	Eradication

12.2.4 *Management Protocols*

Invasive species management protocols for Exuma Fund 2, Ltd. pertain to the following:

- The introduction pathway
- Eradication and control of existing invasive species in the development footprint
- Routine preventive maintenance for future establishment

Continued vigilance following construction buildout is key to long-term preservation of biodiversity.

Exuma Fund 2, Ltd. intends to relocate as many protected species as possible from the proposed site to other areas on the project site, where plants can't be relocated the Owner intends to plant / propagate the species in other locations on the property and follow recommendations provided by the Government of The Bahamas via the Forestry Unit.

12.2.5 *Removal of invasive species*

Exuma 2 Fund, Ltd. has three (3) plants listed on the recommended for removal, control, and monitoring across the island. Additionally, as all plants are either on red lists regionally or locally it is recommended the following methodology is proposed in plant removal.

12.2.5.1 Casuarina

Casuarina sp. were infrequently present along the coastal areas (windward and leeward beaches) with some immature trees starting to grow behind the dwarf mangrove flat adjacent to the lagoon and low relief interior beach. The manual removal of seedlings and saplings is strongly recommended, given the size of the trees, if not possible the trees are to be felled using a chain saw. The stumps will then subsequently be treated with an herbicide that can be sprayed or applied to the bottom of the trunk.

Figure 12-1 Left: Casuarina sp. coastal lagoon perimeter, Right: Casuarina sp. windward dune

12.2.5.2 Scaevola

Scaevola plants were present along the windward dune. The recommendation is that the plants be removed manually to avoid erosional impacts. Starting with the older more mature specimens and working down to the younger specimens by hand-pulling quickly followed by removing them from the site to prevent the plant roots from 'catching' again. Older plants may be mechanically removed by digging or hand-pulling and taken away (along with the seeds) from the site. All fleshy branches are also to be hand-pulled and any broken underground stems also completely removed and replaced with the native variant of a whole new species.

12.2.5.3 Bermuda grass

Bermuda Grass was predominately focused along the nature trail edges. The numbers are low enough not to be of any significant concern, however it needs to be continuously monitored, and any new growth should be removed and stopped, to be replaced with a more native grass or other floral plant.

12.2.5.4 Introduction Pathway

Preventing the introduction of an invasive alien species through invasion pathway management is the most effective practice to avoid unwanted species establishment. Most vectors arrive via human-assisted transport such as planes and ships. These transport mechanisms move organisms outside their natural environs. As an island nation, The Bahamas imports myriad goods, including food, ships, tires, pallets, construction materials, and landscaping. Intentional introductions are often motivated by economic, environmental, and social means, for example agricultural, landscaping, and even environmental control measures.[25] In the absence of national policies to avoid the import of invasive alien species, the following BMPs are recommended.

25 Bullard, JM. (2013). Critical Situation Analysis of Invasive Alien Species Status and Management, The Bahamas. Nassau. Department of Marine Resources.

Introduction Pathway Management BMPs

- **Landscaping – Native Palette.** The landscaping palette should promote a predominantly native species array, with ornamental species reviewed for inclusion on the National Invasive Species Strategy 2013 lists.
- **Landscaping – Purchase Local.** Where feasible, landscaping should be purchased via a local supplier, where trees and shrubs are grown locally, avoiding the human-assisted transport invasion pathway.
- **Materials Review.** Upon arrival, construction materials should be reviewed for unwanted vectors. All earth-moving equipment should be washed down prior to site arrival to prevent transport of invasive seeds, i.e., *Casuarina*, and/or material. Disturbed areas are ideal habitats for invasive seedlings to establish.
- **Vector Control.** Vector control onsite should consist of approved methods and agents. Biological control of vectors such as rats shall not include the introduction of a non-native species.

12.2.5.5 Eradication and Control

The Bahamas National Invasive Species Strategy 2013 (NISS) lists invasive species and also provides a recommendation for control: eradication, control, or none listed. Eradication is the preferred approach to restore and maintain biodiversity; however, it is also the most costly and difficult to implement. Established populations of invasive species, such as the Australian pine, would take significant resources and years of committed action to accomplish eradication.

Of critical importance is the disposal mechanism for the removed invasive species. Felling of botanical species without removal may result in unintentional seed dispersion.

Control techniques include:

- Physical Control – removal by hand, mechanical harvesting, or the creation of physical barriers.
- Chemical Control – chemical dosing, use of toxic baits, and application of herbicides and pesticides.
- Biological Control – the introduction of natural enemies, such as pests and pathogens, from the invader's origin.

It is recommended that Exuma Fund 2, Ltd. pursue physical control via the removal and/or mechanical harvesting of invasive species onsite where feasible. It is anticipated that individuals will be removed to accommodate built infrastructure. Where invasive alien species exist outside the built infrastructure, it is recommended that the developer continue to undertake physical control to eradicate the prevalence of NISS 2013 listed species onsite.

12.2.5.6 Monitoring

Routine maintenance and monitoring for the establishment of invasive alien species, particularly those on the NISS list for eradication, should be ongoing. The most cost-effective approach is preventing the establishment of NISS-listed species.

- **Removal of Invasive Alien Species (IAS) saplings.** *Casuarina* seedlings quickly become established in disturbed areas such as cleared roadways and paths. These areas should be routinely monitoring for the sprouting of IAS saplings. These saplings should be removed immediately.

- **Ongoing Monitoring of Introduction Pathways BMPs.** Policies related to the choice of landscaping palettes and vendors should be continually reviewed for adherence to the Invasive Species Management Plan.
- **Education.** Residents and businesses should be educated on NISS species. Community efforts to identify unknown plants, birds, and invertebrates/mammals should be encouraged. All unknown species should be photographed for identification by informed personnel.
- **Outreach.** Upon identification of an IAS, the developer should inform and work with the relevant authorities to devise an appropriate plan to manage, control, and eradicate the intruder.

