ENVIRONMENTAL ASSESSMENT REPORT
FOR THE IMPLEMENTATION OF MEASURES TO PRESERVE THE BEACH
ST. THOMAS, US VIRGIN ISLANDS

SUBMITTED TO

THE OFFICE OF COASTAL ZONE MANAGEMENT
DEPARTMENT OF PLANNING AND NATURAL RESOURCES
GOVERNMENT OF THE VIRGIN ISLANDS

AND

U.S. ARMY CORPS OF ENGINEERS

SUBMITTED BY

THE RITZ-CARLTON CLUB

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AND

THE GREEN PIECE
ENGINEERING AND THE ENVIRONMENT

FEBRUARY 2022

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1.00 NAME AND ADDRESS OF APPLICANT

The Ritz-Carlton Club, St. Thomas
6910 Great Bay
St. Thomas, VI 00802

2.00 LOCATION OF PROJECT

The Ritz-Carlton Club is located on the eastern end of St. Thomas immediately to the south of Cabrita Point. The Ritz Carlton Club is located on Tract #4 Consolidated Estate Nazareth, No. 1 Red Hook Quarter, St. Thomas, U.S. Virgin Islands.

The center of the beach off which the geotubes, Sargassum barriers and Sargassum collection and storage are proposed is Longitude 18.322407°N and Latitude -64.843139° in Great Bay.

The following location map and agency review map depicts the project in reference to adjacent properties and island features, as well as the jurisdiction line of the Department of Planning and Natural Resources, Division of Coastal Zone Management. The vicinity map is also attached showing the regional context and vicinity in the U.S. Virgin Islands.

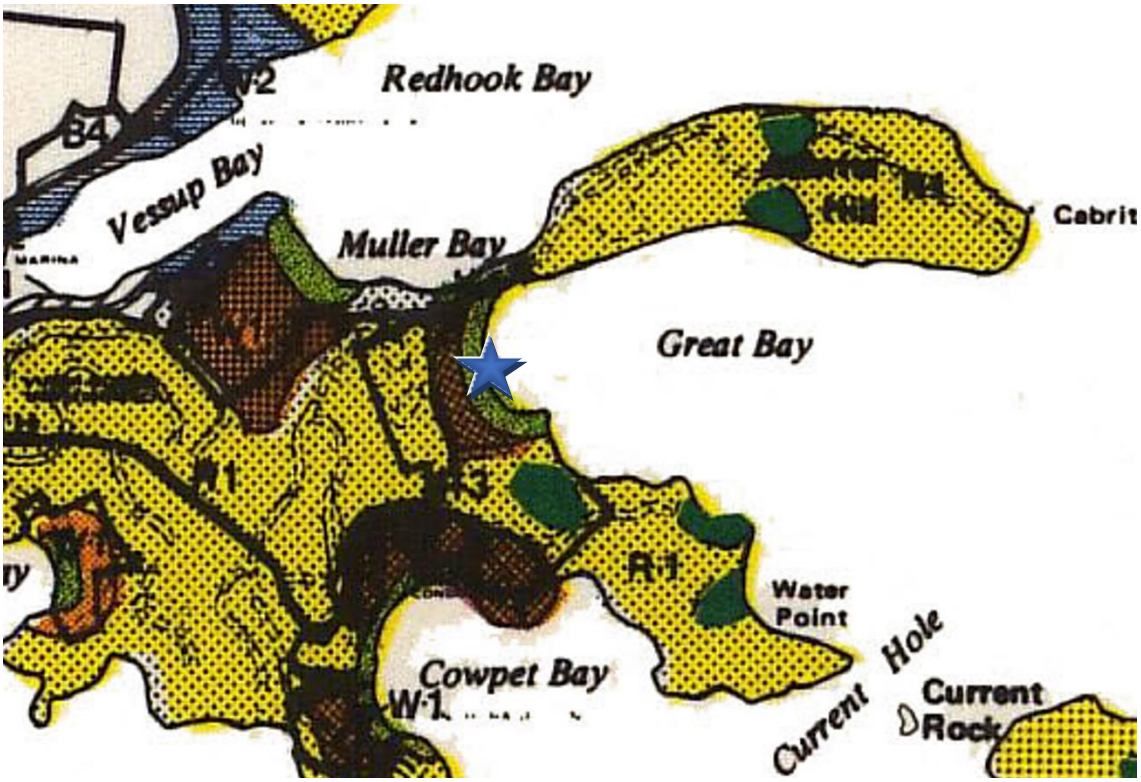


Figure 2.00.1 Agency Review Map. Areas under CZM jurisdiction are shown in color.

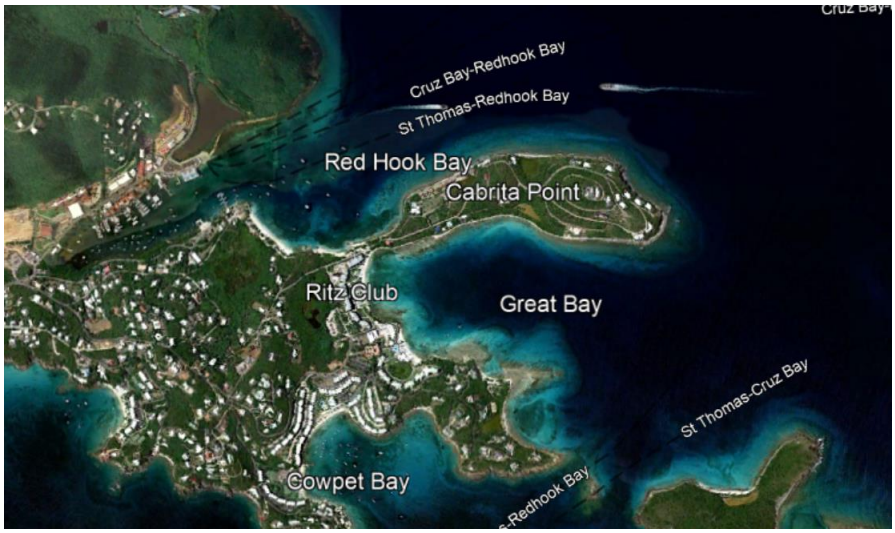


Figure 2.00.2 Vicinity map showing the Ritz-Carlton Club in relationship to other island features.

3.00 ABSTRACT

The Ritz-Carlton Club ("The Club") is seeking approval to undertake measures to preserve its shoreline and beach. Between the passing 2017 hurricanes, the impact of cleaning up sargassum along the shoreline and runoff, the beach has been continually eroding and trees are being undermined along the shoreline.

The Club has renourished the beach repeatedly since 2017 but due to the overall loss of sand from the nearshore environment, the sand is quicky carried offshore by wave action. To stem this loss and to accelerate the accreting of sand along the shoreline, The Club is proposing the placement of Geotubes® ("geotubes") offshore parallel to the shoreline to effectively stop the loss of sand into deeper water.

The year 2021 saw a major sargassum bloom and this inundated the northern side of Great Bay, at times the sargassum was built up more than 60ft offshore. While The Club employed a company at great expense to clean up the sargassum it simply was overwhelming. The beach became unusable, and the smell was so bad that large numbers of guest left the resort. And even with the most careful cleanup methods sand was lost as part of the cleanup. During 2021 The Club requested and received permission to experiment with booms offshore. It was quickly found that trying to keep up with sargassum building up on the barriers was an insurmountable task and the barriers were shifted to direct the floating weed to one area of the beach. Different barrier types and installation methods were tested, and one was found to be superior and was able to protect most of the beach and direct the sargassum into one area which made it far easier to collect and remove. The Club is requesting approval to place screw anchors at various

locations in the bay so that barriers can be installed when needed to control the areas where the sargassum comes ashore.

And lastly, the Club would like to construct a small storage area at the northeastern end of the beach to isolate the area where the Sargassum is collected so that necessary equipment can be protected and hidden from view.

4.00 STATEMENT OF OBJECTIVES SOUGHT BY THE PROPOSED APPLICATION

The purpose of the application is to obtain the approval to implement measures to protect the shoreline and beach at The Ritz-Carlton Club and to minimize future beach nourishment requirements.

5.00 DESCRIPTION OF PROJECT

5.01 Summary of Proposed Activity

The proposal includes the installation of two separate components intended to protect the shoreline.

Geotubes are proposed parallel to the offshore in approximately 5ft of water. Eleven geotubes 51' in length, 9' wide, 22' in circumference, and 4ft in height will be placed offshore. These all have 27' wide scour aprons between 55' – 70' in length. These will be placed parallel to the shoreline 40 to 60ft offshore. The geotextile scour aprons are attached to the seafloor with post that will be driven into the seafloor to hold them in place during filling.

The trail conducted in 2021 showed that the sargassum can be directed successfully into one corner of the beach. It was also found that the barrier angle may need to shift due to wave approach to best accomplish the movement of the sargassum along the barriers. The Club is therefore requesting permission to install up to 750ft of boom offshore and up to 75ft of barrier as a "catch" barrier to prevent sargassum from moving back along the beach to the south. The barrier in stalled will be the Smooth Blue beach bouncer barrier which has a 24" skirt to prevent sargassum from moving below the barrier. The barrier would be installed utilizing 3ft screw anchors and secured by floating lines. Screw anchors would be installed every 25ft, paired anchors will be used to minimize wave impacts. The Club would like permission to install up to sixty-five (65) 3' screw anchors to allow for adjustment of the angle as necessary. Quick releases will be installed on barriers so they maybe rapidly removed or deployed. The screw anchors will remain in place year-round, but the barriers would only be deployed as necessary to prevent sargassum inundation on the beach.

The Club is also proposing to install green fencing on the northern end of the beach to minimize the visual impact of the collected Sargassum, shielding the piles from The Club beach and the public road and adjacent shoreline.

5.01a Purpose of Project

The purpose of the application is to permit the installation of devices that will help protect the shoreline from sand loss due to wave action and to protect the beach from future sargassum blooms.

5.01b Presence and Location of Any Critical Areas and Possible Trouble Spots

There are scattered seagrass beds offshore of the Club, these beds have been significantly impacted by storms over the last few years. These beds contain *Thalassia testudinum, Syringodium filiforme* and *Halodule wrightii*. Over the last few years, the beds have been invaded by the invasive seavine *Halophila stipulacea*.

There are hardbottoms to the north and south of the embayment which are habitat to corals including ESA listed species. The Club has respected the presence of these hard bottoms and has designed all features so no impact will occur.

The northern corner of the beach is the landing point for both electrical cables and fiber optic cables and these have been taken into account in all designs.

The geotubes are filled with sand by creating a 10-12% sand water mixture and as such turbidity will be created as the units are filled. Turbidity barriers will be installed and maintained throughout all filling to prevent sedimentation impacts.

The Club is within the Vessup Bay/ East End Red Hook Area of Particular Concern (APC) (Figure 5.01.1). The Vessup Bay/Red Hook APC is located on the eastern end of St. Thomas and includes Nazareth, Muller, Vessup, Red Hook, Great Bay, Cowpet Bay, Cabrita, Beck and Water Point, Great St. James, Little St, James, and Dog Island.

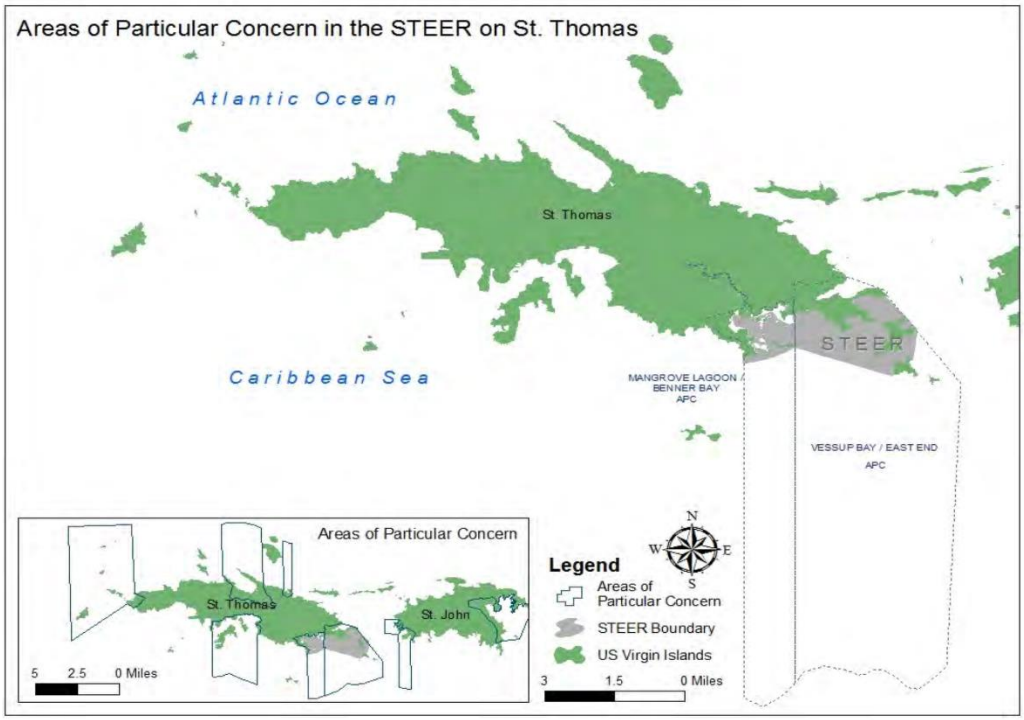


Figure 5.01.1 Areas of Particular Concern (STEER (2011) St. Thomas East End Reserve Management Plan. St. Thomas, USVI.

The Club also lies within the St. Thomas East End Reverse (STEER). STEER was developed to help protect coastal resources including seagrass beds and coral reef communities. The project activities will be in area C of the reserve and is referred to as St. James (Figure 5.01.2).

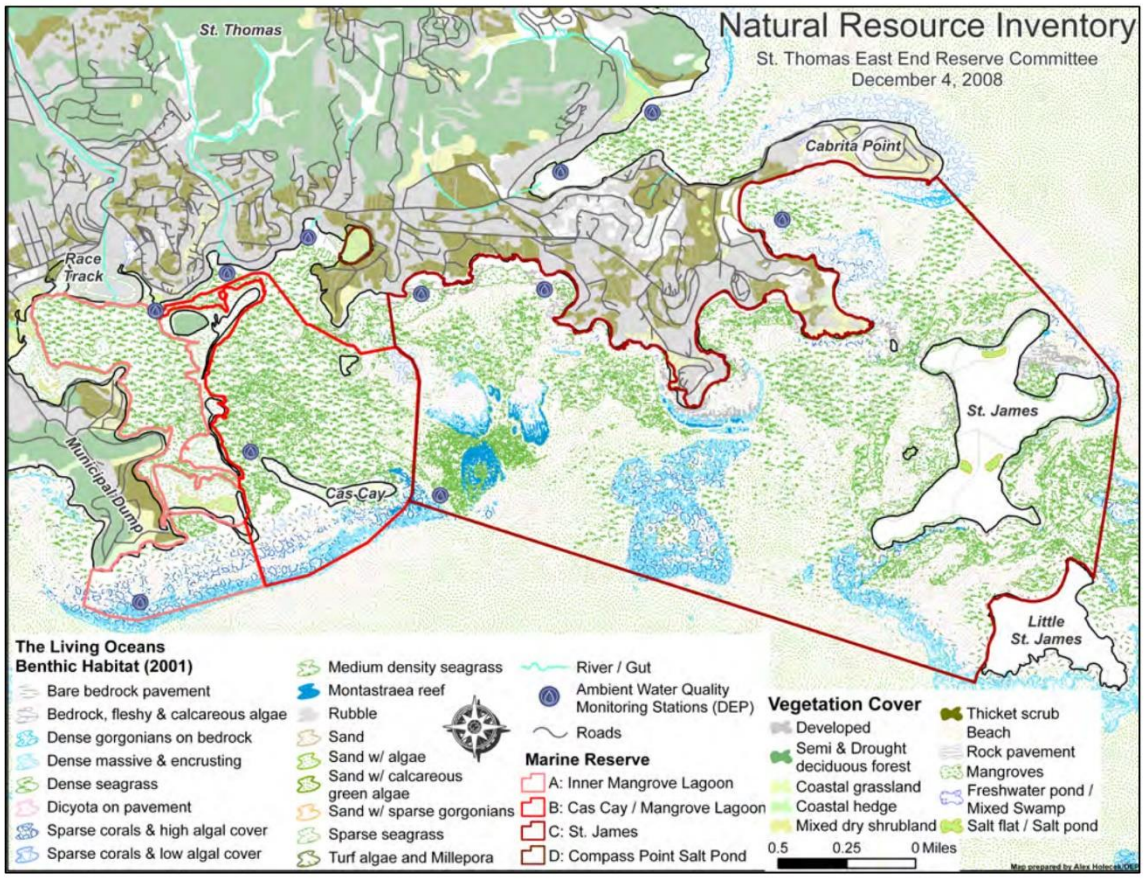


Figure 5.01.2 STEER boundaries. (STEER (2011) St. Thomas East End Reserve Management Plan. St. Thomas, USVI.

The regulations for the St. James are as follows:

St. James Marine Reserve and Wildlife Sanctuary	**Subchapter 96, Section 96-3**	*Prohibited Activities within the St. James MRWS:* • It is unlawful to remove any marine or other wildlife without a permit or specific authorization from the Commissioner
	Subchapter 96, Section 96-4	*Permitted Activities within the St. James MRWS:* Acts permitted, provided a permit is first obtained from the Commissioner: • Scientific collecting in support of and for use in a research project with an approved protocol • The use of castnet with a minimum square mesh size of ¼ inch to capture baitfish (fry) within 50 feet of the shoreline, except for Cow and Calf rocks • Fishing with hook and line

The proposed project activities are in keeping with rules and goals of STEER.

The area is known habitat to protected sea turtles and marine mammals and as such NOAA's Sea Turtle and Smalltooth Sawfish Construction Conditions will be followed as well as NOAA's Vessel Strike Avoidance Measures and Reporting for Mariners during the installation of the sargassum barriers and installation of the mooring tubes.

The beach in the area proposed for the "collection area" is not suitable for sea turtle nesting due to the beach composition which is a mixture of cobble and sand and partially underlain with beach rock.

5.01c Proposed Methods of Construction

Geotubes:

The installation will require a hopper, a pump, an excavator and a 6" tube with a PVC nozzle. The geotextile scour apron will be lain and placed level from side to side with a slope of not more than 1% from end to end. Alignment posts will be installed on 15" centers and driven into the seafloor and attached to the loops which are sewn into the scour apron. The scour aprons are then filled by pumping sand into the apron. Once the apron is filled the geotube is then placed over the inward edge of the apron and unrolled and attached to the anchor poss. The geotubes are then filled at a rate of 1000 and 2500gpm, with the sand mixture between 10% and 12%.

Sargassum Booms:

The 3" screw anchors will be located by GPS and installed by divers, if rock is encountered the

anchor will be moved slightly and a second attempt will be made. During the trails all anchors were able to be installed to a depth of 3' by relocation of up to 20' from original position and ropes could be adjusted to obtain proper position.

Barriers will be assembled on shore and pulled to slowly by a vessel as segments are attached. Once the barrier as reached the proper position the divers will attach the barriers to the anchors with the floated line. Once all the barriers are in place divers will adjust the lines to obtain a taunt line in the correct position.

The nearshore line requires the installation of stakes and screw anchors. The offshore screw anchors will be installed and left in place, the nearshore will require the driving of stakes since the will be in very shallow water and the barrier will not utilize a skirt in the shallowest areas.

Two buoys will be installed on either end of the barrier to warn boaters of its presence. These like the sargassum booms will be removed from the water when there is not sargassum.

Beach Collection Area

The green fencing will be installed around the area where Sargassum is currently collected and loaded into trucks. This is the area where the barriers will be directing the floating weed. The fencing will have a gate on the water side to allow the collection of the Sargassum and will have a gate on the roadside which will allow for the removal of the Sargassum for transport. The western side which is fixed will be planted with seagrapes (*Cocoloba uvifera*) to create a continuous hedge. The gates will be "green walls". This area is not suitable for sea turtle nesting due to the composition of the beach (mix of cobble and sand).

5.01d Provisions to Limit Site Disturbance

The geotubes are being deployed so they impact no hardbottom resources and so that they impact the least about of seagrass as possible. Seagrasses within the footprint of the geotubes will be transplanted to minimize impact.

Turbidity barriers will be installed during the installation and filling of the geotubes. A water quality monitoring plan will be implemented during the installation.

Screw anchors and floated lines are being utilized to minimize impact to the seagrass resources. During trials with the barriers it was found that the manufactures recommendation of steel cables made it difficult to keep the up off the seafloor and that floated lines worked just a well and had no impact on the seafloor.

Erosion control will be installed during all shoreline earth change activities installation of fence post and will be maintained until the installation is complete.

The Sargassum collection area enclosure is intended to minimize the visual impact of sargassum collection operations on the beach and the public who frequent the area. The enclosure will be in an area which is not suitable for turtle nesting and will utilize native vegetation.

5.01e Sediment Control Methods to be Implemented

Turbidity barriers will be installed prior to the placement of the geotubes and will be maintained in the area of in-water work throughout the filling activity and until water quality returns to ambient. A water quality monitoring program will be implemented.

Silt fencing will be installed prior to fence post excavation (collection area) and will be maintained until the area is stabilized.

5.01f Schedule for Construction Activities and Implementation of Sediment Control Measures

Geotubes

Turbidity barriers will be installed around first area of work. The scour mat will be placed and filled and the geotube will be installed and filled. Once water quality has returned to ambient the turbidity barriers will be relocated to the next area of work and the process will repeat.

Sargassum barriers

The screw anchors will be placed, and barriers will be deployed as necessary. No sediment control is necessary.

5.01g Maintenance of Sediment and Siltation Control Measures

The turbidity barriers will be monitored on a continuous basis as part of the water quality monitoring, if defects or deficiencies are noticed they will be addressed immediately. If necessary a double set of barriers will be installed.

Silt fencing will be monitored daily, and any defects of deficiencies will be address immediately.

5.02 Exhibits and Drawings

RITZ CARLTON CLUB
Estate Nazareth, Saint Thomas, US Virgin Islands
STORAGE AREA & BREAKWATER PLAN
BCSC DOSPIVA
The Green Piece Engineering + Environment
Engineers • Surveyors • Planners
SU-1
PLAN VIEW
Ritz-Carlton Club Project
STORAGE AREA CONCEALMENT
CONTIGUOUS BREAKWATER - STANDARD DIMENSIONS
GEOTUBE CONSTRUCTION SEQUENCE:
APPROXIMATE SAND QUANTITIES:
STANDARD TEMPORARY SILT FENCE (N.T.S.)
CONSTRUCTION ENTRANCE

THE RITZ CARLTON CLUB – GREAT BAY, ST. THOMAS
INSTALLATION OF SARGRASSUM DIVERSION BARRIERS
CROSS SECTION
LAY OUT
Ritz Carlton Club
Offshore Sargassum Diversion Barriers
Legend
Barrier Location
Catch Barrier
N
500 ft
Ritz Club
Google Earth

THE RITZ CARLTON CLUB – GREAT BAY, ST. THOMAS

INSTALLATION OF SARGRASSUM DIVERSION BARRIERS

5.03 Project Work Plan

Upon issuance of all necessary permits:

Sargassum Barriers:

1. All screw anchors will be installed, and barriers will be prepared in the storage area for rapid deployment.

As required –

1. Barriers will be staged on beach and pulled into place with a vessel
2. Divers will attach barriers to appropriate screw anchors and adjust ropes.
3. Collection equipment will be staged to effect cleanup and disposal.
4. When no longer need or inclement weather or sea, divers will unhook barriers an vessel will assist in pulling barriers to shoreline for cleaning and storage.

Geotubes:

1. Pumps and hopper staged on northern end of the beach.
2. Turbidity barriers installed around first geotube position.
3. Scour apron installed and filled
4. Geotube installed and filled.
5. Barriers relocated to next position when water quality returns to ambient.

Collection Area

1. Install silt fencing
2. Excavate Fence Post
3. Place Fence Post
4. Place Fencing
5. Plant Seagrapes

6.00 ENVIRONMENTAL SETTING AND PROBABLE PROJECT MODIFICATIONS

6.01 Climate and Weather

Prevailing Winds

The Virgin Islands lie in the "Easterlies" or "Trade Winds," which traverse the southern part of the "Bermuda High" pressure area. Thus, the predominant winds are usually from the east-northeast and east (IRF, 1977). These trade winds vary seasonally (Figure 6.01.1) and are broadly divided into 4 seasonal modes: 1) December to February 2) March to May, 3) June to August and 4) September to November. Below are the characteristics of these modes as taken from Marine Environments of the Virgin Islands Technical Supplement No. 1 (IRF, 1977).

December - February

During the winter the trade winds reach a maximum and blow with great regularity from the east-

northeast. Wind speeds range from eleven to twenty-one knots about sixty percent of the time in January. This is a period when the Bermuda High is intensified with only nominal compensation pressure changes in the Equatorial Trough. "Northerners" or "Christmas Winds," which blow more than twenty knots from a northerly direction in gusts from one to three days, interrupt the trade winds during this period. Such outbreaks average about thirty each year. They are created by strengthening of high-pressure cells over the North American continent, which, in turn, allows weak cold fronts to move, southeastward over the entire Caribbean region. These storms are accompanied by intermittent rains and by clouds and low visibility for mariners.

March - May

During the spring, the trade winds are reduced in speed and blow mainly from the east. Winds exceed twenty knots only thirteen percent of the time in April. The change in speed and direction is the result of a decrease of the Equatorial Trough.

June - August

Trade winds reach a secondary maximum during this period and blow predominantly from the east to east-southeast. Speeds exceed twenty knots twenty-three percent of the time during July. The trend for increasing winds results from the strengthening of the Bermuda High and a concurrent lowering of the pressure in the Equatorial Trough. Trade winds during this period are interrupted by occasional hurricanes.

September - November

During the fall, winds blow mainly from the east or southeast and speeds reach an annual minimum. Only seven percent of the winds exceed twenty knots in October. The low speeds result from a decrease in the Equatorial Trough. During this period, especially during late August through mid-October, the normal trade wind regime is often broken down by easterly waves, tropical storms and hurricanes.

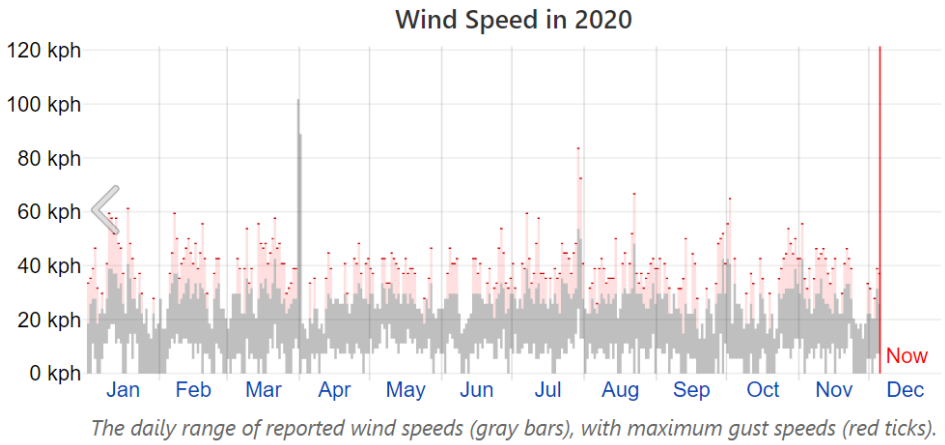


Figure 6.01.1 Wind speed and Gust reported at the Cyril E. King Airport, U.S. Virgin Islands in 2020 averages (https://weatherspark.com/y/28234/Average-Weather-inCharlotte-Amalie-U.S.-Virgin-Islands).

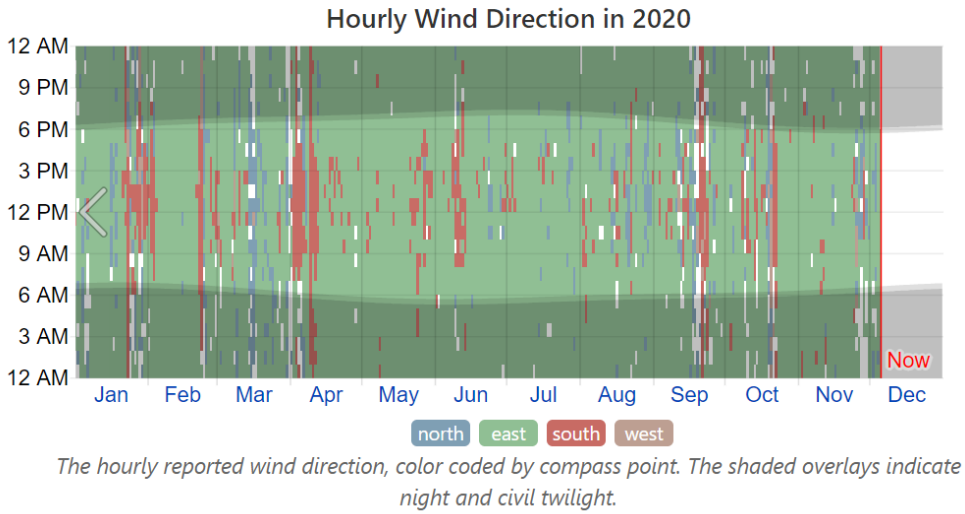


Figure 6.01.2 Hourly wind direction reported at the Cyril E. King Airport, U.S. Virgin Islands in 2020 (https://weatherspark.com/y/28234/Average-Weather-inCharlotte-Amalie-U.S.-Virgin-Islands).

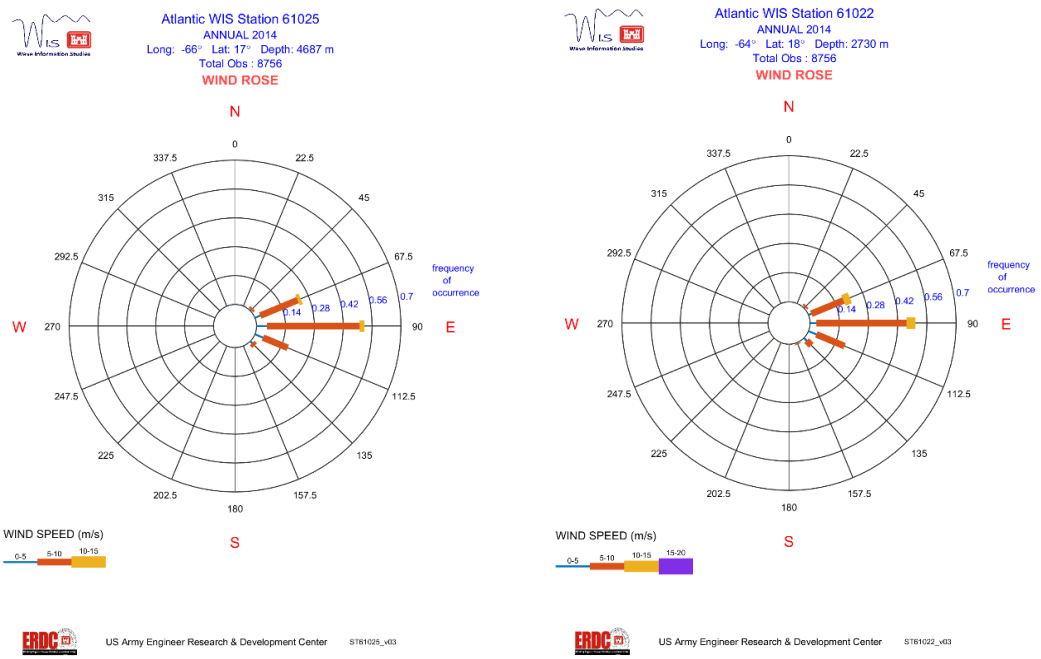


Figure 6.01.3 Wind Roses from the USACE showing the predominant easterly trade winds from the two closest buoys.

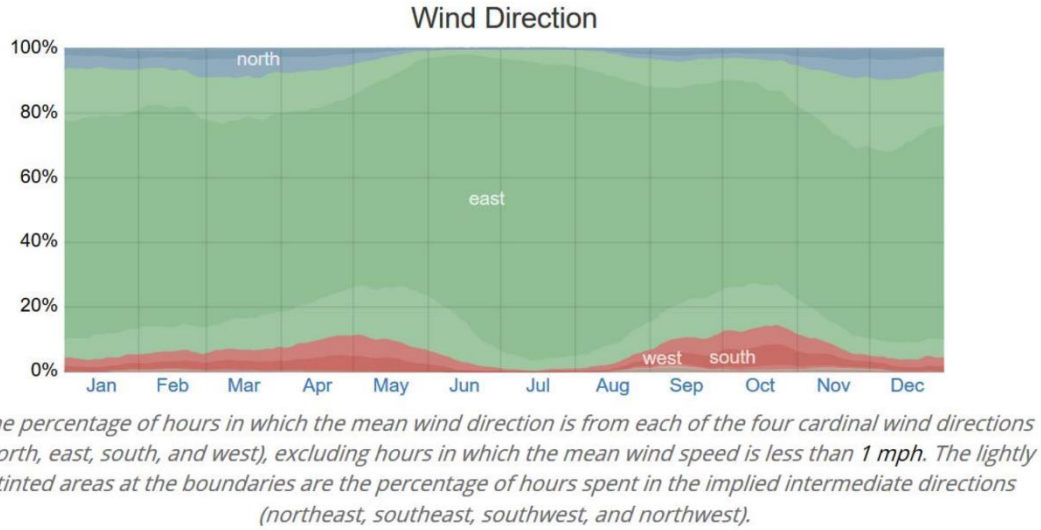


Figure 6.01.4 Wind averages (https://weatherspark.com/y/28234/Average-Weather-inCharlotte-Amalie-U.S.-Virgin-Islands)

Storm and Hurricanes

There are numerous disturbances during the year, especially squalls and thunderstorms. These occur most frequently during the summer, lasting only a few hours and causing no pronounced change in the trade winds.

A tropical cyclone whose winds exceed 74 miles per hour is termed a hurricane in the northern hemisphere, and significantly affects the area. These hurricanes occur most frequently between August and mid-October (Figure 6.01.2) with their peak activity occurring in September. The annual probability of a cyclone is one in sixteen years (Bowden, 1974).

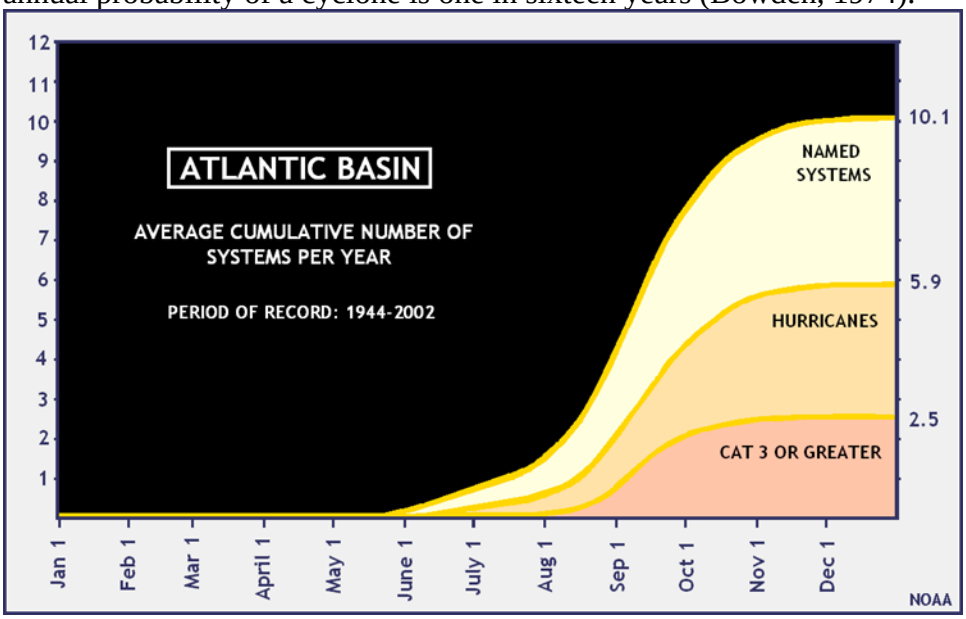


Figure 6.01.5. Tropical Hurricane Frequencies in the Virgin Islands (National Weather Service).

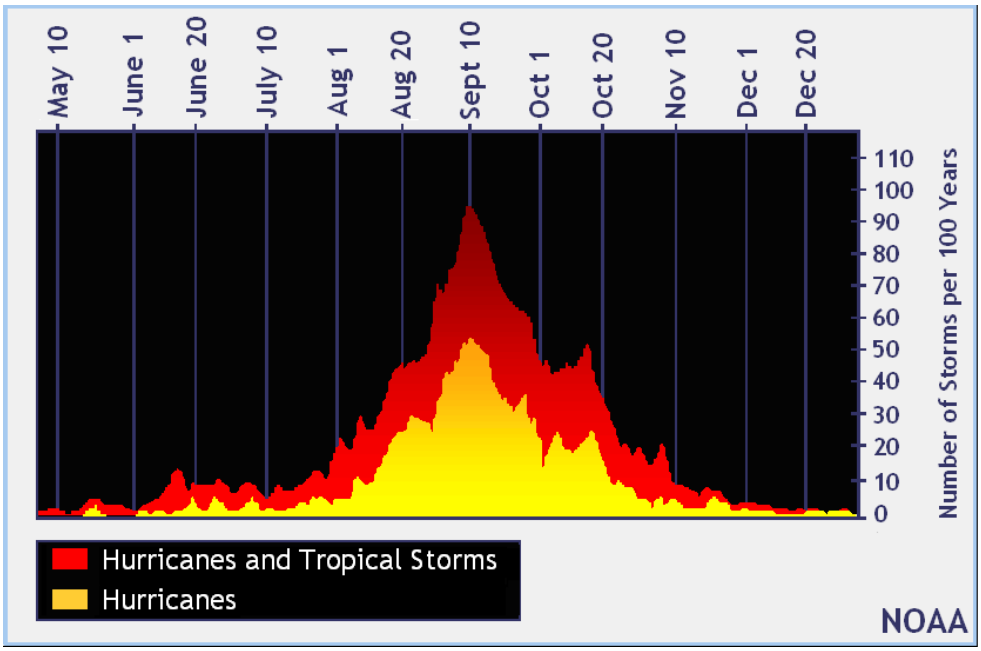


Figure 6.01.6. Tropical Storm and Hurricane Occurrences in the Atlantic (National Weather Service)

Climate

No site specific data is available for the Club. The average annual rainfall on St. Thomas is approximately 45 inches, ranging from 35 inches toward the eastern end of the island to more than 55 inches at the higher elevation to the west. Rainfall usually occurs in brief, intense showers of less than a few tenths of an inch, and major rainfall events are associated with weather systems (USGS 1998). The Virgin Islands have no sharply defined wet season. The wettest period generally is from September to November, and the driest period is from January to June (USGS 1998). The Southeast Regional Climate Center's closest climate station is located in Fort Mylner, St. Thomas (672823) (Southeast Regional Climate Center, University of North Carolina at Chapel Hill. (sercc@climate.ncsu.edu). The data from this station is as follows.