13 Contributors

Melissa Alexiou, Environmental Specialist, Waypoint Consulting, Nassau, The Bahamas

Jamil Jibrilu, Biologist, The Bahamas

Applied Technology Management (ATM), A Geosyntec Company

Integrated Buildings Services (IBS), Nassau, Bahamas

14 References

National Climate Change Committee and The Bahamas Environment, Science and Technology Commission. 2005. National Policy for the Adaptation to Climate Change.

Bahamas National Trust. 2018. Bahamas Protected: Marine Protection Plan for Expanding The Bahamas Marine Protected Areas Network to Meet The Bahamas 2020 Declaration. 2018 https://bahamasprotected.com/protected-areas/.

Bullard, JM. 2013. Critical Situation Analysis of Invasive Alien Species Status and Management, The Bahamas. Nassau. Department of Marine Resources.

Central Bank of the Bahamas. 2021. Quarterly Economic Review (QER). December 2021. (centralbankbahamas.com).

Clements, James F. 2019. The Clements Checklist of Birds of the World, Sixth Edition (2019-update).

Correll, D. S., and H. B. Correll. 1996. Flora of the Bahama Archipelago. A. R. Ganter Verlag KG, FL. 1982, Reprint.

Currie, Dave et al. 2019. The Natural History of the Bahamas: a field guide. Cornell University Press, Ithaca.

Department of Environmental Health Services. 2013. Shanty Town Project.

Department of Statistics. 2010. Census of Population and Housing (Exuma and Cays).

Department of Statistics. 2014. Socio-Economic Report.

Department of Statistics. Commonwealth of The Bahamas. Census Report 2010.

Government of The Bahamas. Forestry. 2021. Declaration of Protected Trees, Order 2021. Laws of The Bahamas.

Hallett, Bruce. 2006. Birds of The Bahamas and the Turks & Caicos Islands. Macmillan Caribbean.

International Finance Corporation (IFC). 2007. Environmental, Health, and Safety (EHS) Guidelines. Noise Management. April 30, 2007

International Monetary Fund (IMF). 2020. Adapted from The Bahamas – Request for Purchase Under the Rapid Financing Instrument – Press Release; Staff Report; and Statement by the Executive Director for The Bahamas. Country Report No. 20/191. June 2020 https://www.imf.org/en/Publications/CR/Issues/2020/06/04/The-Bahamas-Request-for-Purchase-under-the-Rapid-Financing-Instrument-Press-Release-Staff-49489.

International Monetary Fund (IMF). 2021. Adapted from The Bahamas – IMF Executive Board Concludes 2020 Article IV Consultation with The Bahamas. Press Release: No. 21/23. January 26, 2021.

International Monetary Fund (IMF). 2022. At a Glance. 2022. The Bahamas and the IMF.

International Plant Protection Convention (IPPC). 2020. Climate Change and Land. Summary for Policymakers.

International Plant Protection Convention (IPPC). 2022. Sixth Assessment Report. Working Group II. Fact Sheet – Small Islands.

Ministry of the Environment and Housing. Notice. The Bahamas Protected Areas. Official Gazette. July 20, 2021.

Moultrie, S. 2013. The Bahamas National Invasive Species Strategy 2013. Nassau: Department of Marine Resources.

National Geographic. 2003. Field Guide to the Birds of North America. Fourth Edition. Washington, D.C.

National Oceanic and Atmospheric Administration (NOAA). 2022. Hurricane History Tracker and Database http://coast.noaa.gov/hurricanes/.

Raffaele, H. 2003. Birds of the West Indies. Princeton University Press. Princeton, NJ.

Raffaele, Herbert et al. 2003. Field Guide to the Birds of the West Indies. Helm Field Guides. Christopher Helm. London

Sealey, Neil E. 2006. Bahamian Landscapes. 3rd Edition. Nassau: Department of Marine Resources. Macmillan Caribbean. 2006

Sibley, David Allen. 2003. The Sibley Field Guide to Birds of Eastern North America. Alfred A. Knopf, Inc. New York, USA.

Sims, Ralph, Roberto Schaeffer, Adjo A. Amekudzi, Bruno Soares Moreira Cesar Borba, Helena Chum, Philippe Crist, Han Hao, Jennifer Helfrich, Thomas Longden, André Frossard Pereira de Lucena, Paul Peeters, Richard Plevin, Steve Plotkin, Robert Sausen. 2014. Transport (Chapter 8). In: AR5 Climate Change 2014: Mitigation of Climate Change. United Nations Intergovernmental Panel on Climate Change (IPCC).

The Bahamas Environment, Science & Technology Commission (BEST Commission). 2013. National Invasive Species Strategy for The Bahamas.

Alberto E. Areces-Mallea, Alan S. Weakley, Xiaojun Li, Roger G. Sayre, Jeffrey D. Parrish, Camille V. Tipton and Timothy BoucherThe Nature Conservancy. 1999. A Guide to Caribbean Vegetation Types: Preliminary Classification Systems and Descriptions. The Nature Conservancy. Arlington, VA.

U.S. Army Corps of Engineers (USACE). 2004. Water Resources Assessment of The Bahamas. https://www.sam.usace.army.mil/Portals/46/docs/military/engineering/docs/WRA/Bahamas/BAHAMAS1WRA.pdf.