ESTATE FORT MYLNER, VIRGIN ISLANDS (672823)
Period of Record Monthly Climate Summary
Period of Record : 1/ 1/1972 to 8/31/1995

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)					Insuff	icient	Data						
Average Min. Temperature (F)					Insuff	icient	Data						
Average Total Precipitation (in.)	3.01	2.09	2.19	3.80	4.69	3.26	2.68	4.07	6.09	6.62	7.33	3.35	49.19

Percent of possible observations for period of record.
Max. Temp.: 0% Min. Temp.: 0% Precipitation: 95.3%

The station data is not available since 1995. The Charlotte Amalie Harbor Station (678905) collected more recent data.

CHARLOTTE AMALIE HAR, VIRGIN ISLANDS (678905)
Period of Record Monthly Climate Summary
Period of Record : 1/12/1972 to 4/30/2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	84.7	85.0	85.5	86.4	87.4	89.1	89.9	90.1	89.5	88.6	87.0	85.5	87.4
Average Min. Temperature (F)	72.3	72.2	72.7	74.2	76.3	77.7	78.0	78.1	77.6	76.6	75.1	73.3	75.3
Average Total Precipitation (in.)	2.03	1.45	1.46	2.74	3.35	2.75	2.66	3.83	5.42	5.94	5.54	2.84	40.01

Percent of possible observations for period of record.
Max. Temp.: 84% Min. Temp.: 83.6% Precipitation: 80.9% Snowfall: 80.1% Snow Depth: 76%

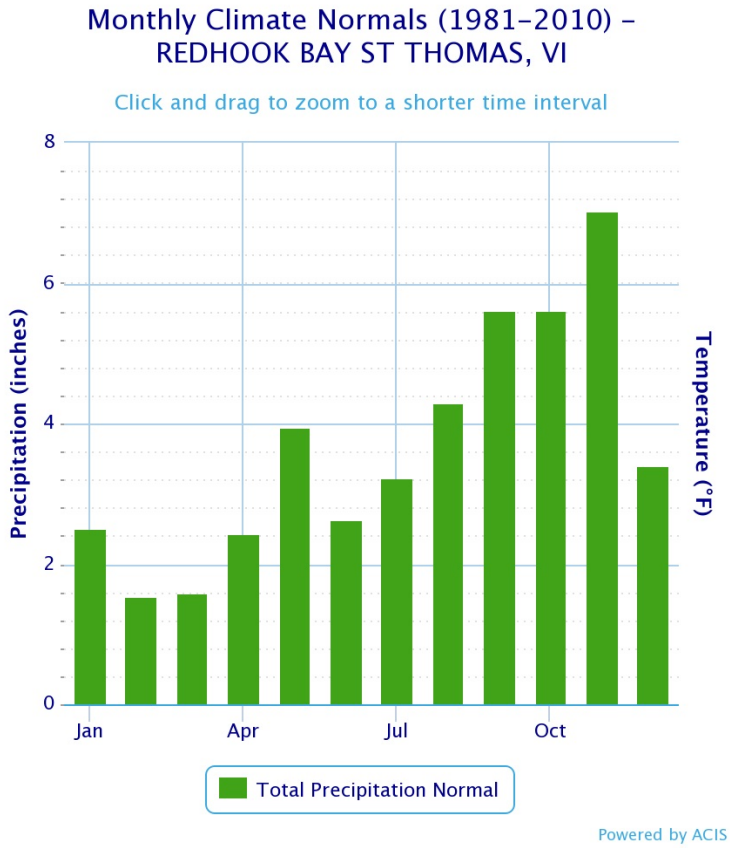


Figure 6.01.7 Rainfall Normals for Red Hook, St. Thomas.
https://www.weather.gov/images/sju/Interactive_Map/RedHookBay.jpg

The difference between the mean temperatures of the coolest and warmest month is only 5 to 7 degrees F. The highest temperatures are in August or September and the lowest are in January or February. The highest average daytime temperature in the warmest months is about 88 degrees F, and in the coolest months it is in the low 80's. Nighttime lows are usually in the mid 70's during the warmer months and in the high 60's during the cooler months (USGS 1998). In

general, air temperature in the Virgin Islands ranges between 75 degrees and 88 degrees.

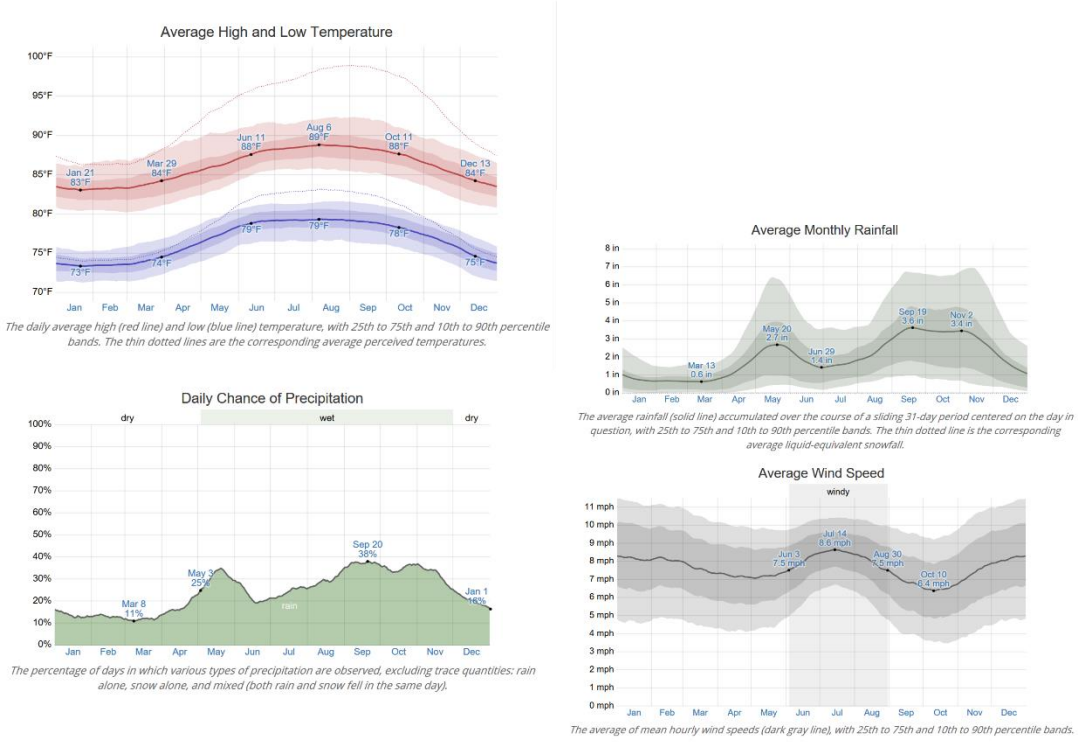


Figure 6.01.8 Climate averages (https://weatherspark.com/y/28234/Average-Weather-inCharlotte-Amalie-U.S.-Virgin-Islands)

Impact of Weather on the Site

The prevailing winds are one of the greatest factors in the accumulation of Sargassum in Great Bay the prevailing winds push the floating weed onto the Clubs Beach and since Great Bay is a very narrow deep embayment there is no way for the Sargassum to be moved out of the bay except for during significant storm events.

6.02 Landforms, Geology, Soils, and Historic Use

GEOLOGY OF ST. THOMAS

The Virgin Islands are near the northeastern corner of the present Caribbean Plate, a relatively small trapezoidal-shaped plate that is moving eastward relative to the North and South American continents carried on the American plate. The arc of the Lesser Antilles is an active volcanic arc above a subduction zone in which the Atlantic oceanic crust of the American Plate is carried downward under the Caribbean Plate. The closest volcano to the Virgin Islands that is still active is on Saba, about 160 km. to the east.

St. Thomas is composed of stratified volcanic and volcaniclastic rocks with minor limestone of the Early Cretaceous (Albain) to possibly the late Cretaceous Age (Donnelly 1966). These rocks are of granitic composition, some of which may be as young as Tertiary (Kesler and Sutter, 1979). The oldest rocks of St. John are submarine lavas (keratophyre and spilite), beds of volcanic debris and chert. Associated intrusive rocks of the Water Island Formation is overlain by andesitic volcanic and volcaniclastic rocks of the Louisenhoj Formation, which underlies the island of St. Thomas to the east and much of the northwestern portion of St. John. Donnelly (1966) suggested that the Louisenhoj Formation was deposited unconformably on the slopes and environs of a subaerial volcanic island located roughly between St. Thomas and St. John, on the Water Island Formation after a period of emergence, tilting and erosion, an area now occupied by Pillsbury Sound. The youngest layered deposits on St. Thomas are volcaniclastic rocks of the Tutu Formation. Fossils contained in the Tutu Formation suggest that those deposits are of the Early Cretaceous (Albain) Age (Donnelly et. al. 1971). It appears that all the volcaniclastic rocks of St. Thomas were deposited in a relatively short period of time spanning 10 to 15 million years approximately 100 million years ago (D. Rankin 1988).

St. Thomas is characterized by an irregular coastline, numerous bays, steep slopes and small drainage areas. For the most part the topography is very mountainous and coastal plains are almost completely absent.

GEOLOGY OF THE GREAT BAY

The sandy beach extends between the shoreline beach rock and reef to the north and a rocky promontory to the south. The area offshore of the beach is a sandy which extends throughout the center of the bay. There is beach rock which is periodically exposed along the shoreline, and a large amount of the rock pavement was exposed by the hurricanes of 2017.

HISTORIC USE

The site has been developed into hotel and resort use for more than 50 years.

The 1954 aerial shows the undeveloped area and the salt ponds which lie to the west. The narrow sandy beach is present.

By 1972 the Grand Palazzo had been constructed on the site.

ADVERSE SITE CONDITIONS

The typical waves and wave patterns have minimal effect on the beach area which is well protected from the predominant waves approach. The offshore area is in Zone VE10, where coastal flooding with velocity hazards (wave action) is predicted to be 10 ft. (Flood Insurance Rate Map, Panel 30 of 94, revised April 16, 2007). The shoreline is significantly impacted by wave action during storm events, and the 2017 hurricane season moved large amounts of sand offshore well beyond the cell where the sand is typically moved back and forth on to the beach. This has led to continual shoreline erosion since that time.

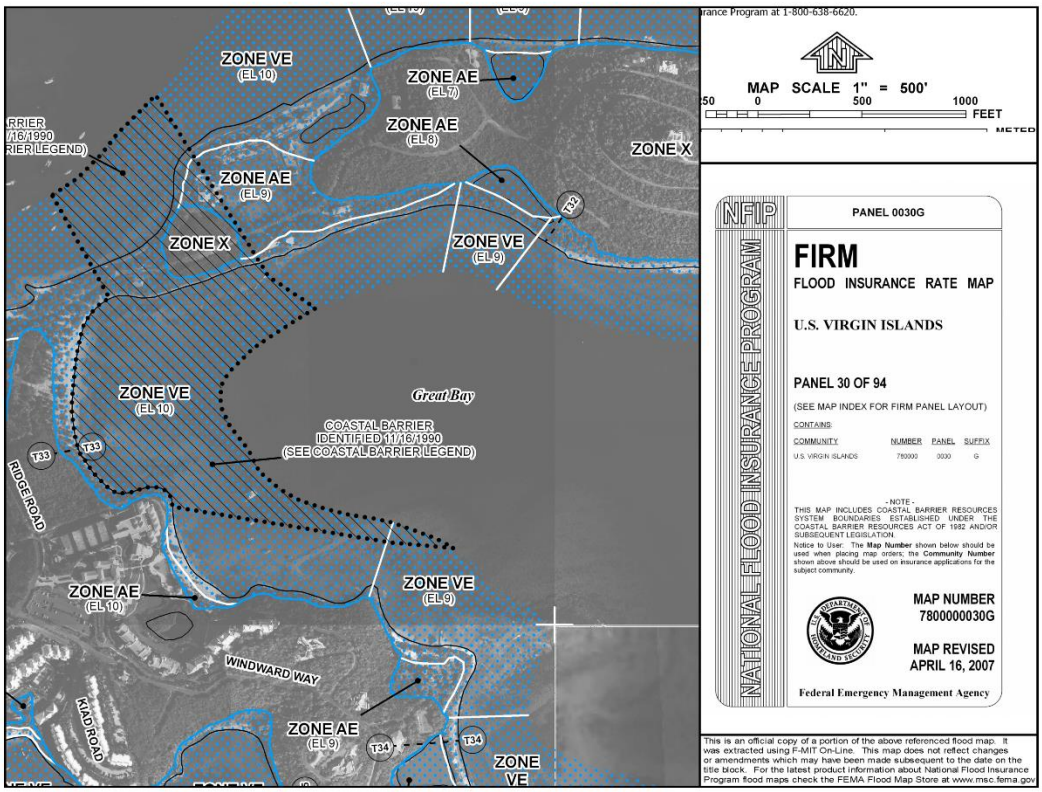


Figure 6.02.3 Flood Insurance Rate Map, Panel 30 of 94, revised April 16, 2007.

The U.S. Virgin Islands lie in one of the most earthquake prone areas of the world, and are susceptible to ground shaking, earthquake-induced ground failures, surface fault ruptures and tsunamis (Hays, 1984). The activity is mostly associated with large-scale tectonic activity or faulting, originating in the Anegada Trough to the northeast of the islands. The trough and its related scarp apparently were thrown up by block faulting during the late Pliocene or early Pleistocene. It is oriented generally northeast to southwest, separating St. Croix from Puerto Rico and the other Virgin Islands. Based on shallow focused earthquakes, the Anegada Fault Trough is estimated to be more than 400 miles in length. There are indications that strike slip movement is occurring, with St. Croix shifting northeast relative to Puerto Rico (Puerto Rico Water Authority 1970). The year 2022 marks the 155th anniversary of the last major earthquake in the islands. The quake, which occurred on November 18, 1867, had an identified intensity of VIII on the Modified Mercalli Scale (7.5 Richter). This earthquake produced severe damage from ground acceleration and a tsunami estimated at 20 ft. high when it struck the north shore of St. Croix. Earthquakes of this magnitude have generally been associated with epi-central ground accelerations of between 0.05 and 0.35 gravities. Since the 1867 quake, there has been continuous recording of low intensity activity all below 6.0 Richter.

SOILS

A custom soil report was prepared for the site by the Cooperative Soil Survey. The headland to the south of the beach is identified as Southgate Rock Complex with slopes 20-40% (SrE). These soils are found on ridges, hillslopes, and mountain slopes and extend beyond the Mean High-Water Line. The beach area is listed as Beaches, sandy and spans back into the vegetation line.

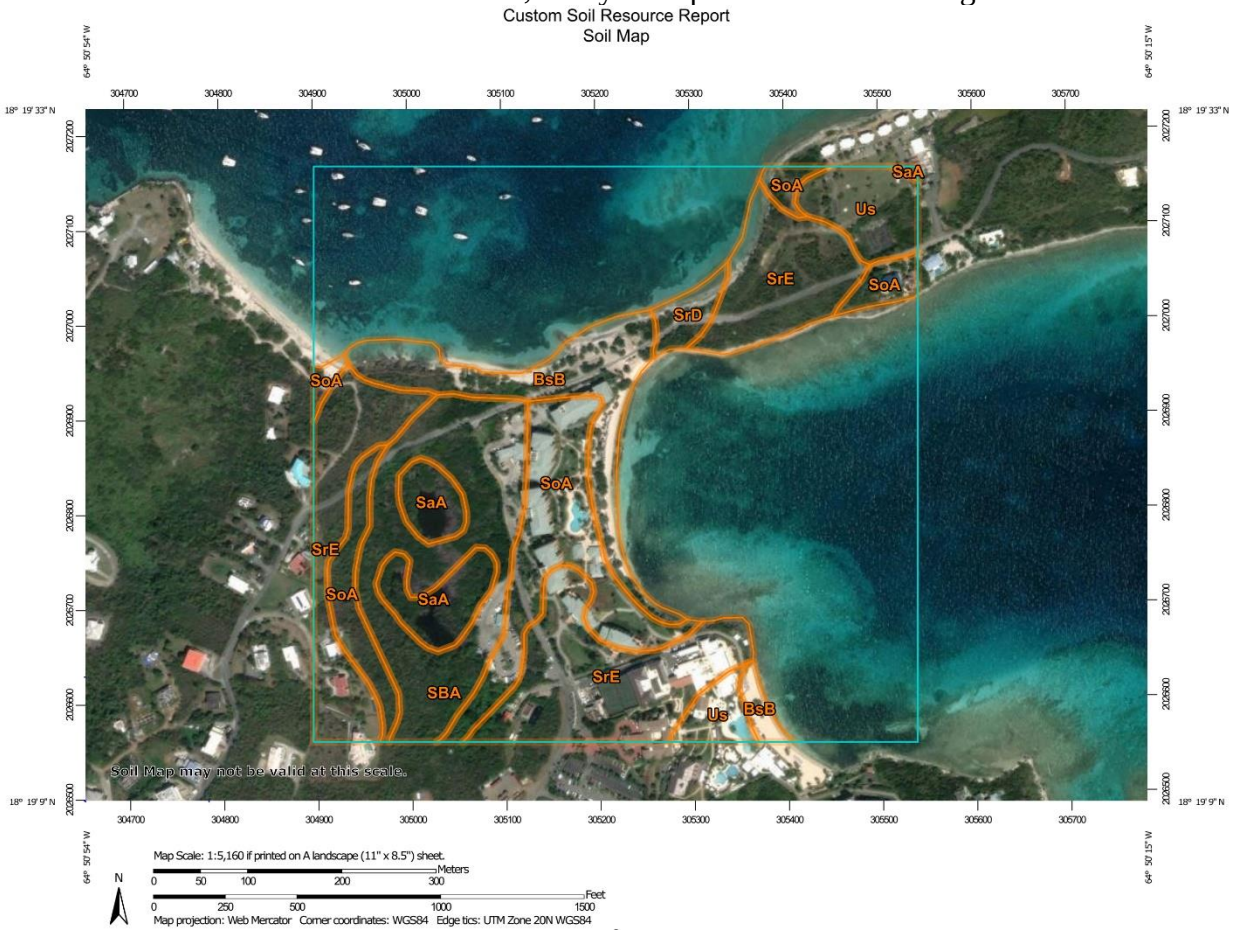


Figure 6.02.3 Custom Soil Map for Ritz Carlton Club.

IMPACT OF BEACH PRESERVATION MEASURES

The intention of the proposed measures is to preserve the shoreline and minimize future beach erosion. The geotubes should allow for the preservation of sand on the beach and the accretion of sand along the shoreline.

Beaches on the northern coast of Yucatan in Mexico have been significantly eroding over the last 15 years, low-crested geotubes have shown that they are an effective and environmentally friendly alternative for shore stabilization (Alvarez, 2006).

The sargassum barriers will have a minimal impact on site geology but were seen to result in sand accretion when they were deployed.

6.03 Drainage, Flooding and Erosion Control

6.03a Terrestrial and Shoreline Erosion

The geotubes and Sargassum barriers are located entirely offshore and therefore have no impact on terrestrial erosion.

The geotubes are intended to minimize and prevent shoreline erosion. The geotubes are intended to retain sand on the beach and should act to increase shoreline accretion.

The deployment of the Sargassum barriers during the trail result in accretion along the shoreline due to its damping of the waves.

6.03b Relationship of the Project to the Coastal Flood Plain

The typical waves and wave patterns have minimal effect on the beach area which is well protected from the predominant waves approach. The offshore area is in Zone VE10, where coastal flooding with velocity hazards (wave action) is predicted to be 10 ft. (Flood Insurance Rate Map, Panel 30 of 94, revised April 16, 2007) (page 21). The shoreline is significantly impacted by wave action during storm events, and the 2017 hurricane season move large amounts of sand offshore well beyond the cell where the sand is typically moved back and forth on to the beach. This has led to continual shoreline erosion since that time.

6.04 Fresh Water Resources

The Sargassum barriers, and geotubes will have no impact on freshwater resources.

6.05 Oceanography
6.05a Sea Bed Alteration

The proposal includes the installation of two separate components all intended to protect the shoreline.

Geotubes are proposed parallel to the offshore in approximately 5ft of water. Eleven geotubes 51’ in length, 9’ wide, 22’ in circumference, and 4ft in height will be placed offshore. These all have 27’ wide scour aprons between 55’ – 70’ in length. These will be placed parallel to the shoreline 40 to 60ft offshore. The geotextile scour aprons are attached to the seafloor with post that will be driven into the seafloor to hold them in place during filling.

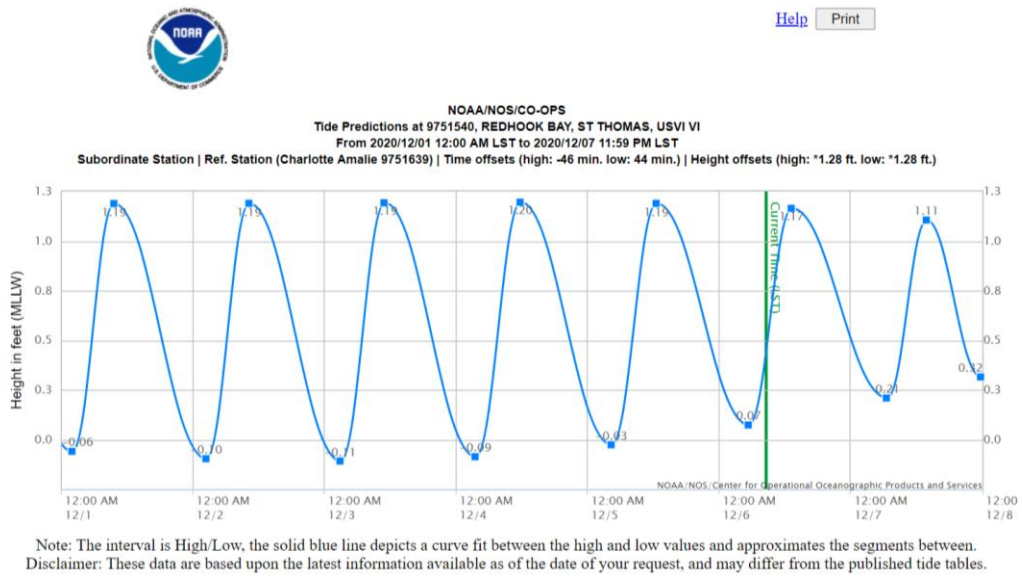
A trail conducted in 2021 showed that the sargassum can be directed successfully into one corner of the beach. It was also found that the barrier angle may need to shift due to wave approach to best accomplish the movement of the sargassum along the barriers. The Club is therefore requesting permission to install up to 750ft of boom offshore and up to 75ft of barrier as a "catch" barrier to prevent sargassum from moving back along the beach. The barrier in stalled will be the Smooth Blue beach bouncer barrier which as a 24" skirt to prevent sargassum from moving below the barrier. The barrier would be installed utilizing screw anchors and would utilize floating lines. Screw anchors would be installed every 25ft, and pair anchors will be used to minimize wave impacts. The Club would like permission to install up to sixty-five (65) 3' screw anchors to allow for adjustment of the angle as necessary. A quick release has been designed into the barriers, so they maybe rapidly removed or deployed. The screw anchors will remain in place year-round, but the barriers would only be deployed as necessary to prevent sargassum inundation on the beach.

6.05B TIDES AND CURRENTS

The Virgin Islands coastal areas are not subject to significant tidal ranges or tidal currents. Due to the small size of the island, the sea flows around the island causing an average tidal height of only a few inches and maximum change of only a little over a foot. Only very narrow intertidal zones are found because of this lack of tidal amplitude and the steepness of the island rising out of the sea. The tides within Great Bay are primarily semi-diurnal in nature, with two cycles of high and two of low water every 24 hours. The second cycle is often indistinguishable. The mean tides range from 0.8f. to 1.0 ft and the spring tidal ranges reach up to 1.3ft (IRF 1977). There are no notable locally driven tidal currents due to the lack of confinement within the area. NOAA has a tide gauge in Charlotte Amalie which is a southern exposure which has been recording water levels since 1975. The high tide recorded on September 18, 1989 (Hurricane Hugo) was +3.35ft, and in 1995 during Hurricane Marilyn the Charlotte Amalie tide station recorded the highest tide height 3.98ft above Mean Lower Low Water (MLLW). The lowest tide recorded was on February 6, 1985 and was -1.44ft. The tidal ranges of the Charlotte Amalie station are as follows:

Mean Higher High Water	1.09ft
Mean High Water	0.94ft
Mean Tide Level	0.54ft
Mean Sea Level	0.52ft
Mean Low Water	0.13ft
Mean Lower Low Water	0.0ft

There is also a Tide Station in Red Hook (Station ID: 9751540), the station is located at latitude 18° 19.6 N and longitude 64° 51.1 Wand has a mean tidal range of 0.82ft and a diurnal range of 1.09ft.



Note: The interval is High/Low, the solid blue line depicts a curve fit between the high and low values and approximates the segments between.
Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.

Figure 6.05.1. Tidal data from the Redhook Tidal Station (NOAA Buoys)

The surface currents throughout the Caribbean are driven by the North Equatorial Current that runs through the islands west-northwest and then joins the Gulf. These currents change little from season to season with the currents coming more from the south during the summer months. Because of the shallowness of the Caribbean basin of less than 1000m, mainly surface water from the Atlantic flows through the islands. The westerly drift of the Caribbean Current sweeps into Pillsbury Sound from the Southeast, seeking a way North through the barrier set up by the Cays to discharge along the North Shore of St. Thomas and out into the Atlantic. The current flows in Great Bay in a northwesterly direction. A drogue study has been conducted in Great Bay during the fall of 2020 and drogues were found to travel from the East to West on all days.

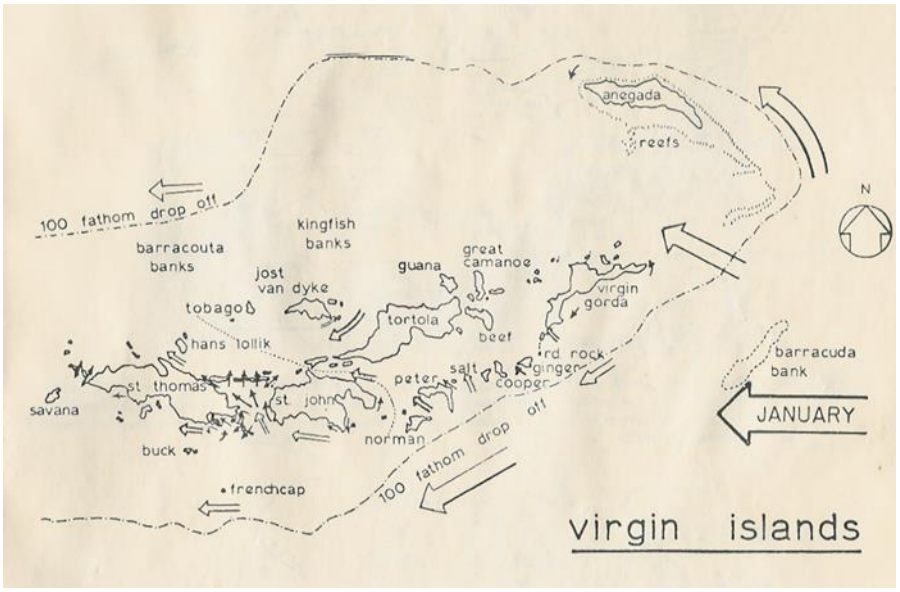


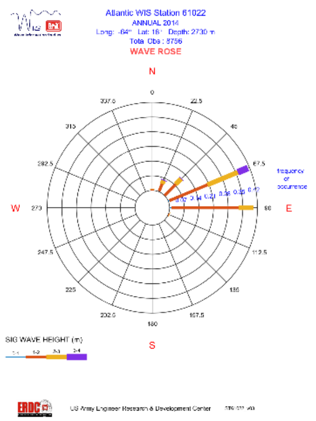
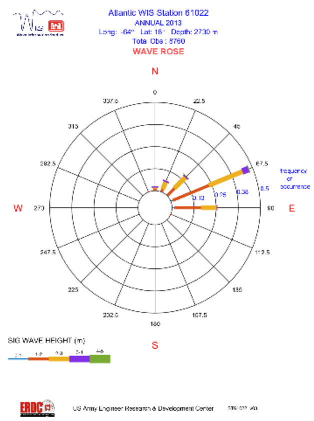
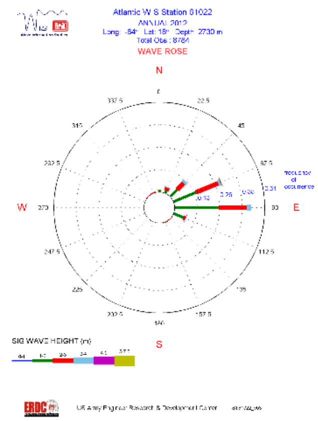
Figure 6.05.2 Currents surround the northern islands and Cays (IRF 1977).


Figure 6.05.3. Drogue tracks during 2020/2021 Sargassum study. The property is shown by the red star.

6.05C WAVES

The deep-water waves off Great St. James are primarily driven by the northeast trade winds that blow most of the year. Waves average from 1 to 3ft from the east, 42% of the time throughout the year (IRF, 1977). For 0.6% of the time easterly waves reach 12ft in height. The southeasterly swell with waves one to twelve feet high become significant in late summer and fall when the trade winds blow from the east or when tropical storms and hurricanes pass the islands at a distance to the south. During the winter months, long length, long period northern swells develop to a height

of 1 to 5 feet. The USACE Hindcast Studies for buoy 61022 the two buoy whose waves patterns directly affect the project site, shows that a majority of the waves which occurred approach from easterly directions.

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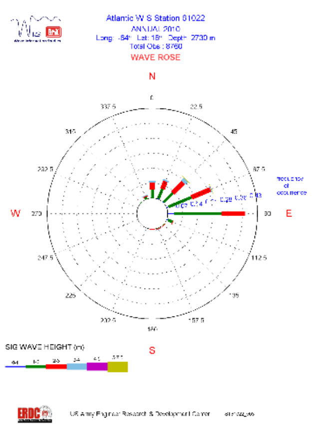
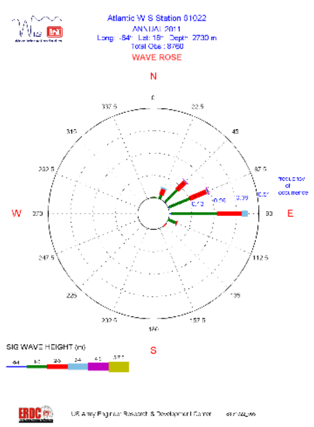
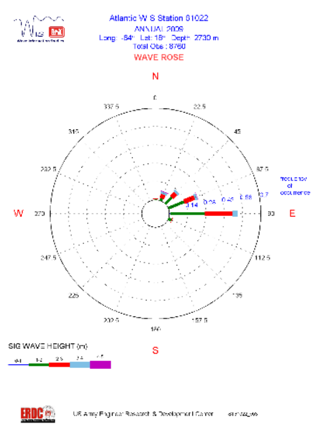
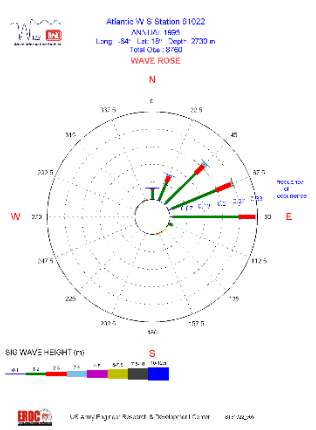
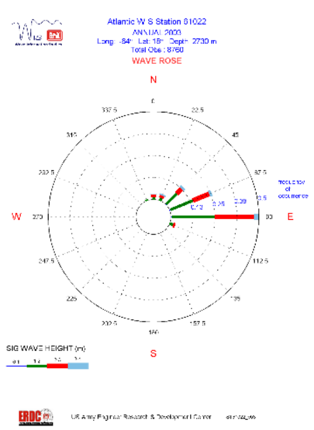
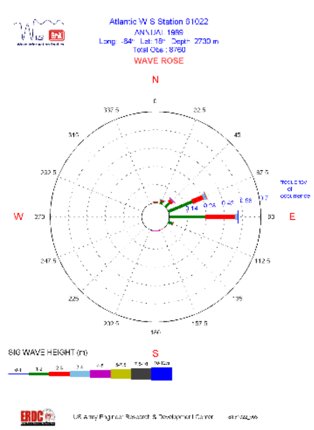







Figure 6.05.4. Wave Roses from the USACE Wave Information Studies for buoy 61022.

6.05D MARINE WATER QUALITY

The offshore waters around the Ritz Carlton Club are classified as Class B, and the best usage of these waters is listed as the propagation of desirable species of marine life and for primary contact recreation (swimming, water skiing, and related activities) (Figure 6.05.4). The quality criteria, which should be maintained, include dissolved oxygen not less than 5.5 mg/l from other than natural conditions. The pH must not vary by more than 0.1 pH unit from ambient; at no time shall the pH be less than 7.0 or greater than 8.3. Bacteria (fecal coliform) cannot exceed 70 per ml., and turbidity should not exceed such that a secchi disc is not visible at minimum depth of one meter.

Water quality within Great Bay is excellent.

Turbidities and dissolved oxygen readings at a depth of 1 meter were taken within the area in October of 2015. The result are shown below.

Location	Date	10/15/15	10/24/15	10/28/15
18° 19.270'N 64° 50.487'W		0.64ntu/6.2mg/l	0.70ntu/6.4mg/l	0.51ntu/5.9mg/l
18° 19.247'N 64° 50.475'W		0.63ntu/6.4mg/l	0.69ntu/6.3mg/l	0.50ntu/5.7mg/l
18° 19.230'N 64° 50.475'W		0.65ntu/6.1mg/l	0.74ntu/6.0mg/l	0.54ntu/5.7mg/l
	Date	9/16/16	10/5/16	11/2/16
18° 19.270'N 64° 50.487'W		0.81ntu/6.2mg/l	0.54ntu/5.9mg/l	0.75ntu/6.1ntu
18° 19.247'N 64° 50.475'W		0.59ntu/6.0mg/l	0.84ntu/6.0mg/l	0.58ntu/5.7mg/l
18° 19.230'N 64° 50.475'W		0.67ntu/5.9mg/l	0.64ntu/5.8mg/l	0.83ntu/5.7mg/l

Samples were taken in 2021 offshore of the site at 3 locations off the beach.

Date	6/16/2021	8/19/2021	10/1/2021	11/16/2021
Location				
18.322954°-64.842381°	0.67	0.75	0.81	0.84
18.322358°-64.842499°	0.71	0.86	0.77	0.87
18.321755°-64.842235°	0.78	0.76	0.65	0.81

IMPACT OF THE PROPOSED BEACH PROTECTION DEVICES

The installation of the geotubes have the potential to negatively impact water quality during the filling of the tubes and as such turbidity barriers will be installed and a water quality monitoring plan will be implemented.

The installation of the drainage system should improve water quality by minimizing s runoff reaching the water and discharging sand filtered water in a controlled manner in an area not subject to erosion.

The purpose of the geotubes is to dampen wave action and to allow for the retention and accretion of sand on the beach. Both the sargassum barrier and the drainage improvements have a secondary affect of accreting sand on the shoreline. The barriers by dampening wave action and the drainage system by reducing water content in the upper layers of the beach.

The geotubes effectively reduce the wave size inshore, dampening the energy and allowing for the accretion of sand inshore of the barriers.

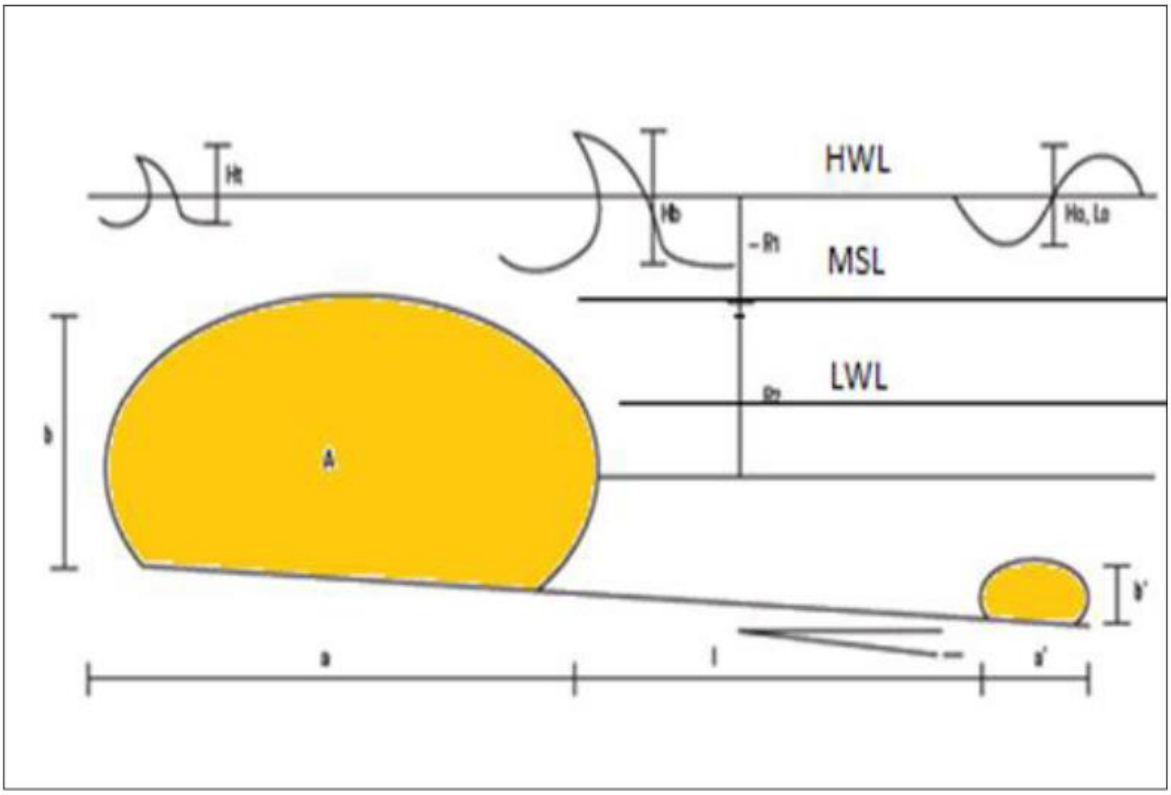


Figure 6.05.5 Waves are dampened by the presence of the submerged geotubes (Sulaiman, 2012).