U.S. Army Corps of Engineers (USACE). 2004. Water Resources Assessment of The Bahamas. United States Southern Command. December 2004. bahamaswra.pdf (army.mil)

United Nations. 2018. The Bahamas Voluntary National Review on the Sustainable Development Goals to the High Level Political Forum of the United Nations Economic and Social Council.

Watkins, Graham, Atkinson, Rachel, Canfield, Eloise, Corrales, Denis, Dixon, John, Factor, Seth, Hardner, Jared, Hausman, Heidi, Hawken, Iona, Huppman, Reed, Josse, Carmen, Langstroth, Robert, Pilla, Ernani, Quintero, Juan, Radford, Greg, Rees, Colin, Rice, Dick, Villalba Alberto. 2015. Guidance for Assessing and Managing Biodiversity Impacts and Risks in Inter-American Development Bank Supported Operations. IDB-TN-932. November 2015.

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

15 CVs

Melissa Alexiou, MSc., PMP
Director

CONTACT

Melissa Alexiou
P.O. Box N4805
Nassau, The Bahamas

1 (242) 376-1448
malexiou@waypoint.bs

NATIONALITY & LANGUAGE

Citizenship: United States of America
Residency: Spousal Permit with Right to Work – Bahamas
Languages: English

EDUCATION

Master of Science, Environmental Science and Policy, The Johns Hopkins University
Bachelor of Arts, Environmental Studies, Rollins College
Certificate, Geographic Information Systems (GIS), The Johns Hopkins University

PROFESSIONAL CERTIFICATION & TRAINING

Project Management Professional (PMP), Project Management Institute
National Association of Environmental Professionals (NAEP)
ASTM E1527 Phase I & II Environmental Site Assessments for Commercial Real Estate
OSHA 10-Hour Certification

EXPERIENCE

2012 – Present

Waypoint Consulting Ltd., Environmental and Project Management Consulting, Director, Nassau, Bahamas

- Environmental Impact Assessments, Environmental Management/Mitigation Plans
- Climate Change, Vulnerability, Risk & Adaptation
- Project management and administration services for permitting
- Construction Monitoring for Environmental Management
- Research analyst, advisory consulting services, and technical writing

Selected Projects

Environmental, Social, and Geotechnical Study for Resilient Micro-Grids projects in East Grand Bahama, IDB BH-L1048

Waypoint prepared the Environmental and Social Impact Assessment and Environmental and Social Management Plan for the East Grand Bahama Micro-Grid Project. This project is part of the InterAmerican Development Bank program titled "Reconstruction with Resilience in the Energy Sector in The Bahamas". The project strives to rebuild Grand Bahama with energy resilience following Hurricane Dorian in 2019.

Environmental Impact Assessment & Environmental Management Plan, ADH Ltd, (Children's Bay Cay, Williams Cay, Madam Daus Cay), Exuma, The Bahamas

Waypoint Consulting prepared the environmental documentation to secure a Certificate of Environmental Clearance (CEC) for the luxury resort and residential development by ADH Ltd. The development includes a marina, ultra luxury residences, spa and other amenities, private docks, and back-of-house infrastructure.

Environmental Impact Assessment & Environmental Management Plan, Cotton Bay Holdings Limited, Cotton Bay Resort, Eleuthera, The Bahamas
Waypoint Consulting prepared the environmental documentation to secure a Certificate of Environmental Clearance (CEC) for the luxury resort and residential development by Cotton Bay Holdings Limited. The project expands on the former Cotton Bay Club to include a branded hotel and branded residences, unbranded residence, road relocation, and rehabilitation of the existing golf course.

Environmental Impact Assessment & Environmental Management Plan, Sandals International, Fowl Cay Resort & Overwater Bungalows, Fowl Cay, Exuma, The Bahamas
Waypoint Consulting prepared the environmental documentation to secure a Certificate of Environmental Clearance (CEC) for the Fowl Cay Resort expansion inclusive of overwater bungalows. Fowl Cay Resort was the first project to receive a CEC for overwater bungalows.

Environmental Management Plan, Demolition of Simm's Point (Nygard Cay), New Providence, The Bahamas
Waypoint Consulting prepared the environmental documentation to secure a Certificate of Environmental Clearance (CEC) for the demolition of the property formerly referred to as Nygard Cay. Best management practices for demolition considered the highly exposed site, high volume of debris, and the project's social and political sensitivities.

Environmental Baseline Data Collection, BPL LNG Facility, Clifton Pier, New Providence, The Bahamas
Waypoint was subcontracted by DHI Group as the lead local environmental consultant to perform environmental consulting services including environmental baseline data collection for a proposed BPL LNG facility on a greenfield site adjacent to its Clifton Pier operations. Waypoint facilitated the CEC Application, environmental permitting process, marine benthic surveys and water quality data collection. The project was suspended by the Government of The Bahamas and never completed.

Environmental Impact Assessment & Environmental Management Plan, Venetian Village, New Providence, The Bahamas
Waypoint Consulting prepared the environmental documentation to secure a Certificate of Environmental Clearance (CEC) for the multi-purpose commercial, retail, hotel, and residential development of Venetian Village. Venetian Village is scheduled to open the retail spaces in late 2024.

Environmental Impact Assessment & Environmental Management Plan, Torch Cay (Hog Cay), Exuma, The Bahamas
Waypoint Consulting prepared the environmental documentation to secure a Certificate of Environmental Clearance (CEC) for the luxury resort and residential development on Torch Cay, Exuma. The 707-acre island includes a runway, expansive exterior marina, golf course, residences, hotel, amenities, and back-of-house infrastructure.