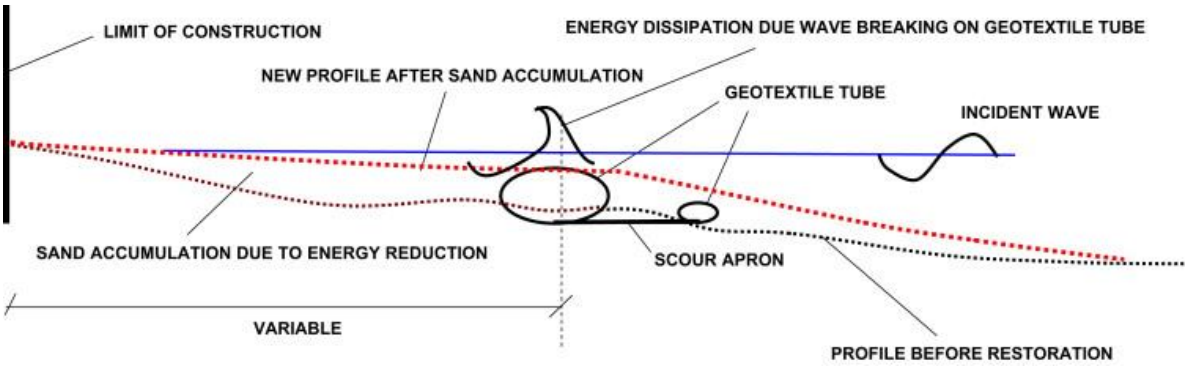


Figure 6.05.7 Changes in the shoreline profile after installation of submerged geotubes (Alavrez, 2007)

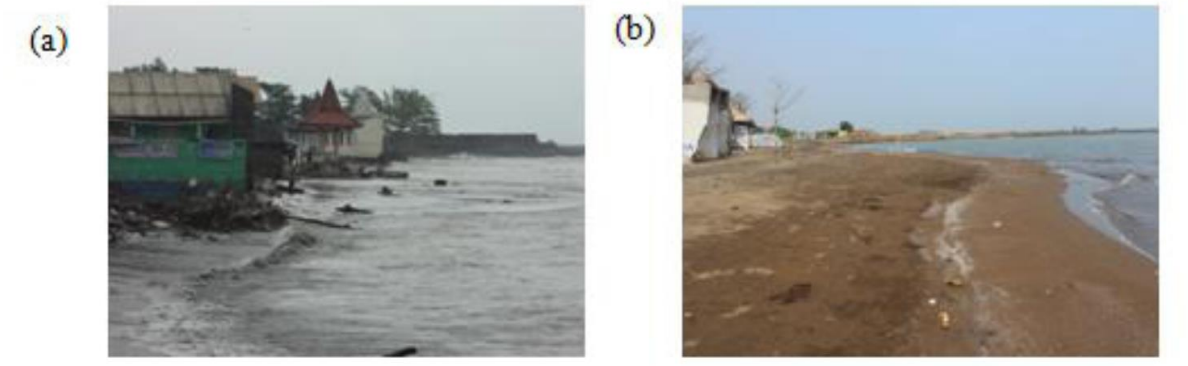


Figure 8. Sigandu Beach condition (a) before and (b) after LCB installation.

Figure 6.05.8 The results of the installation of geotubes along the coastline (Sulaiman, 2012)

6.06 Marine Resources and Habitat Assessment

The Ritz Carlton proposes to install geotubes, or geotextile bags, along the shoreline to the Ritz Carlton club beach in Great Bay, St. Thomas. Geotubes are commonly used in shoreline erosion control for coastal protection, dewatering of dredge spoils, and for flood control, among other applications. The Ritz Carlton club beach has experienced continued erosion, exacerbated by sargassum removal along the beach. The Ritz Carlton has conducted a trial utilizing sargassum barriers to redirect the flow or sargassum, and is asking as a part of this application to install them in the future when needed and proposes to install geotubes to prevent further shoreline erosion caused by hurricane and storm events. Geotubes have been utilized in over 50 countries, including in the Dominican Republic and Mexico.

A trail conducted in 2021 showed that the sargassum can be directed successfully into one corner of the beach. It was also found that the barrier angle may need to shift due to wave approach to best accomplish the movement of the sargassum along the barriers. The Club is therefore requesting permission to install up to 750ft of boom offshore and up to 75ft of barrier as a "catch" barrier to prevent sargassum from moving back along the beach. The barrier in stalled will be the

Smooth Blue beach bouncer barrier which as a 24" skirt to prevent sargassum from moving below the barrier. The barrier would be installed utilizing screw anchors and would utilize floating lines. Screw anchors would be installed every 25ft, and pair anchors will be used to minimize wave impacts. The Club would like permission to install up to sixty-five (65) 3' screw anchors to allow for adjustment of the angle as necessary. A quick release has been designed into the barriers, so they maybe rapidly removed or deployed. The screw anchors will remain in place year-round, but the barriers would only be deployed as necessary to prevent sargassum inundation on the beach.

A Google Earth aerial caught an excellent picture of the sargassum barriers while they were deployed during the trial.

Figure 6.06.1 Google Earth September 2021

Geotubes are proposed parallel to the offshore in approximately 5ft of water. Eleven geotubes 51' in length, 9' wide, 22' in circumference, and 4ft in height will be placed offshore. These all have 27' wide scour aprons between 55' – 70' in length. These will be placed parallel to the shoreline 40 to 60ft offshore. The geotextile scour aprons are attached to the seafloor with post that will be driven into the seafloor to hold them in place during filling.

Benthic Habitat Description

General

The Ritz Carlton is located in Great Bay, St. Thomas. Great Bay is located on the east end of St. Thomas and is an eastern facing bay. Because it is eastern-facing, Great Bay experiences high wind energy and is susceptible to large influxes of Sargassum. The deep embayment has two sandy beaches surrounding a rock promontory. There are coral colonized hard bottoms which line both the northern and southern sides of the bay. Offshore bay supports seagrass beds composed of *Thalassia testudinum, Syringodium filiforme, Halodule beaudettei, Halophila decipiens* and more recently *Halophila stipulacea*. There are ESA listed coral species which occur on the reefs that fringe each side of the bay and the rocky promontory. The Ritz-Carlton Club beach is approximately 850 feet long and is separated from the Ritz-Carlton Hotel beach to the south by a rocky point.

The NOAA NOS Benthic habitat map depicts the rocky promontory to the south of the sandy beach as reef colonized bedrock nearshore and then reef colonized pavement with channels further offshore grading into seagrass 10 to 30% colonization. This is fairly accurate description of the benthic habitats within the area. The NOAA NOS map follows.

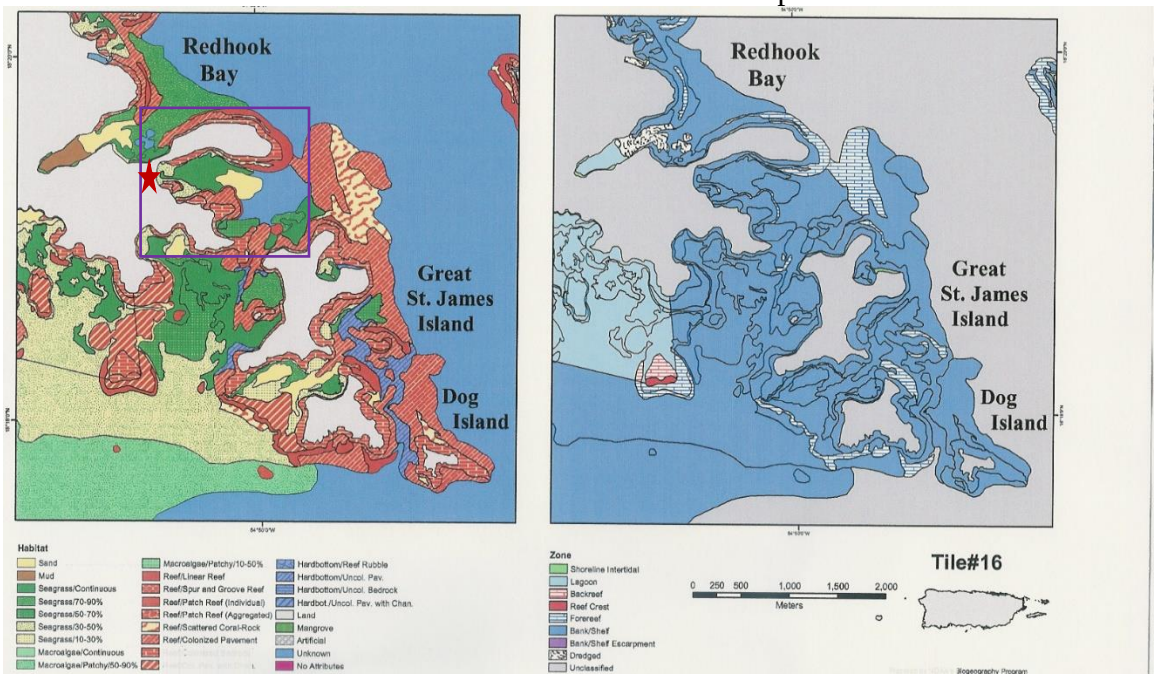


Figure 6.06.2. NOS Benthic Habitat Map Tile 16. Great Bay is shown within the blue box, and the project site is indicated by the red star.

METHODS

In December 2021 and January 2022 divers conducted roving benthic surveys within the survey area in Great Bay to locate and identify benthic resources within the survey site. Benthic substrate, presence/absence of corals, and the locations of seagrass beds were recorded. A Garmin GPSMAP 78 handheld marine GPS device was used to mark the location of seagrass boundaries as well as to mark the locations of coral species listed as endangered in the Endangered Species Act (ESA) of 1973. Photos and videos were taken to document the benthic survey.

Figure 6.06.3. Benthic Survey Area: Great Bay, St. Thomas

FINDINGS

The survey site is a 7.42-hectare area located within Great Bay, St. Thomas. The survey area contains both soft and hard bottom areas with colonization of corals and seagrass. Soft bottom areas within the survey site are mostly colonized by *Thalassia testudinum* (turtle grass). There is also colonization by *Syringodium filiforme* (eel grass) and *Halophila stipulacea* (invasive seagrass). Shallow areas (< 15 feet) are primarily colonized by *T. testudinum* and *S. filiforme*, while the deeper areas (> 15 feet) contain *H. stipulacea* interspersed with *T. testudinum.* There are some sand patches within and around seagrass colonization. Hard bottom areas include consolidated hardbottom near the shoreline and patchy boulder reefs.

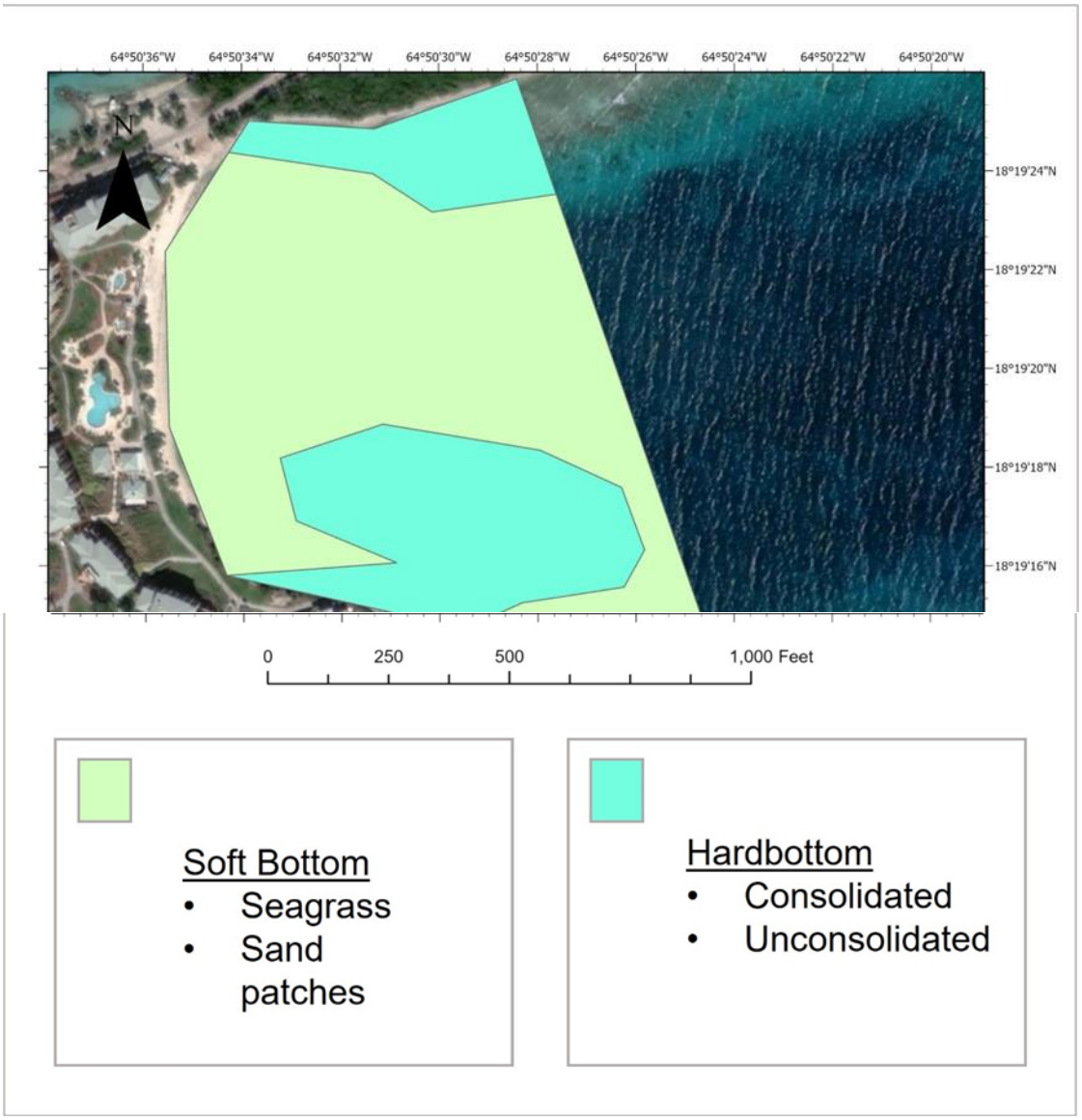


Figure 6.06.4. Hard and Soft Bottom Habitats identified in Benthic Survey: Great Bay, St. Thomas

Sixty three ESA corals from five species were identified in the survey area. *Acropora palmata* (Elkhorn coral) and *Acropora prolifera* (Elkhorn/Staghorn hybrid) were seen in some of the shallow portions of the study site while *Orbicella annularis, Orbicella faveolata,* and *Orbicella franksii* in both shallow and deeper reefs within the study site. Corals were concentrated over hard bottom areas, particularly on the reef located to the south of the Club beach and on the reef to the north of the Club beach.

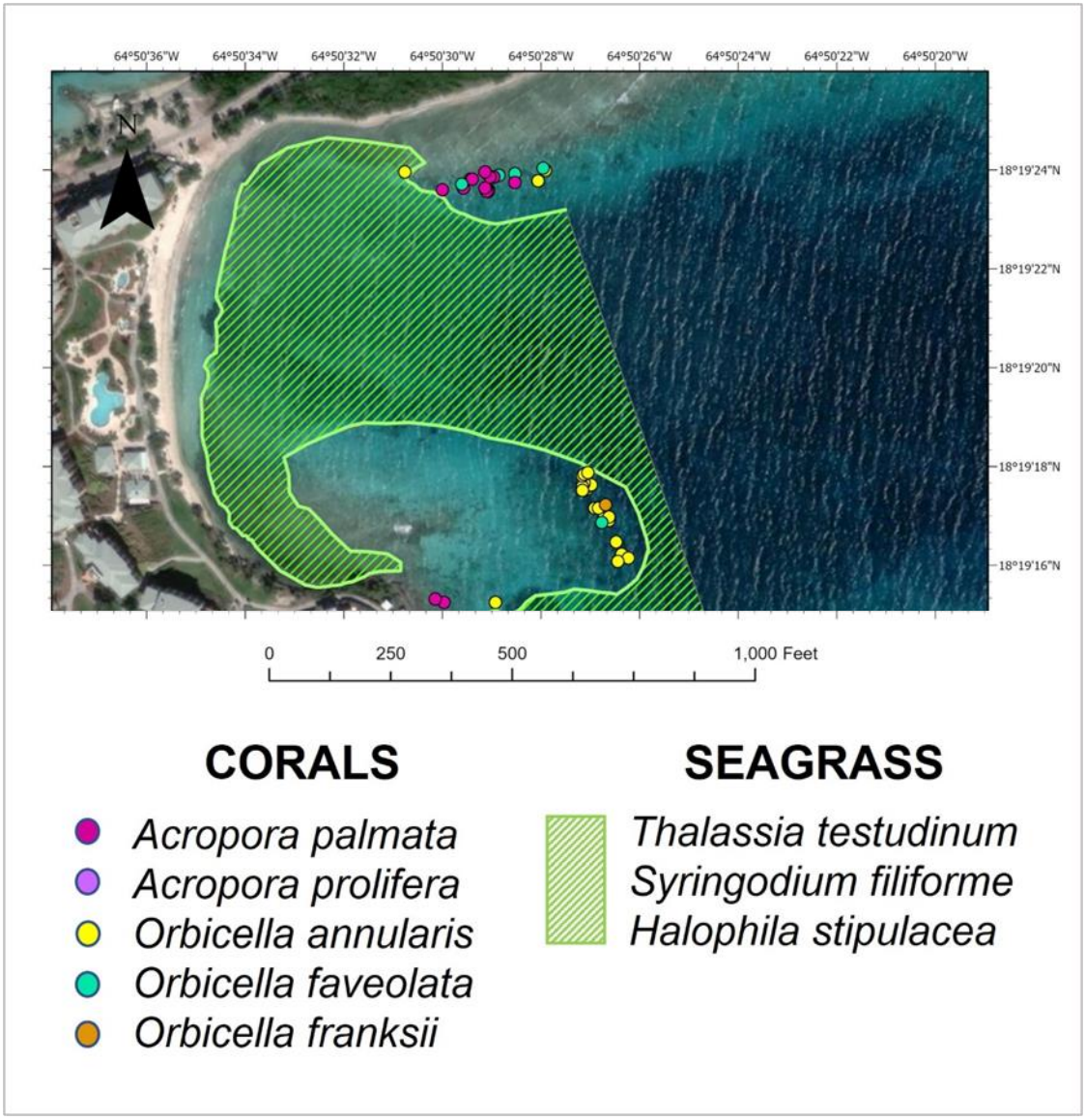
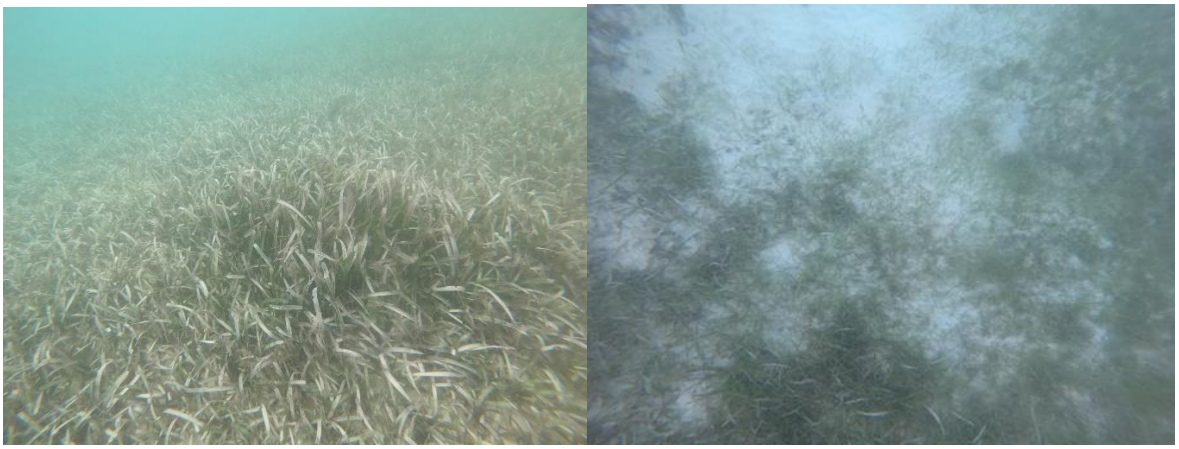


Figure 6.06.5. ESA-listed corals and seagrasses identified in Benthic Survey: Great Bay, St. Thomas

Other corals and algae also are present within the study site. Non-endangered corals such as *Siderastrea siderea, Porites porites, Porites astreoides, Pseudodiploria strigosa,* and *Pseudodiplora clivosa.* Algae species were identified within the seagrass and among the hard bottom areas. *Halimeda monile, Udotea* spp., *Caulerpa spp.*, and *Turbinaria spp.* were found among the seagrass and several species of *Dictyota* were found among the hard bottom and coral reef areas.

One ESA listed fish species was found within the study area. A small (~35 cm) Nassau grouper was seen on the deeper reef to the south of the Club beach.

BENTHIC SURVEY PHOTOS



Thalassia testudinum (Turtle grass)(Left) - *Thalassia testudinum* (Turtle grass) and *Syringodium filiforme* (eel grass)(Right)

Orbicella annularis in seagrass (*T. testudinum* -north)(Left) - *T. testudinum* (Turtle grass) in shallows near the Club beach (Right)

Patches of *H. stipulacea* (invasive seagrass) within *T. testudinum* (Turtle grass) (Left) - *S. filiforme* (Eel grass) near southern shoreline on Ritz Club beach (Right)

Acropora palmata colonies along the northern reef edge (Left) - *Porites porites* mound along northern reef edge (Right)


Acropora palmata and other corals in shallow water by RO intake pipe to south of the Club Beach (Left) - Corals and sea fans on boulders on the rocky headland to south. (Right)


Large *O. annularis* colony on deeper reef (~25 feet) between the two beaches (Left) - Nassau Grouper on deep reef south of the Club

6.06. 1 List of Endangerd Species off the Ritz Club Area

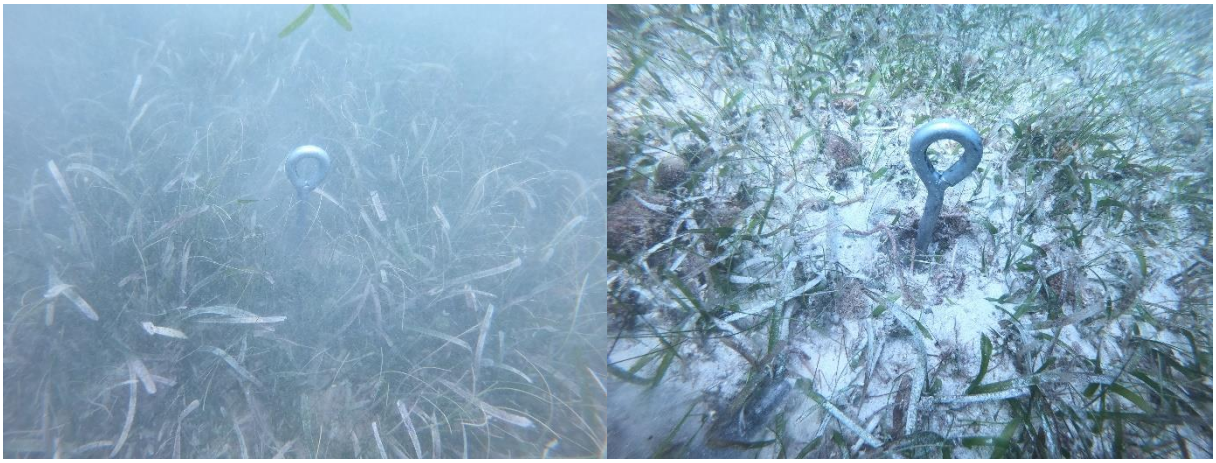
ID	Species	Lat	Lon	Length (ft)	Width (ft)
1	Orbicella faveolata	18.32330	-64.84127	1.5	1.0
2	Orbicella annularis	18.32327	-64.84113	1.0	1.0
3	Orbicella annularis	18.32327	-64.84113	1.0	1.0
4	Orbicella annularis	18.32333	-64.84109	2.0	1.5
5	Orbicella faveolata	18.32334	-64.84110	2.0	1.5
6	Orbicella faveolata	18.32331	-64.84126	1.5	1.0
7	Acropora palmata	18.32326	-64.84126	2.0	1.5

8	Orbicella faveolata	18.32330	-64.84135	1.5	1.0
9	Acropora palmata	18.32329	-64.84138	2.5	1.0
10	Acropora palmata	18.32329	-64.84140	4.0	1.5
11	Acropora palmata	18.32322	-64.84141	0.5	0.5
12	Acropora palmata	18.32322	-64.84141	0.5	0.5
13	Acropora palmata	18.32322	-64.84141	0.5	0.5
14	Acropora palmata	18.32322	-64.84141	1.0	0.5
15	Acropora prolifera	18.32321	-64.84141	0.5	0.5
16	Acropora prolifera	18.32321	-64.84141	0.5	0.5
17	Acropora prolifera	18.32321	-64.84141	0.5	0.5
18	Acropora palmata	18.32321	-64.84141	1.0	0.5
19	Acropora palmata	18.32321	-64.84142	1.0	1.0
20	Acropora palmata	18.32321	-64.84142	0.5	0.5
21	Acropora palmata	18.32321	-64.84142	1.0	0.5
22	Acropora palmata	18.32323	-64.84143	1.0	1.0
23	Acropora palmata	18.32323	-64.84143	1.5	1.0
24	Acropora palmata	18.32323	-64.84143	1.0	0.5
25	Acropora palmata	18.32332	-64.84143	1.5	1.0
26	Acropora palmata	18.32328	-64.84151	3.0	1.5
27	Acropora palmata	18.32328	-64.84150	1.5	1.0
28	Acropora palmata	18.32323	-64.84155	1.5	1.0
29	Orbicella annularis	18.32325	-64.84156	0.5	0.5
30	Orbicella faveolata	18.32325	-64.84156	1.0	0.5
31	Acropora palmata	18.32322	-64.84167	0.5	0.5
32	Orbicella annularis	18.32332	-64.84188	2.0	1.0
33	Orbicella annularis	18.31999	-64.84000	0.5	0.5
34	Acropora palmata	18.32090	-64.84166	3.5	2.0
35	Acropora palmata	18.32092	-64.84171	3.0	2.5
36	Orbicella annularis	18.32077	64.84153	2.0	1.5
37	Orbicella annularis	18.32090	-64.84137	0.5	0.5
38	Orbicella annularis	18.32117	-64.84066	2.5	2.0
39	Orbicella annularis	18.32115	-64.84062	1.5	1.0
40	Orbicella annularis	18.32113	-64.84068	2.0	2.0
41	Orbicella annularis	18.32124	-64.84069	1.0	1.0
42	Orbicella annularis	18.32137	-64.84076	2.0	2.0
43	Orbicella annularis	18.32136	-64.84073	2.0	1.5
44	Orbicella annularis	18.32138	-64.84073	1.5	1.5
45	Orbicella faveolata	18.32135	-64.84077	1.0	0.5

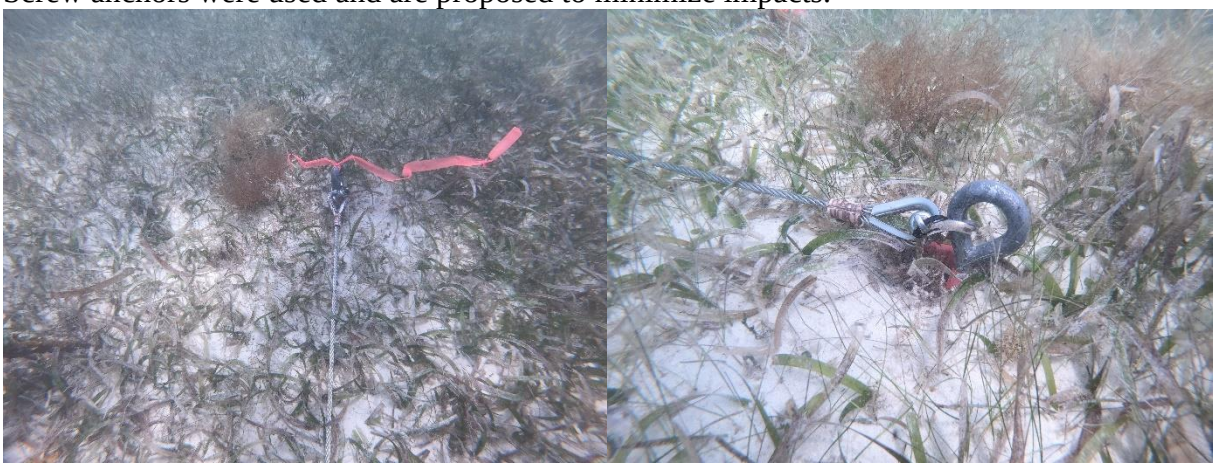
46	Orbicella annularis	18.32143	-64.84081	1.0	1.0
47	Orbicella annularis	18.32143	-64.84079	3.0	1.5
48	Orbicella faveolata	18.32145	-64.84075	1.5	1.0
49	Orbicella franksi	18.32145	-64.84075	0.5	0.5
50	Orbicella annularis	18.32155	-64.84087	4.0	2.5
51	Orbicella annularis	18.32153	-64.84087	2.5	2.5
52	Orbicella annularis	18.32154	-64.84085	2.5	2.0
53	Orbicella annularis	18.32155	-64.84085	2.0	1.5
54	Orbicella annularis	18.32156	-64.84087	2.5	1.5
55	Orbicella annularis	18.32157	-64.84088	2.0	1.5
56	Orbicella annularis	18.32155	-64.84088	3.0	2.5
57	Orbicella annularis	18.32156	-64.84083	2.5	2.5
58	Orbicella annularis	18.32157	-64.84087	2.5	1.0
59	Orbicella annularis	18.32155	-64.84088	2.0	1.0
60	Orbicella annularis	18.32153	-64.84088	1.5	1.0
61	Orbicella annularis	18.32161	-64.84088	2.5	1.5
62	Orbicella annularis	18.32162	-64.84087	3.5	3.0
63	Orbicella annularis	18.32163	-64.84085	2.0	2.0

IMPACT OF INSTALLATION OF SARGASSUM BARRIERS AND GEOTUBES

The installation of the sargassum barriers should have a negligible impact on the offshore seagrass beds. No impacts to these beds were noted during the trial.



Screw anchors were used and are proposed to minimize impacts.



Elastec's proposed anchor placements were well out from the curtains which resulted in the cables being close to the bottom near the anchors. During the trials it was found that shifting to the floated lines proved a better installation method not only to protect the seagrasses but for ease of installation.

By stopping the buildup of sargassum on the shoreline it may prevent impact to shallow seagrass along the shoreline which is smothered and scoured when the floating sargassum builds up along the shoreline and sinks.

Based on the benthic survey, there will impact to benthic resources as a result of the installation of geotubes. There are no corals or ESA coral critical habitat or hardbottom within the footprint of the geotubes. There is dense coverage of *T. testudinum* in the shallow nearshore areas of survey area which will be affected by geotube installation. The eleven geotubes will affect approximately15,390 square feet (0.14 ha – 0.346ac) of seagrass. It is estimated that 90% of this seagrass is *Thalassia testudinum*, and 10% is composed of both *S. filiforme* and invasive *H. stipulacea.* Approximately ½ or 0.07 ha or 0.173 ac of seagrass is not mixed with *H. Stipulacea* and will be transplanted.

The geotubes will result in the buildup off sand near shore but this will be a slow enough process for the seagrass to survive the buildup.

6.07 Terrestrial Resources

Only the collection area will be constructed on uplands. The beach area is colonized by coconut palms (*Cocos nucifera*), and seagrapes (*Cocoloba uvifera*). The collection area is being designed to avoid all trees and their roots as much as possible. The implementation of the beach retention system should allow for the buildup and retention of sand on the shoreline and should save the trees which are currently having their bases eroded out.

6.08 Wetlands

The U.S. Army Corps of Engineers defines wetlands as "those areas that are periodically inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, bogs, marshes and similar areas." (U.S. Army Corps of Engineers, 1986). The project components are located entirely offshore, except for the collection area and has no impact on wetlands.

6.09 RARE AND ENDANGERED SPECIES

All three endangered sea turtle species are known to frequent the waters offshore of St. Thomas: Leatherback Sea turtles (*Dermochelys coriacea*), green sea turtles (*Chelonia mydas*) and hawksbill sea turtles (*Eretmochelys imbricata*). Both green and hawksbill turtles have been seen during the numerous surveys in Great Bay. The offshore seagrass beds and coral reefs are foraging habitats for these species. The site does have a suitable turtle nesting beach although no nest were seen during repeated monitoring related to the cable installations.

A large Giant Manta Ray (*Manta birostris*) was seen offshore of the site around 2000.

Scalloped Hammerhead (*Sphyma lewini*) and Oceanic Whitetip Shark (*Carcharhinus longimanus*) do not occur within the project area due to its proximity to shore.

The endangered Antillean manatee (*Trichechus manatus manatus*) has recently been seen in the U.S. Virgin Islands after not being seen for many years. No manatees have been reported from this area.

Coastal waters and waters within the Virgin Islands are frequented by whales *(Megaptera novaeangliae, Balaenoptera physalus*) during winter for mating and birthing and dolphins (*Tursiops truncates*) are year-round residents. Dolphins have been frequently seen with Great Bay and whales are occasionally seen in Pillsbury Sound adjacent to Great Bay.

Table 6.09.1. ESA Threatened and Endangered Species Potentially Occurring in the Greater Project Area

Scientific Name	Common Name	Status
Acropora palmata	Elkhorn coral	T
Acropora cervicornis	Staghorn coral	T
Orbicella annularis	Lobbed Star coral	T
Orbicella faveolata	Mountainous star coral	T
Orbicella franksi	Boulder star coral,	
Dendrogyra cylindrus	Pillar coral	T
Mycetophyllia ferox	Rough Cactus Corals	T
Eretmochelys imbricata	Hawksbill sea turtle	E
Dermochelys coriacea	Leatherback sea turtle	E
Chelonia mydas	Green sea turtle	T
Caretta caretta	Loggerhead sea turtle	T
Trichechus manatus manatus	West Indian manatee	E
Megaptera novaeangliae	Humpback whale	E/D[2]
Balaenoptera physalus	Finback whale	E
Epinephelus striatus	Nassua grouper	T
Manta birostris	Giant Manta Ray	T
Sphyma lewini	Scalloped Hammerhead	T
Carcharhinus longimanus	Oceanic Whitetip Shark	T

Table 6.09.2 ESA Species Observed in the Action Area

	Great Bay
Species	
ESA Listed	
Acropora palmata	X
Acropora cervicornis	
Orbicella franski	X
Orbicella annularis	X

Orbicella faveolata	X
Mycetophyllia ferox	
Dendrogyra cylindrus	
Eretmochelys imbricata	X
Dermochelys coriacea	
Chelonia mydas	X
Caretta caretta	
Trichechus manatus manatus	
Megaptera novaeangliae	
Balaenoptera physalus	
Epinephelus striatus	
Manta birostris	X
Sphyma lewini	
Carcharhinus longimanus	

Table 6.09.3.Species managed by CFMC occurring in the nearshore in the Virgin Islands.

Scientific Name	**Common Name**
Cnidarians	All corals
Strombus gigas	Queen conch
Panulirus argus	Spiny lobster
Epinephelus struiatus	Nassau grouper
E. guttatus	Red hind
E. fulvus	Coney
Ocyurus chrysurus	Yellowtail snapper
Lutjanus analis	Mutton snapper
L. apodus	Schoolmaster
L. gruiseus	Grey snapper
L. vivanus	Silk snapper
Chaetodon striatus	Butterflyfish
Holocentrus ascensionis	Squirrel fish
Haemulon plumieri	White grunt
Balistes vetula	Queen triggerfish
Malacanthus plumieri	Sandtilefish
Sparisoma chrysopterum	Redtail parrotfish
Lactophrys quadricornis	Trunkfish
-	Sharks and Tunas
-	Swordfish and Billfishes

Impact of Project

The project will have the potential to impact sea turtles, and marine mammals during vessel

movements in the bay.

The Standard Construction Conditions established for the sea turtles by the National Marine Fisheries Service and Vessel Strike Avoidance Measures and Reporting for Mariners will be implemented during the project construction and are attached for reference in Appendix B. This will also protect the West Indian Manatee (*Trichechus manatus*), while not usually present in the USVI, two have been seen in St. Croix in 2018.

Turbidity barriers will be deployed, and water quality monitored will be conducted during all in water work. Turbidity barriers will not be opened or removed until interior water quality has settled to acceptable levels. Turbidity barriers will be removed or secured when not in use to limit impact to the surrounding benthos. If turbidity control is properly maintained and monitored the impacts should be minimal.

6.09.1 Sea Turtles - Hawksbill (*Eretmochelys imbricata*), Leatherbacks *(Dermochelys coriacea)* and Green turtles (*Chelonia mydas*): Leatherback sea turtles are an offshore species that are rarely observed close to shore except during their nesting season. Green and hawksbill sea turtles have been reported as occurring nearshore off The Club. The proposed project *may affect but is not likely to adversely affect* green and hawksbill sea turtles.

The potential adverse effects that the proposed project could have on green and hawksbill sea turtles would be related to impacts due to injuries and collisions from in-water equipment and vessel traffic, and impacts to turtle foraging habitat. There is also the potential that turtles may become entangled in the turbidity control curtains. Special precautions would be used to minimize these potential impacts. Water Quality Control and Monitoring are proposed (Appendix B).

Mitigation efforts have been proposed to minimize and abate impacts to sea turtles. The project will be constructed in strict observance of NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions,* as well as NMFS's *Vessel Strike Avoidance Measures and Reporting for Mariners*. The implementation of the construction conditions will provide protection to sea turtles by requiring temporary work stoppages to protect any sea turtles sighted within 50 feet of the in-water work footprint. The avoidance measures will require all vessels to operate at low speeds, have sea turtle and marine mammal observers, and maintain safe distances from sea turtles.

Based on the above, the potential adverse effects of the project on sea turtles have been determined to be either insignificant or discountable.

6.09.2 Elkhorn coral, Staghorn, Rough Cactus Coral, Lobed Star Coral, Boulder Star, Mountainous Star Corals and Pillar Coral

Acropora palmata, Orbicella faveolata, O. franksi, O. annularis, Dendrogyra cylindrus and *Mycetophyllia ferox* do not occur in the project footprint. A map locating these species (Figure 6.06.5) and a table of their locations (Table 6.06.1) is found in 6.06 Marine Resources The nearest ESA coral colonies are on the rocky headland to the south of the project area, and to the east along the north shore of Cabrita Point. No ESA corals are found in the project footprint.

6.09.3 Nassau Grouper (*Epinephelus striatus*) The Nassau grouper has been seen during the 2021 surveys of nearshore hardbottom to the east of the site and during this survey.

6.09.4 Sharks and Rays: Giant Manta Ray (Manta birostris), Scalloped Hammerhead (Sphyma lewini), Oceanic Whitetip Shark (Carcharhinus longimanus)

These are open water species which should not occur within the embayment, however a Giant Manta Ray was seen within the bay in 2000.

6.09.5 Marine Mammals: Whales, Dolphins, and West Indian Manatee (Trichechus manatus)

Dolphins do occasional occur within the bay . Vessel Strike Avoidance Measures and Reporting for Mariners (NOAA Fisheries Service, Southeast Region) will be implemented. Therefore, impacts to marine mammals should be avoided.