Environmental Impact Assessment & Environmental Management Plan, Disney Cruise Line, Lighthouse Point, Eleuthera, The Bahamas
Waypoint Consulting was the lead local environmental consultant for Disney's Cruise Destination and Entertainment Facility at Lighthouse Point, Eleuthera. This $250+ million project features a cruise ship pier, marina, and associated facilities for cruise passengers. The project completed the environmental permitting process under the Environmental Planning and Protection Act 2019 and Environmental Impact Assessment Regulations 2020 including public consultation. The project welcomed its first cruise ship in June 2024.

Environmental Legislative Review for Offshore Petroleum Industry
Waypoint reviewed existing and proposed legislation for relevance to the offshore petroleum industry. International Conventions and National Environmental Policies were also included in the assessment.

Env. & Social Analysis – Climate-Resilient Coastal Mgmt. & Infrastructure Program – IDB BH-L1043
The purpose of the ESA was to identify environmental and social aspects including risks, evaluate site-specific aspects, and provide recommendations for measures to mitigate identified impacts for projects proposed on Long Island, Grand Bahama, Andros, and New Providence. Stakeholder consultation was a critical element for site specific project evaluation.

Environmental Site Assessment, Philautia, Eleuthera, The Bahamas
Waypoint prepared an Environmental Site Assessment to document existing site conditions at the former U.S. Naval Facility, Eleuthera. Decommissioned in 1980, quarters and general infrastructure including larger generators and catchment basin exist in deteriorated conditions.

Environmental Impact Assessment: Cruise Line, Private Island Development, The Bahamas
Waypoint provided local environmental consulting expertise to assist a major cruise line with identifying a suitable location for a new cruise ship destination facility. In association with ATM, Waypoint prepared an EIA and liaised with government officials.

A Comprehensive Strategy for the Optimization of Family Island Airports - IDB BH-L1027, Bahamas
Waypoint was subcontracted to provide support in the review and application of existing environmental regulations and guidelines for The Bahamas Civil Aviation Department (BCAD). Review of BCAD schedules combined with a review of national parks and important bird areas was part of a gap analysis to strengthen environmental understanding and commitment by the aviation authority.

Environmental Manager. North Abaco Port Project, Great Abaco, The Bahamas
Waypoint was the designated Environmental Manager for the completion of the North Abaco Port Project which included opening the port basin to the Sea of Abaco. Waypoint provided oversight of the Environmental Monitor and submitted weekly environmental reporting to the BEST Commission.

Environmental Management Plan: Commercial Forestry Project, The Bahamas
Waypoint was subcontracted to provide research, and technical writing and editing for an Environmental Management Plan (EMP) related to a potential commercial forestry project in The Bahamas. EMP best management practices highlighted fire management, wildlife management, and management protocols for sensitive environmental features, preservation of water quality and soil quality.

Environmental Impact Assessment: Children's Bay Cay, Exuma, The Bahamas
Waypoint in coordination with Applied Technology Management (ATM) provided technical writing services, environmental analysis, and consultation for local project permitting. Waypoint is the local environmental consultant of record and liaises directly with government.

Phase 1 Big Pond Landfill Remediation/Restoration IDB Mitigation for Roadworks, New Providence,
Melissa provided environmental monitoring services to the Contractor through Islands By Design Ltd. for remediation efforts at Big Pond, a former landfill and important urban mangrove ecosystem. Remediation of the former landfill served as the mitigation component for the New Providence Road Improvement Project. Mitigation included the demolition of two buildings, removal of contaminated soils, removal of surface waste, and the implementation of a boardwalk, trails, and basketball courts.

2010 – 2012
Islands By Design, Environmental Scientist, Nassau, Bahamas

Selected Projects
BEC Abaco 69kV Transmission Line, Abaco, EIA
As a high priority project, environmental and socio-economic analysis was performed under a tight schedule with significant implications for residents of the Greater Abacos.

South Beach Township Project, Nassau
The South Beach Township Project was an initiative to rehabilitate a low-income area through planning for an area of southeastern New Providence. A key component of the plan was to identify existing environmental issues, namely flooding and limited beach access, and to rectify these issues to create a mixed-use sustainable community.

Sports Centre Redevelopment Project, Nassau- Environmental Monitor
As the Environmental Monitor, I performed twice weekly site visits to document contractor compliance to the EMP and monthly reports to evaluate overall contractor compliance and provide recommendations for improvement.

2007 – 2008
Farkas Berkowitz & Company, Associate, Washington, DC
A Strategic Management Consulting Firm where Melissa performed market research and analysis for top Engineering News Record, Fortune 500 firms

2005 – 2007
Protection Strategies Incorporated, Environmental Scientist, Arlington, VA
Government Contractor to U.S. Environmental Protection Agency (EPA) for the Water Contaminant Information Tool (WCIT)

CONTINUING EDUCATION AND CONFERENCES

- National Association Environmental Professionals Project Management Series (4 modules), 2024
- Results-Based Project Management, Professional Certificate, IADB, December 2021
- Climate Change: Financial Risks and Opportunities. Imperial College Business School (Imperial X) March 2021
- National Association of Environmental Professionals (NAEP) Virtual Conference, Aug 2020/May 2021
- Management for Environmental Results with Performance Based Measurement, Johns Hopkins U., 2019
- Coastal and Marine Spatial Planning Advancement Training, Duke University and Battelle, Spring 2015
- Creation and Restoration of Wetlands, Everglades Wetland Research Park, October 2014
- Sponsor, Bahamas Natural History Conference, March 2014 & 2016 & 2018

SKILLS

- Geographic Information Systems (GIS)
- MS Word, MS Excel, MS PowerPoint, MS Publisher, MS Visio, MS Project