6.09.6 Effects Determinations on ESA Species:

Sea Turtles - Hawksbill (*Eretmochelys imbricata*), Leatherbacks (*Dermochelys coriacea*) and Green sea turtles (*Chelonia mydas*). The proposed action should have no effect on leatherback sea turtles (*Dermochelys coriacea*); and is not likely to adversely affect green (*Chelonia mydas*; South Atlantic distinct population segment), and hawksbill (*Eretmochelys imbricata*) sea turtles.

Elkhorn coral (*Acropora palmata*), Staghorn coral (Acropora cervicornis), Boulder star coral (*Orbicella franksi*), Mountainous star coral (Orbicella faveolata), Lobbed star coral (Orbicella annularis) Pillar Coral (*Dendrogyra cylindrus*), and Rough Cactus Coral (*Mycetophyllia ferox*) The proposed action is not likely to adversely affect elkhorn (*Acropora palmata*), staghorn (*Acropora cervicornis*), boulder star (*Orbicella franksi*), mountainous star coral (Orbicella faveolata) lobbed star coral (Orbicella annularis), Pillar coral (*Dendrogyra cylindrus*) and rough cactus (*Mycetophyllia ferox*) corals; and elkhorn and staghorn coral critical habitat.

Nassau Grouper (*Epinephelus striatus*) The proposed action is not likely to adversely affect the Nassau grouper (*Epinephelus striatus*).

Sharks and Rays: Giant Manta Ray (Manta birostris), Scalloped Hammerhead (Sphyma lewini), Oceanic Whitetip Shark (Carcharhinus longimanus)

The project should not have a direct impact on these species. These are large open water species which should not be in the project area. There should be no impacts to these animals.

6.09.6 The project will have a Minor Effect (long term) on Fish, Crustaceans, Mollusks, and Other Aquatic Organisms. The project involves direct and indirect impacts to the marine environment and habitats which are habitat to fish and invertebrates. Impacts will be minor and will be short-term during construction. Seagrass will be transplanted to minimize the loss of forage habitat. Once complete the species which currently utilize the area will continue to do so.

6.10 Air Quality

All of St. Thomas is designated Class II by the Environmental Protection Agency in compliance with National Ambient Air Quality Standards. In Class II air quality regions the following air pollutants are regulated: open burning, visible air contaminants, particulate matter emissions, volatile petroleum products, sulfur compounds, and internal combustion engine exhaust (Virgin Islands Code Rules and Regulations). The proposed projects only involve the use of small piece of equipment for their installation, i.e., a single vessel, a single backhoe and a pump. The use of the equipment will result in an increase of combustion exhaust, but this will be minimal and will have no long-term effect.

Once installed all measure will no impact on air quality.

7.00 IMPACTS ON THE HUMAN ENVIRONMENT
7.01 Land and Water Use Plans

The Ritz-Carlton Club is within an area which is zoned R-3 Residential Medium Density. The proposed project components are amenities for the existing resort. There will be no change of use of the area.

7.02 Visual Impact

The placement the geotubes will have no impact on the viewscape, the geotubes are underwater.

The selected sargassum barrier is blue which will minimize its appearance from the beach, there will be two markers installed to increase its visibility to boaters.

7.03 Impact on Public Services

7.03a Water

The proposed project will have no impact on the public water supply.

7.03b Sewage Treatment and Disposal

The proposed project will have no impact on public sewage treatment and disposal.

7.03c Solid Waste Disposal

The proposed project will have no impact on solid waste disposal. A present Sargassum is collected on the northern end of the beach, loaded into dumpsters and or trucks and hauled to the Bovoni Landfill. The overall disposal will not change, however, the Sargassum will be directed to the northern end of the beach so that machinery is not required to work on the beach itself except to do minor maintenance and grooming. The Sargassum will be collected behind a vegetative buffer and will be visually screened from the beach and shoreline with native vegetation.

7.03d Roads, Traffic and Parking

The proposed modification will result in no change on roads or traffic.

7.03e Electricity

The proposed project will create no change in electrical requirements. The marker buoys will use solar lights.

7.03f Schools

The project will have no impact on public or private schools.

7.03g Fire and Police Protection

The project will have no impact on fire or police protection.

7.03h Health

The project will not increase the use of the public health facilities.

7.04 Social Impacts

The project will help preserve the shoreline, which will maintain the beach for the resort guest and residents.

7.05 Economic Impact

The Club has had to play significant amount to nourish and clean the beach. The Club has lost guest due to the loss of the beach and or its use and this results in the loss of hotel taxes and the money these tourists spend in the Virgin Islands. Preserving the shoreline will make The Club more financially viable.

The Club will pay submerge land fees for the areas occupied by these components.

7.06 Impacts on Historical and Archeological Resources

The application is for the placement of screw anchors and the placement of geotubes on the surface just offshore of the beach. There should be no impact on historical or archeological resources by these activities.

7.07 Recreational Use

The application is for the installation of measure to protect the shoreline and beach so that the Club can provide a suitable beach for its quest. The beach is heavily used for recreational activities. The geotubes will be placed so there is 1.5ft clearance of water over the tops and this will allow snorkelers and swimmers to pass over them. The barriers are located between 400-700ft from the shoreline snorkelers or swimmers can go around them or under them. The area is heavily used by kite boarders and the barrier are in an area used by the boarder. The boarders have been affected by the sargassum and have had difficulty launching during the extreme build ups. With the barrier in place the boarders will be able to launch behind the barriers and will be able to go around the ends of the barriers or jump over the barriers.

The public will continue to have access to the shoreline in accordance with V.I. Law.

7.08 Waste Disposal

The proposed project will have no impact on waste disposal. The sargassum will continue to be disposed of properly at the Bovoni Landfill.

7.09 Accidental Spills

The structures which are proposed will not have the potential for accidental spill during placement of the geotubes heavy equipment will be utilized. To minimize the potential for spills equipment will be check for leaks prior to use and no fueling will be allowed on site.

7.10 Potential Adverse Effects Which Cannot Be Avoided

The installation of the geotubes have the potential to negatively impact water quality during the filling of the tubes and as such turbidity barriers will be installed and a water quality monitoring plan will be implemented.

The geotubes will have an impact on the nearshore SAV which is a mix of *Thalassia testudinum*, Syringodium filiforme Halodule wrightii and Halophila stipulacea. The barriers will sit on approximately 15,900sqft of SAV (0.36ac) of the SAV 50-60% is *Thalassia*, 10% is *Syringodium* and 15-20% is Halodule. About 10% is *Halophila*. All seagrass which is not mixed with *Halophila* will be transplanted. Based on the distribution of the *Halophila* about 0.07ha of the seagrass or 7535 sf can be transplanted (0.173ac).

The geotubes will result in the buildup off sand near shore but this will be a slow enough process for the seagrass to survive the buildup where sand accumulates

8.00 Mitigation Plans

To minimize these impacts as a part of application a Water Quality Monitoring Plan will be implemented during the installation of the geotubes.

In order to minimize impacts to SAV a Seagrass Relocation Plan will be implemented. To compensate for impacts which cannot be avoided a cleanup plan will be implemented in the bay removing debris from the expansive seagrass beds to allow for recolonization.

9.00 Alternatives to Proposed Action

Geotubes

No Action – Nothing could be done and the beach would continue to eroded and need repeated nourishment. Which while the extraction does not hurt the immediate area the removal of sand from another source does have environmental impacts.

Breakwater – A breakwater could be constructed offshore which would protect the beach and minimize future sand loss. This would need to be built farther out than the geotubes and therefore would have a greatest seagrass impact. As with the geotubes the seagrasses could be transplanted minimizing impact. The breakwater could be emergent and be visible to the shoreline or could be submerged. The breakwater would be introducing hard substrate which could become coral habitat. A breakwater would require the use of large offshore barges and equipment and would have more construction related impacts.

Geotubes on the shoreline - geotubes could be placed on the shoreline to prevent future erosion inland and they could be covered in sand to restore the beach, however this would require repeated nourishment of the upper layers as they are impacted by sand.

Preferred Alternative – The preferred alternative is to place the geotubes offshore which will allow for the retention of sand placed on the beach and to allow for a slow build up of sand over time between the geotubes and the shoreline. Overtime the beach will advance offshore.

Sargassum Barriers

No action – If nothing is done the beach will continue to be inundated during large sargassum blooms.

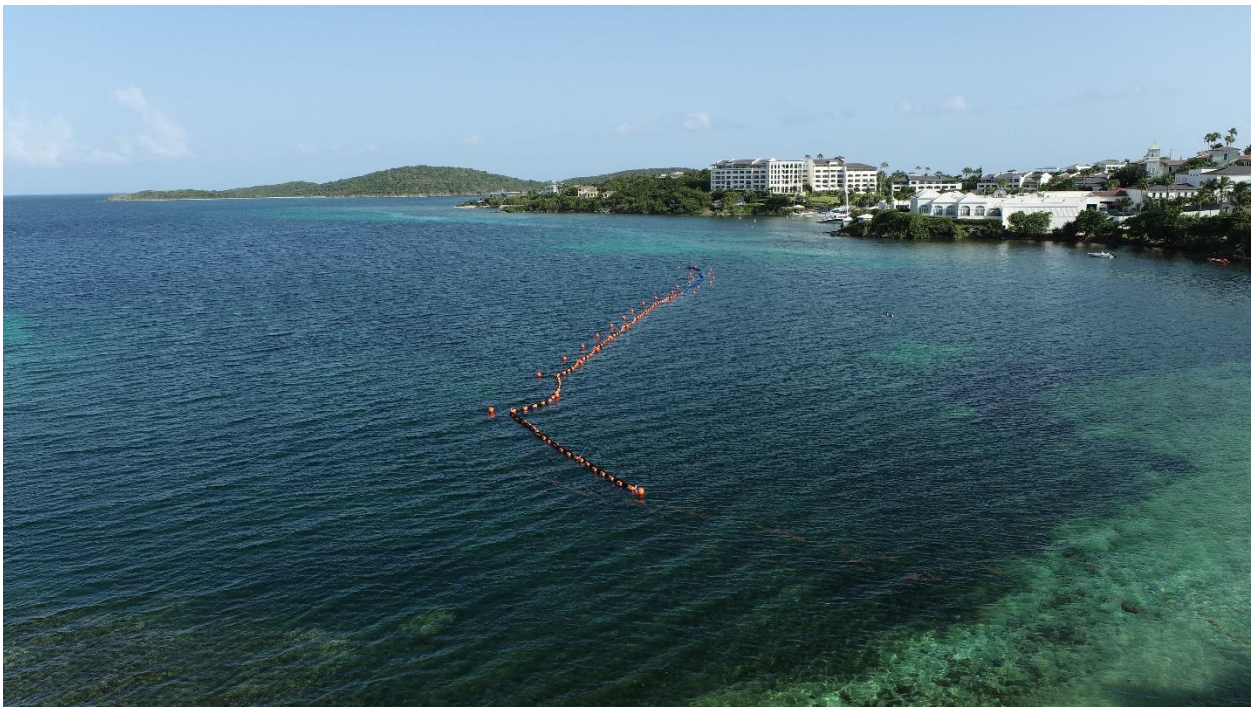
June 18, 2021

June 19, 2021

Catching and Collecting Behind Barrier – Bioimpact, Inc. worked with Beach Clean during the summer of 2021 to determine if a vessel could be used to collect the sargassum and release it offshore in a location which would not impact other beaches. It was found that the volume that could be collected and the time it would take to discharge in a "safe" area would not allow for success. Even with a barrier system the vessel could not keep up with the volume. Furthermore, seas of even 1ft made it very difficult to adequately collect the mats.

Directing Barriers – Barriers were found to be able to direct the sargassum, so it only accumulated in one area of the beach. This prevented it from impacting another site and allow for the cleanup effort to be direct in one location.

Two barrier types were tried, and the smooth blue barrier was found to capture all the sargassum and then the sargassum would move along the barrier toward the intended location.



Barrier Attachments – The manufacture wanted the barriers to be attached by metal cables which were placed a distance out from the barriers, the cable has the potential of impacting the seafloor and were difficult to deploy and remove. Floated lines did not impact the seafloor and were easy to install and remove.

Sargassum Screening –

No Action: The collection and removal could continue as is and it would continue to be unsightly.

Placement of a solid fence – A solid wall or fence could be built which would have solid gate which could block the visual impact of the collection operation. This would create a "structure" on the beach which would not be natural looking.

Green-wall enclosure – A wall of seagrapes can be created which will hide the operation from the southwest and east. Green gates would then be installed which are covered with native beach vines. This will be a more attractive component and look like landscaping rather than a structure.

10.00 Relationship Between Short Term and Long Term Uses of Man's Environment

The application is for the implementation of beach/shoreline protective measures intended to

preserve the shoreline and minimize the need for future nourishment. Protecting existing resources and minimizing the need for impact to other resources is the practice to protect the environment.

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APPENDIX I

BIOIMPACT, INC.
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KINGSHILL, ST. CROIX
U.S. VIRGIN ISLANDS 00851
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QUALIFICATION STATEMENT

Bioimpact, Inc. is a Virgin Islands Corporation licensed to do business in the Virgin Islands Since 1986.

Bioimpact, Inc. is qualified to conduct and prepare both terrestrial and marine Environmental Assessment Reports required by the Department of Planning and Natural Resources, Division of Coastal Zone Management, and the U.S. Army Corps of Engineers.

Bioimpact, Inc. has wetland delineators certified by the National Wetland Science Training Cooperative to establish wetland jurisdictional limits for the U.S. Army Corps of Engineers.

Bioimpact, Inc. is experienced in the creation and implementation of wetland mitigation programs.

Bioimpact, **Inc.** is experienced in developing and implementing marine water quality monitoring programs and long-term photographic monitoring of the benthic environment. **Bioimpact, Inc.** has EPA certified water samplers and analysts.

Bioimpact, Inc. has successfully designed and implemented large scale coral and seagrass transplant programs.

Bioimpact, Inc. is experienced in cable landfall studies and the establishment of routes for undersea cables and monitoring of cable installations to minimize impact.

Bioimpact, Inc. is experienced in endangered species surveys included the endangered coral, as well as terrestrial flora and fauna species and is experienced in preparing Biological Assessments for National Marine Fisheries and Fish and Wildlife Service.

Bioimpact, Inc. is experienced in the transplant and monitoring of Environmental Protection Act (ESA) listed coral species as authorized under “take permits” from National Marine Fisheries Service.

Bioimpact, Inc. is experienced in preparing Environmental Assessments for federal permitting and the issuance of Findings of No Significant Impact.

Bioimpact, Inc. is experienced in the preparations of Phase I Environmental Site Assessments as set forth in the ASTM Standard Practice Designation E 1527-13 and All Appropriate Inquires and Phase II Environmental Site Assessments as set for in ASTM E1903 – 11.

Bioimpact, Inc. is experience in the development and implementation of sampling plans to detect and delineation hazardous materials and petroleum products.

Bioimpact, Inc. is experience in conducting deep water ROV surveys up to 1000ft and has all the necessary equipment to undertake these studies.

Bioimpact, Inc. has conducted environmental studies in the U.S. Virgin Islands, Puerto Rico, British Virgin Islands, throughout the Caribbean and in the Florida Keys.

PARTIAL JOB LIST

Updated January 10, 2022

MONITORING LARGE SCALE PROGRAMS

2021 – Present Watershed Sampling St. Croix and St. Thomas as a subcontractor to Watershed Consulting Associates, LLC

2013 – Present U.S. Virgin Islands Ambient Water Quality Monitoring Program, sampling for St. Croix.

2021 – Present Development and Implementation of a Water Quality and Environmental Monitoring plan for construction of a Private Dock in Chocolate Hole

2021- Present Development and Implementation of a Water Quality Monitoring plan for the reconstruction of Frenchmans Reefs Dock and minor dredging

2019- Present Development and Implementation of the Water Quality and Environmental Monitoring Plan for the installation of a Single Point Mooring at Limetree Marine Terminals, St. Croix.

2018 - 2021 Development and Implementation of the Water Quality and Environmental Monitoring Plan for the Construction of the Veterans Drive Project on St. Thomas for Virgin Islands Department of Public Works.

2014-2018 Development and Implementation of the Environmental Monitoring Plans for the Conversion of VIWAPA to LPG for Vitol, St. Croix and St. Thomas.

2014-2018 Development and Implementation of the Environmental Monitoring Plans for the Development of a Dolphin Exhibit for Coral World (VI), Inc., St. Thomas.

2013-2018 Development and Implementation of the Water Quality and Environmental Monitoring related to the dredging of the Crown Bay Marine Terminal and Turning Basin, St. Thomas.

2016 Development and Implementation of the Water Quality Monitoring Plan for the WICO Emergency Bulkhead replacement, St. Thomas.

2013 –2015 Environmental Monitoring of the wetland created as mitigation for the development of VIWMA's St.Croix Transfer Station

2013-2018 Development and Implementation of the Monitoring Plans for VIDPW's Improvements to Veterans Drive St. Thomas

2013-2018 Development and Implementation of the Monitoring Plans for VIPA's Maintenance Dredging of Crown Bay Marina, St. Thomas

2013-2018 Development and Implementation of the Monitoring Plans for Westin Resorts Permitting of the dock and Improvements of Drainage, St. John

2012 –2018 Development and Implementation of the Monitoring Plans for viNGN's Cable System in the USVI.

2011-20198 Water Quality and Environmental Monitoring Program for the increase in discharge from the Frenchman's Reef Hotel, St. Thomas

2010-2012 Development of the Water Quality and Environmental Monitoring Program for the development of Thatch Cay, with special emphasize on the ESA listed coral species

2009 Establishment of the baseline for the dredging of Charlotte Amalie Harbor and entrance channel and the filling of the dredged hole in Lindbergh Bay, St. Thomas for West Indies Company

2009 – 2010 Water Quality Monitoring Plan for the Construction of the dock at Frenchman's Cove, St. Thomas for Marriott Vacation Club, Inc.