COMMUNITY INVOLVEMENT

- Bahamas Society of Engineers, Associate Member
- Bahamas Engineers, Architects, and Allied Professionals, Board Member, 2016-2021
- Bahamas Chamber of Commerce, Energy and Environment Committee, 2015-2016

Jamil Jibrilu

180A Sandyport Drive
P.O Box S.P. 63915
Nassau, Bahamas
JamilJibrilu@integratedmail.org
jajibrilu@gmail.com
Number: (242) 426 0050

EDUCATIONAL BACKGROUND

2019-2020 **Kingston University** **London, England**

Masters of Science in Environmental Management (Merit)

Modules Studied:

- Water, Energy and Land Resources Management,
- Environmental Management,
- The Challenge of Climate Change,
- Research Methods and Techniques,

Research Project

A systematic Review of Environmental Management System (EMS) EMAS and ISO 14001 and their potentially relevant application to Small Island Developing States (SIDS) in the Caribbean region using The Bahamas as a Case Study.

2012-2015 **University of Salford** **Manchester, England**

Bachelor of Science, Honours Degree in Geography

Modules Studied:

- Geographical Information Systems
- Earth Surface Process
- Monitoring Environmental Change
- Sustainable Cities
- Water Resolutions,
- Climate Change

2011-2012 **David Game College** **London, England**

Foundation Programme in Law, Humanities and Social Sciences

WORK EXPERIENCE

2020 - 2022 **Department Of Environmental Planning & Protection (DEPP)** *formally the BEST Commission* **Nassau, Bahamas**

Project Manager and Environmental Officer

Responsibilities included:

- Full GEF Funded National Project Coordinator.
- Environmental Impact Assessments (EMP) Reviews
- Environmental Management Plans (EMP) Review and Oversight
- Certificate for Environmental Clearance (CEC) Application review and the necessary project oversight.
- Provide input on potential Grant funded proposals.
- Tasked with general oversight for preparing Drone procurement and overall training plan for the department.

2020 - 2022	Bahamas Environment Science & Technology (BEST) Commission	Nassau, Bahamas

Environmental Officer

Responsibilities included:

- **National and Development projects:** Worked on a wide array of projects which involved the study and review of EIA's, and provided the necessary oversight to ensure the projects conformed to Best Practices and met the required Environmental standards, as well as ensuring an appropriate EMP was in place and was strictly adhered to.

- **Project Management**: Responsible for three UNITED NATIONS ENVRIONMENT PROGRAMME (UNEP) full project implementation, including project finances, project operations, equipment procurement, and project reporting for both projects, using the newly introduced UNEP Anubis online Platform.

- **Climate Change Negotiations –**A delegate on the national delegation to climate change having represented the country on the international stage in stating the Countries targets and defending the position amongst scrutiny from other country states.

- **Legislation:** Read and reviewed proposed bills to provide comments and recommendations to parliamentarians for debate and implementation.

SUMMER INTERNSHIP

2014 **Volunteer Worker for Nokia UK** **London England**

Gathered geo data on behalf of Nokia to be used and offered as part of the Nokia Maps app.
Selected as part of a team to undertake a Geographical Information Systems (GIS) study of Manchester City Centre on behalf of Nokia using ArcMap and ArcCatalog software to update and replace maps that were out of date.

2013 **Bahamas National Trust** **Nassau Bahamas**

Responsibilities included:

- Responsible for teaching children about the marine
- environment to help raise awareness of natural habitats.
- Prepared study materials for both Students and
- Teachers on the course.
- Taught High School teachers how to conduct a fish survey
- and identify and classify different species of marine life.
- Conducted a performance assessment of the teachers.
- Provide input on Park Maintenance plan.
- Any day-to-day responsibilities assigned

ADDITIONAL EXPERIENCE INFORMATION

2019 — Collected water samples on Behalf of Thames Water (London based Water Utility Company) to be studied in the Lab to make the necessary policy changes and recommendations.

2016 - 2019 — Attended numerous international conferences and meetings where I provided presentations on behalf of the Government of The Bahamas under the Ministry of Environment on the overall Country's Goals and plans for mitigating and adapting against climate change to an international audience and then defend the position.

Member of the Environmental Oversight Team for the full Demolition of the iconic Crystal Palace Hotel (Bahamas).

2018 — Member of Bahamian Delegation to Conference of the Parties (COP) 24 Katowice, Poland.

Member of the Environment oversight team on the review of numerous development projects including reviews for Disney Cruise Line, Norwegian Cruise Line & MSC Ocean Cruise lines project and OBAN Oil Refinery on Grand Bahama Island, among many others.

	Anubis Trained: Trained and competent in using the newly introduced UNEP Anubis online platform for use in GEF funded projects.
2017	Drone Certification obtained, trained to fly a drone using geo location and waypoints to present to interested parties and produce 3D and 2D Models to be used as reports.
2016	Member of the environmental oversight team that reviewed the Environmental Planning and protection Bill to go the House of Parliament for review and debate. Atlantic and Gulf Rapid Reef Assessment (AGGRA) Certification obtained. Able to monitor and assess reefs to support coral reef efforts in conservation through the distribution of relevant data, research and educational materials about marine ecosystems (Coral, Benthic and Fish species). The use of standardized assessment protocols designed by AGGRA, which has produced valuable regional surveys of coral reef health.
2014 - 2015	Study trips to Swiss and French Alps, specifically to collect data for the Hydrochemistry of Meltwaters Draining from an Alpine Glacier to be published as part of annual data journal.
2013 - 2014	Part of a consultancy group tasked with assessing the angling opportunities in Greater Manchester on behalf of the City Council. Based on the quality of the report, it was recommended to the council for implementation.

ADDITIONAL SKILLS

- PADI Open Water Dive Certificate, Bahama Dive Centre Nassau, Bahamas
- Proficient in Microsoft Word Office, PowerPoint and Excel
- Experienced with ArcGIS, ArcCatalog and ERDAS Imagine

PERSONAL STATEMENT

Having worked in the BEST Commission and now Department of Environmental Planning and Protection (DEPP) which served under both the Ministry of Environment and Housing, and then later The Office of the Prime Minister I had a range of roles under three different government administrations. My roles ranged from reviewing legislation, Project Management, to developmental projects as well as representing The Bahamas and speaking on behalf of the Government of the Bahamas numerous times, This has led to me having a very broad and diverse skill range as well as the ability to pick up on new skills and training very easily.

REFERENCES

Available Upon Request

16 Appendix

16.1 IBS Structural Foundation Design for Proposed Dune Lots

IBS INTEGRATED BUILDING SERVICES
Integrated Building Services
Engineering Design & Consultation

Our Ref: IBS/P250311/CAC/001

June 20th, 2025

Steve Harbaugh
Exuma Fund 2, Ltd.
Stocking Island, Exuma

Dear Sir:

Re: Structural Foundation Design for Proposed Dune Lots

As part of the Certificate of Environmental Clearance application for the proposed development, the Department of Environmental Planning and Protection has requested that a structural engineer provide a proposed design for the foundations of the dune (ocean-side) lots.

Based on our extensive experience designing structural foundations with similar soil conditions on New Providence as well as several Family Islands, including Exuma, we are confident that the buildings can be built with foundations capable of supporting the proposed structures. Due to the limited availability of equipment and knowledge on the islands, we typically do not recommend deep foundations, such as auger-cast-in-place concrete piles or steel helical piles, but they can be specified in some cases if needed. Therefore, we would recommend an oversized reinforced concrete spread or mat footing that is located at an elevation below the dune scour angle. Sand is an excellent bearing material when confined, and the design intent is to keep it as such.

See attached site sections for reference.

Should you have any questions or concerns, feel free to contact the undersigned.

Best Regards,

Christopher A. Wells, PE, PMP
Managing Director

Ph:242-324-5445
Fax:242-324-5480
P.O. Box EE-15251
Nassau, Bahamas

E-mail: info@gointegrated.com
Web: www.gointegrated.com

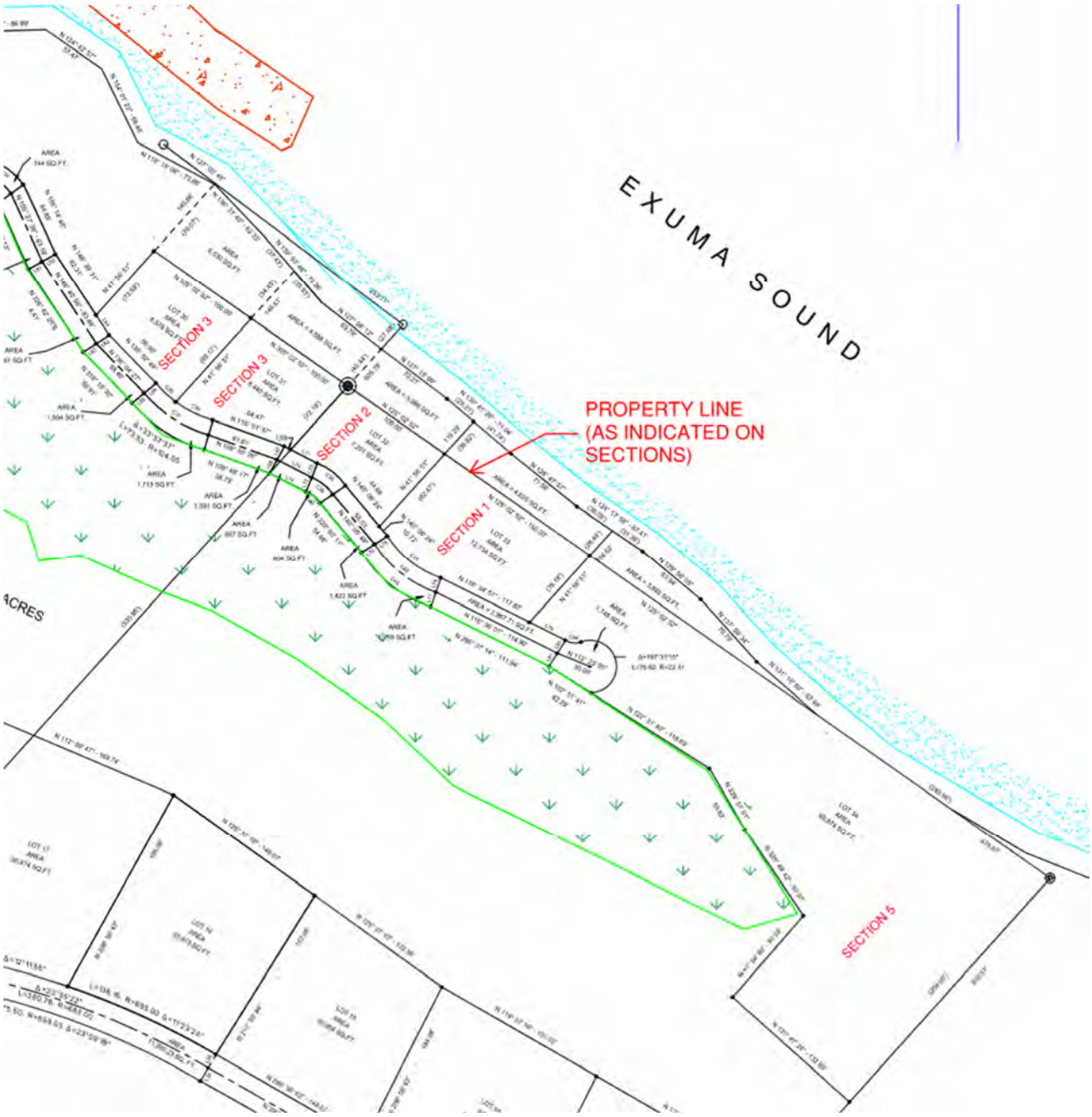
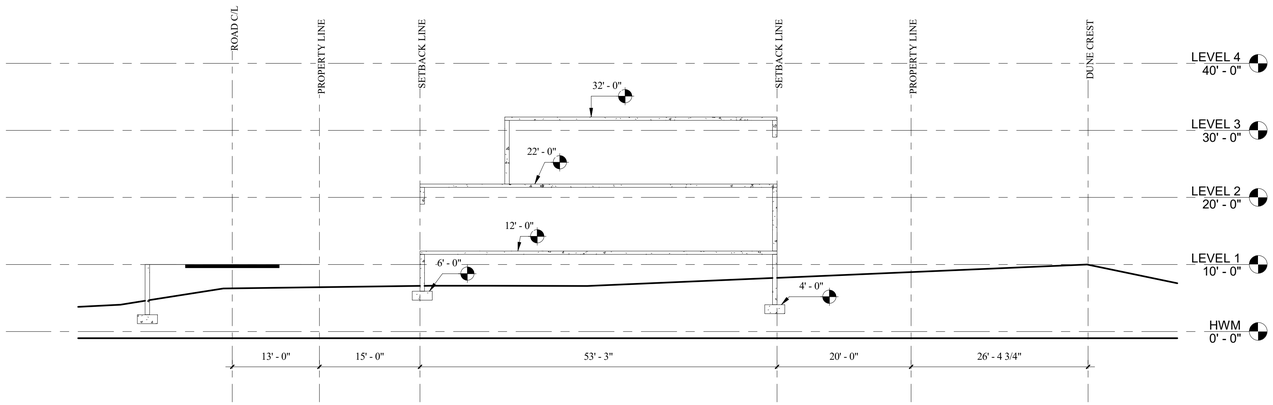
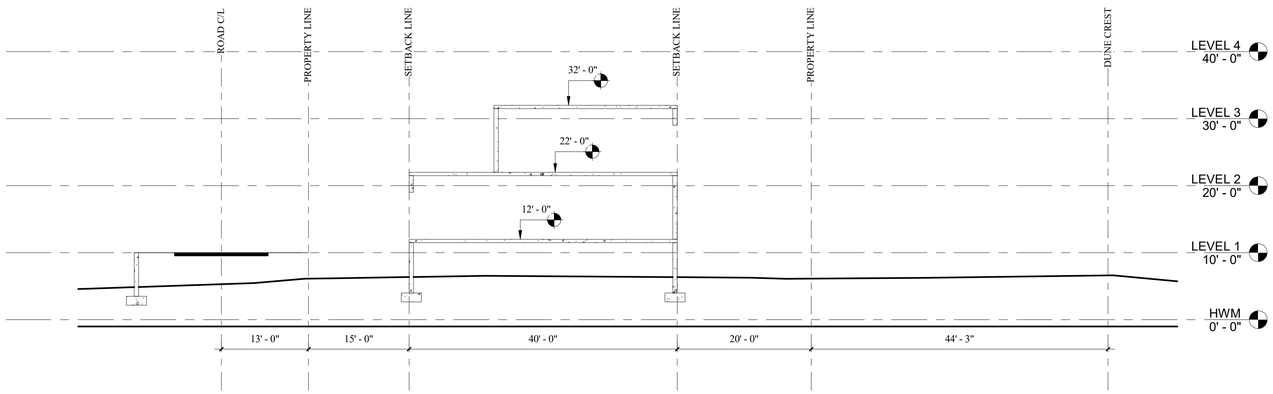


Figure 1: Site Section Locations

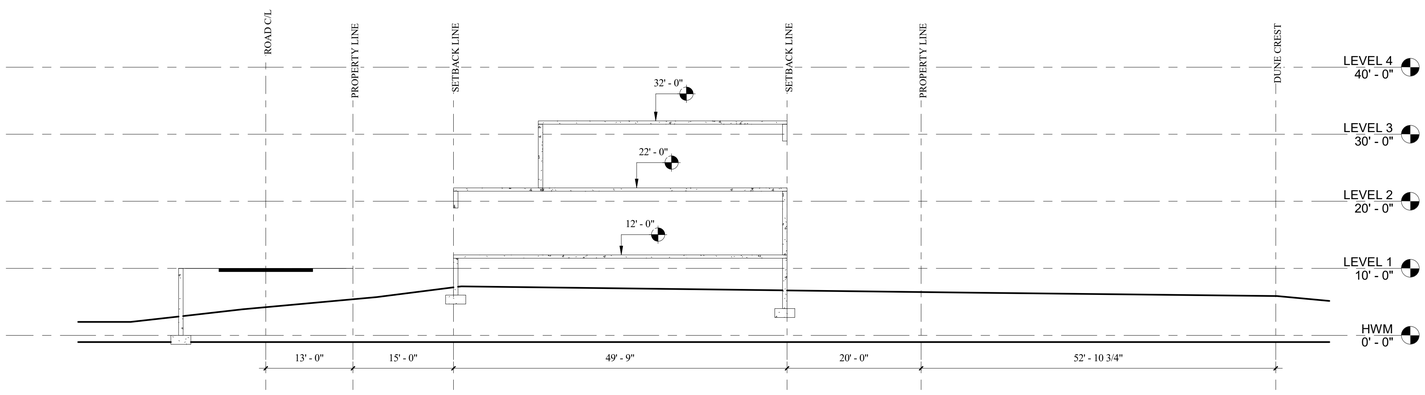
Ph:242-324-5445
Fax:242-324-5480
P.O. Box EE-15251
Nassau, Bahamas
E-mail: info@gointegrated.com
Web: www.gointegrated.com



SECTION 1
3/32" = 1'-0"



SECTION 2
3/32" = 1'-0"



SECTION 3
3/32" = 1'-0"

FOR REVIEW

IBS
INTEGRATED BUILDING SERVICES
SUITE 6, COLONIAL HOUSE
PRINCE CHARLES DRIVE
NASSAU, THE BAHAMAS
242 324-5445
info@goibintegrated.com

STOCKING ISLAND DEVELOPMENT
FOR EXUMA FUND 2, LTD.

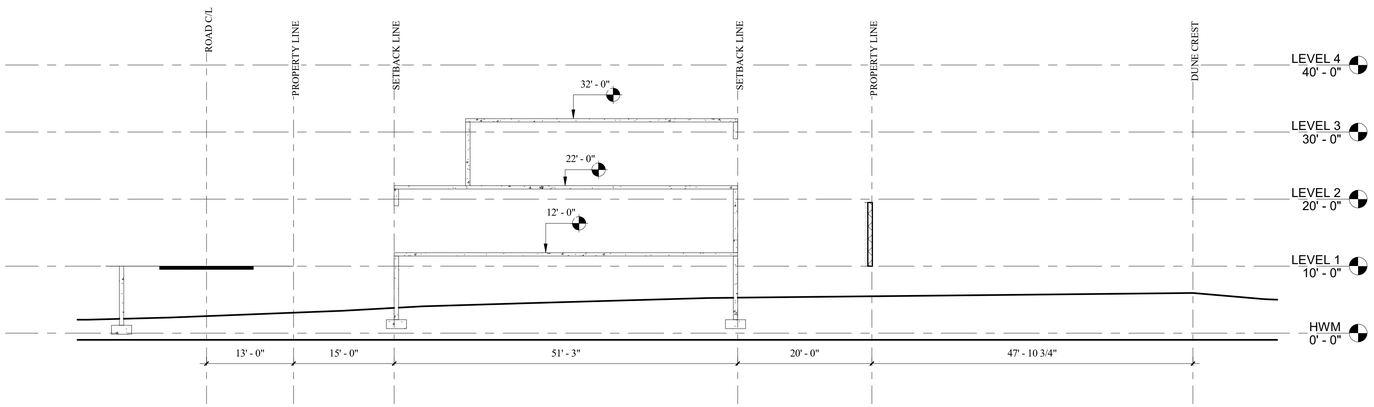
Drawing Description
PROPOSED SITE STRUCTURAL SECTIONS

No.	Description	Date
1	ISSUED FOR REVIEW	09/04/2025

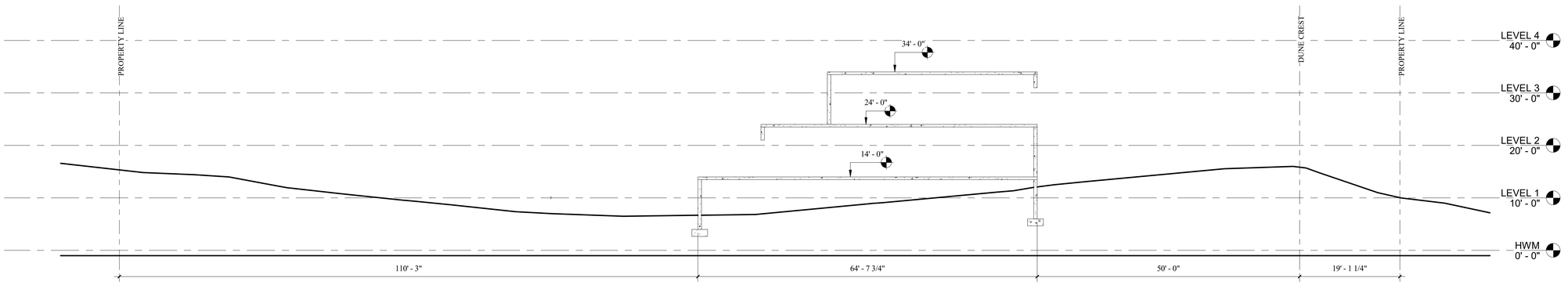
Drawn by CW
Checked by CW
Approved by CW
Date
Project number

Drawing No.
SK-01
Scale 3/32" = 1'-0"

18/09/2025 3:42:30 pm



SECTION 4
3/32" = 1'-0"



SECTION 5
3/32" = 1'-0"

FOR REVIEW

IBS
INTEGRATED BUILDING SERVICES
SUITE 6, COLONIAL HOUSE
PRINCE CHARLES DRIVE
NASSAU, THE BAHAMAS
242 324-5445
info@ibsintegrated.com

STOCKING ISLAND DEVELOPMENT
FOR EXUMA FUND 2, LTD.

Drawing Description
PROPOSED SITE STRUCTURAL SECTIONS

No.	Description	Date
1	ISSUED FOR REVIEW	09/04/2025

Drawn by CW
Checked by CW
Approved by CW
Date
Project number

Drawing No.
SK-02
Scale 3/32" = 1'-0"

18/06/2025 3:42:31 pm