2009-2015 Environmental Monitoring for the development of Oil Nut Bay, and YCCS Yacht Club, Virgin Gorda, BVI, for Victor International

2008-2009 Environmental Monitoring of the development of Scrub Island, BVI, for MainSail Development, LLC

2007 – 2010 Water Quality Monitoring for the development of the Calabash Boom Affordable Housing Complex in Calabash Boom, St. John for Reliance Housing

2007 - 2009 Water Quality and Environmental Monitoring for the Subdivision of 77 acres in

Hansen Bay, St. John, for Flamboyant

2006- 2008 Water Quality Monitoring for the dredging of the Sand Channel for the V.I. Water and Power Authority

2006-2007 Water Quality Monitoring for the renovations to the Ritz Carlton Hotel, St. Thomas for Ritz Carlton

2006 - 2010 Environmental monitoring for the placement of undersea cables at the Global Crossing Cable Station in St. Croix for Global Crossing Network, ALCATEL and TYCO

2005-2007 Water Quality Monitoring for the dredging of Crown Bay, St. Thomas for the V.I. Port Authority

2005- 2006 Water Quality and Environmental Monitoring for Improvements to the Redhook Marine Terminal for the V.I. Port Authority

2004 - 2011 Water Quality and Environmental Monitoring for the construction of the Pond Bay Resort, St. John for First American Development Group

2003 - 2006 Water Quality Monitoring for the construction of the Enighed Pond Marine Terminal, St. John, for the V.I. Port Authority

2002 - 2008 Water Quality and Environmental Monitoring for the development of Marine Amenities on the island of Lovango, St. John, for the Joseph Markus Trust

2003 - 2004 Water Quality Monitoring for the development of the Crown Bay Marine Terminal, St. Thomas for the V.I. Port Authority

2002-2005 Water Quality Monitoring for the improvements to the Gallows Bay Marine Terminal, St. Croix, for the V.I. Port Authority

1999-2006 Water Quality Monitoring for repairs to the Frederiksted Pier, St. Croix, for the V.I. Port Authority

2001-2008 Coral Transplant Monitoring for the Enighed Pond Marine Terminal, St. John, for the V.I. Port Authority

2001- 2007 Coral Transplant Monitoring for the Mangrove Lagoon Sewage Treatment Plant Outfall, St. Thomas for the V.I. Department of Public Works

2000 - 2003 Water Quality Monitoring for the dredging of Charlotte Amalie Harbor, St. Thomas, for the V.I. Port Authority

2001 - 2002 Water Quality Monitoring for Improvements to the Tropical Shipping Dock in Crown Bay, St. Thomas for Misener Marine

2000 - 2006 Seagrass Transplant Monitoring for the Seagrass Transplant for the Dredging of Charlotte Amalie Harbor for the V.I. Port Authority

1999- 2002 Water quality monitoring for Construction of Cable Stations at Estate Northside for Global Crossings

1997-2002 Wetland monitoring of the Airport Mitigation Site at the Henry E. Rohlsen Airport for the V.I. Port Authority

1997 - 2002 Wetland monitoring for the Fairplains Mitigation Site at the Henry E. Rohlsen Airport for the V.I. Port Authority

1997- 2005 Water quality monitoring program for Construction of the Christiansted Boardwalk in St. Croix prepared for the Government of the Virgin Islands

1997-2005 Wetland monitoring of Tren Urbano, PR 5 and PR 22 Mitigation *Sites in Puerto Rico under subcontract to Nutter and Associates for the Puerto Rico Highway Authority

1996 Water quality monitoring program for Expansion and Improvements to the Redhook Marine Terminal in St. Thomas prepared for the V.I. Port Authority

1996 Water quality monitoring program for the creation of The Enighed Pond Marine Terminal in St. John prepared for Maguire Group, Inc. for the V.I. Port Authority

1996-1998 Water quality monitoring for the Expansion of the Molasses Pier at the Third Port St. Croix conducted for the V.I. Port Authority

1995 Water quality for the Construction of the AT&T Cable Landing Facility, Estate Northside St. Croix, conducted for AT&T Submarine Systems

1992-1994 Water quality monitoring program for the Reconstruction of the Frederiksted Pier, conducted for the V.I. Port Authority, St. Croix

1992-1993 Establishment of a baseline and long term monitoring of the benthic community potentially impacted by the Water and Power Authority Outfall from the Richmond Power Plant, conducted for the V.I. Water and Power Authority, St. Croix

1992-1993 Preparation of a biological monitoring study for the Cooling Pond Discharge, and monitoring of the algal bloom within the cooling ponds; development of management strategies to alleviate algal and runoff problems, the V.I. Alumina Corporation, St. Croix

1990-1992 Water quality monitoring for The Dredging Project and Related Activities in Christiansted Harbor, conducted for the V.I. Port Authority, St. Croix

1989 Turtle Monitoring Program for Manchineel Beach, St. Croix

LARGE SCALE MITIGATION PROGRAMS

Implementation of the Coral transplant for the replacement of the U.S. Coast Guards Aids to Navigation, 209 corals were transplanted, St. Croix

Development and Implementation of the Compensatory Mitigation Plan for the transplant of approximately 1700 corals, repair of 500 corals of opportunity and outplanting of 3000 ESA listed corals for Limetree Bay Terminal's Single Point Mooring on St. Croix.

Development and Implementation of a Compensatory Mitigation Plan for the relocation of 1.25 acres of seagrass and transplant of 631 corals from the impact footprint of the Veterans Drive Project in St. Thomas and the Repair of Damaged Corals on Triangle Reef.

Development and Implementation of the Mitigation Plan for the relocation of 10,000 corals off the WICO bulkhead in Havensight for West Indies Company in St. Thomas.

Development and Implementation of a coral transplant (190 corals) for the Stabilization of the Seawater Intake line for Marriott Frenchman's Reef, transplant of St. Thomas.

Development and Implementation of a coral transplant to minimize construction impacts for LPG Improvements at the VIWAPA facilities on St. Croix and St. Thomas.

Development and Implementation of a coral and seagrass transplant for Coral World (VI), Inc. in Association with the development of the dolphin exhibit in St. Thomas. Transplant of approximately 250 corals were transplanted and then more than 500 corals were repair post 2017 hurricanes.

Development and Implementation of the Mitigation Plans for VIDPW's Improvements to Veterans Drive St. Thomas

Development and Implementation of the Mitigation Plans for VIPA's Dredging of Crown Bay Marine Terminal and Turning Basin, St. Thomas

Development and Implementation of the Mitigation Plans for VIPA's Maintenance Dredging of Crown Bay Marina, St. Thomas

Development and Implementation of the Mitigation Plans for Westin Resorts Permitting of the dock and Improvements of Drainage, St. John

Virgin Islands Waste Management Authority creation of an Herbaceous Wetland as mitigation for the construction of the Transfer Station at the Anguilla Landfill, St. Croix

Mainsail Coral Transplant/Seagrass Transplant for impacts associated with the development of the Scrub Island Resort BVI, Bioimpact, Inc. came in and completed the transplant and monitoring began by others (Approximately 3000 Corals)

Victor International Coral Transplant for impacts associated by the development of an access ramp and dock at Oil Nut Bay, BVI (Approximately 300 corals)

V.I. Port Authority Mangrove Mitigation for the construction of the Enighed Pond Terminal in St. John (2.8 Acres of Mangrove Wetland)

Joseph Markus Trust Creation of Acropora Thickets and Artificial Reefs as mitigation for the construction of a barge landing facility on the island of Lovango

V.I. Port Authority Transplanting of coral out of the area of impact for the development of the Crown Bay Marine Terminal, St. Thomas (Approximately 3000 Corals)

Department of Public Works Mangrove Mitigation Project for the construction of the Mangrove Lagoon Sewage Treatment Plant, St. Thomas (Approximately 1 Acre of Mangrove Wetland)

V.I. Port Authority Transplanting of Coral out of the area of impact for the Enighed Pond Marine Terminal Project, St. John (Approximately 50,000 Corals)

Department of Public Works Transplanting of Coral out of the area of impact for the placement of the Mangrove Lagoon Sewage Treatment Plant Outfall, St. Thomas (7,000 Corals)

V.I. Port Authority Transplanting of Coral out of the area of impact for the mooring improvements to the Frederiksted Pier, St. Croix (Approximately 300 corals)

V.I. Port Authority Transplanting of Seagrass from the Dredging footprint for the dredging of Charlotte Amalie Harbor, St. Thomas (Approximately 2 acres)

V.I. Port Authority/Department of Public Works, Mangrove Mitigation Project for the construction of the Molasses Dock Road, St. Croix (Approximately ½ acre)

V.I. Port Authority creation of Herbaceous Wetlands for mitigation at the Henry E. Rohlsen Airport, St. Croix (Approximately 1 acres)

V.I. Port Authority mitigation plan for impact incurred in Fairplains Gut by the VIPA plan for creation of 16,000 Square Feet of Wetland at the Manning Bay Site, St. Croix

V.I. Water and Power Authority plan for creation of 4.1 Acres of Wetland as mitigation of the construction of the South Shore Power Plant, Third Port, St. Croix

Green Cay Plan for mitigation for the impacting of 12 Acres of Wetland for the construction of the Green Cay Resort, St. Croix

ENVIRONMENTAL ASSESSMENT REPORTS 2014- CURRENT

Container Port, Golden Grove and Midland Road Underground Projects, V.I. Water and Power Authority, Environmental Assessment Report for the installation of underground power systems to improve resiliency, St. Croix

Flamingo Bay Eco-Resort, BBK Development, Environmental Assessment Report for the development of the small eco-resort on Water Island

Pearl Landfill and Recycling Facility, VI Waste Management Authority, Environmental Assessment Report for the development of a solid waste facility in Estate Pearl, St. Croix

Charlotte Amalie Harbor Dredging, V. I. Port Authority, Environmental Assessment Report and HUD Environmental Assessment for the dredging of the Charlotte Amalie Harbor Channel, Turning Basin and WICO Inner Berth, developed Water Quality and Environmental Monitoring Plans and Mitigation Plans for Seagrass and Corals and Compensatory Mitigation Plans, St. Thomas

Crown Bay and East Gregory Channel Dredging, V. I. Port Authority, Environmental Assessment Report and HUD Environmental Assessment for the dredging of portions of Crown Bay and East Gregory channel so that the Quantum Class Vessel can safely access the northern berth when an Oasis class is at Dock developed Water Quality and Environmental Monitoring Plans and Mitigation Plans for Corals and Compensatory Mitigation Plans, St. Thomas

Frenchmans Reef and Morningstar, Beach Enhancement and Shoreline Stabilization, Diamond Rock Frenchman's Owner/CREF 3, Environmental Assessment Report for the revetement of the shoreline, the installation of offshore breakwaters and sand renourishment, development of Water Quality Monitoring and Mitigation Plans, St. Thomas

Emergency Response Dock and Shoreline Revetment at the Harley Plant, V. I. Water and Power Authority, Environmental Assessment Report for the construction of an emergency fuel spill response dock and the revetment of the eroded shoreline, developed Water Quality Monitoring Plan, St. Thomas

Consolidated Permit for Randolph E. Harley Power Plant, V. I. Water and Power Authority, Environmental Assessment report to bring all components into compliance including those pre-dating CZM, St. Thomas

Underwater Memorial Park, Virgin Islands Underwater Memorial Park, Environmental Assessment Report for the creation of an underwater park to intern ashes into reef building structures, developed Monitoring and Compensatory Mitigation Plans, St. Thomas

Mooring and Operation of a Restaurant/Bar in Pillsbury Sound, Cowgirl Bebop, LLP, Environmental Assessment Report for the installation of moorings for vessels and patrons in Pillsbury Sound, development of Monitoring and Mitigation Plans, St. John

Cruz Bay Underground, V. I. Water and Power Authority, Environmental Assessment Report for the installation of underground power cable system in Cruz Bay Feeder 7E, St. John

Tropical Marine Expansion, Tropical Marine, Environmental Assessment Report to combine docks at Mangrove Marine and off Plot 28 into Tropical Marine and the expansion of the existing dock, developed Water Quality and Environmental Monitoring Plans and Mangrove Mitigation Plans, St. Thomas

Blue Beardbeach Resort, Wyndham Bluebeard's Beach Club, Environmental Assessment Report for the renovation and expansion of the existing Limetree Resort, St. Thomas

Repair to Cruz Bay Visitor Center, Docks and Surrounding Grounds Impacted and Hurricanes Irma and Maria, Croft Engineering/NPS, Environmental Assessment Report for the dredging of the basin and repairs to the bulkhead and renovation and upgrades to the existing Visitor Center, development of Water Quality Monitoring Plan, St. John

Latitude 18 Marina, Jack Rock B-A C, LLC. Environmental Assessment Report for the development of a marina and management mooring field, and dry storage for vessels, developed Water Quality Monitoring and Compensatory Mitigation Programs, St. Thomas.

Green Cay Marina, St. Croix Financial Center, Environmental Assessment Report for Expansion of the existing marina, permitting of maintenance dredging and beach and shoreline improvements, St. Croix

King Christian Dock, USVI Opportunity Fund, LLC, Environmental Assessment Report for the reconstruction and expansion of a hurricane damaged dock, developed Water Quality and Mitigation Plans, St. Croix

Renovations and Expansion of an Existing Dock, Inter-Island Ferry Service, Environmental Assessment Report for the extension and expansion of an existing dock to better accommodate dockage of vessels, St. Thomas

Repair of a Hurricane Damaged Dock, Margaritaville, Environmental Assessment Report for the

reconstruction of the damaged dock, permit later modified to extend reverse osmosis line, St. Thomas

Boat Building Facility and Dock, Gold Coast Yacht, Inc., Environmental Assessment Report for boat building warehouse and a launch and outfitting dock, developed Water Quality Monitoring and Compensatory Mitigation Plans, St. Croix

Turquoise Bay Resort, VIPM, LLC Environmental Assessment Report for a glaming resort and restaurant, St. Croix

Christiansted National Historic Site Existing Wharf Replacement, HDR/National Park Service Environmental Assessment Report for the replacement of the failing sheet pile wall and bulkhead, developed Water Quality and Acoustic Monitoring Plans, St. Croix

Lovango Cay Beach Club and Resort, Lovango Island Holdings, LLP, Environmental Assessment Report to permit the development of a beach club and resort and sited and permitted moorings, Lovango Island

Wave Attenuation System, LSJ, LLC, Environmental Assessment Report for the installation of wave attenuation systems and developed Water Quality Monitoring and Compensatory Mitigation Plans, Little St. James

Installation of Access Docks, and Barge Landing Facility, Great St. James, Great St. Jim, LLC. Environmental Assessment Report for the development of a new dock and the renovation of an existing dock and the construction of barge landing, developed Water Quality Monitoring, Mitigation and Compensatory Mitigation Plans, Great St. James

Installation of a Single Point Mooring at the Limetree Bay Terminal, St. Croix, Limetree Bay Terminals, LLC. Environmental Assessment Report for the installation of an undersea pipeline, PLEM and buoy system in 650ft of water, conducted ROV surveys to 1250ft of water depth and developed and implemented Water Quality and Environmental Monitoring plans, developed, and implement extensive endangered species compensatory mitigation program, St. Croix

St. Croix Sports Complex, Coastal Systems, Environmental Assessment Report for the construction of the Paul. E. Joseph Stadium, wetland delineations, and terrestrial and marine endangered species assessments, development of sea turtling lighting mitigation, St. Croix

Installation of a Submarine Cable System, V.I. Water and Power Authority, Environmental Assessment Report, cable routing, beach landfall study, developed Water Quality and Environmental Monitoring Plans, St. Thomas

Maintenance Dredging of Krause Lagoon Channel, V.I. Port Authority, Environmental

Assessment Report for the dredging of the Cross-Channel into the Container Port and into the Molasses dock and development of Water Quality Monitoring and Mitigation Plans, St. Thomas

Installation of New Reverse Osmosis Discharge and Intake Line, Westin Resorts, Environmental Assessment Report for the installation of an intake over 2000ft offshore, St. John

Shoreline Stabilization Project for Buccaneer Hotel, The Buccaneer, Environmental Assessment Report for the placement of a shoreline stabilization structure to protect the eroding shoreline threatening hotel units, St. Croix

VIWAPA's Conversion to LPG, VITOL and V.I. Water and Power Authority, Environmental Assessment Report for the installation of LPG conversion equipment, tanks, and piping, and the expansion of the fuel dock and permitting of an offshore deep-water buoy for LPG ships, developed and implemented Water Quality and Environmental Monitoring Plans, developed and implemented Larval Sampling plan, St. Croix and St. Thomas.

viNGN Submarine Cable Network Acatel-Lucent for Virgin Islands Next Generation Network, conducted cable beach landfall studies and routing, Environmental Assessment Report for the installation of an inter island cable system, developed and implemented Water Quality and Environmental Monitoring Plans, Virgin Islands

Improvements to the Frederiksted Pier, V.I. Port Authority, Environmental Assessment Report, for the installation of a new Tender Landing, Developed Water Quality Monitoring and Compensatory Mitigation Plans, St. Croix

Improvements to the Red Hook Marine Terminal, V.I. Port Authority, Environmental Assessment Report for the construction of a new Customs Building and shoreline improvements, developed Water Quality Monitoring, Mitigation and Compensatory Mitigation Plans, St. Thomas

Offshore Windmills, Ocean Energy, Inc., Environmental Assessment Report for the installation of offshore turbines, submarine cable and cable landing, development Water Quality Monitoring and Compensatory Mitigation Plans, conducted birds studies, St. Thomas

St. John Marina, Summers End Group, Environmental Assessment Report for the development of a marina and associated upland facilities, developed Water Quality Monitoring, Mitigation and Compensatory Mitigation Plans St. John

Maintenance Dredging of the Schooner Channel, V.I. Port Authority, Environmental Assessment Report for the dredging of the Schooner Channel to 18ft., evaluation of alternative alignments, developed Water Quality Monitoring and Compensatory Mitigation Plans,

Environmental Assessment for HUD/VIHFA, St. Croix

Remediation of Hydrocarbon Contamination at the V.I. Seaplane Ramp, V.I. Port Authority, Environmental Assessment Report for the installation of sheet piles to restore facility and contain hydrocarbon contaminated soil, developed Water Quality Monitoring and Mitigation Plans, prepared and implement LUST Remediation Plan, St. Croix.

Maintenance of the Existing Bulkhead and Maintenance Dredging of Charlotte Amalie Harbor, CH2M Hill, West Indies Company, Environmental Assessment Report for the replacement of the sheet pile in the inner berth, developed Water Quality Monitoring and Coral Transplant Mitigation Plans St. Thomas

ENVIRONMENTAL ASSESSMENT REPORS 2009-2013

Dredging of Crown Bay Marine Terminal and Turning Basin, Environmental Assessment Report for the dredging of the Crown Bay Marine Terminal and basin, development and implementation of monitoring and coral mitigation programs, V.I. Port Authority, St. Thomas.

Maintenance Dredging of Crown Bay Marina, Environmental Assessment Report for the dredging of Crown Bay Marina, and the development and implementation of water quality monitoring and coral and seagrass mitigation, V.I. Port Authority, St. Thomas

Improvements to Bordeaux Road, with Parsons Brinkerhoff, for V.I. Department of Public Works, Federal Highways Environmental Assessment for a Finding of No Significant Impact, St. Thomas.

Improvement to Spring Gut Road, with Stanley Engineer, for V.I. Department of Public Works, Federal Highways Environmental Assessment improvements to Spring Gut Road for a Finding of No Significant Impact St. Croix.

Coral World's Dolphin Exhibit, Coral World (VI), Inc. Environmental Assessment Report for the construction of an off shore dolphin pen and viewing dock and development and implementation of monitoring and mitigation plans, including endangered corals mitigation and monitoring, St. Thomas.

Expansion of the Spratt Bay Homeowners Dock, SBHOA, Environment Assessment Report, mitigation and monitoring plans, Water Island.

Veterans Drive, with Parsons Brinckerhoff, for the V.I. Department of Public Works, Environmental Assessment Report, development, and implementation of water quality monitoring, coral and seagrass mitigation plans and compensatory mitigation for impacts, development of an Environmental Assessment for Federal Highways for a Finding of No

Significant Impact, and drafting of the U.S. ACE Environmental Assessment and Statement of Findings, St. Thomas

Chiller Cooling System, BaHaMar, HDR, Environmental Assessment for the placement of an intake for a chiller for the BaHaMar Resort, development of route to have least possible impact, Grande Bahama

Reverse Osmosis Facility, V.I. Water and Power Authority, Environmental Assessment Report for the installation a new Reverse Osmosis Facility at the St. Thomas Power Plant, St. Thomas

Submarine Power Cable for V.I. Water and Power Authority between the Islands of St. Thomas and St. John, developed route, and developed and implemented Water Quality Monitoring and Mitigation Plans, Pillsbury Sound USVI

Chiller System and Dock Repairs at Frenchman's Reef, Diamond Rock Frenchman's Owner, Environmental Assessment Report, Larval Study for Intake, Conducted Current Studies Developed and implemented Water Quality Monitoring Plan and Mitigation, Plan, St. Thomas

Expansion of Heavy Materials Krum Bay Facility, Heavy Materials St. Thomas, Environmental Assessment Report and developed Water Quality Monitoring Report, St. Thomas

33 Mega-Watt Waste to Energy Plant, Alpine Energy Group, Inc. Environmental Assessment Report, designed Water Quality Monitoring Plan and Mitigation Plan, Conducted Endangered Tree Boa Surveys, St. Thomas

18 Mega-Watt Waste to Energy Plant, Alpine Energy Group, Inc., Environmental Assessment Report, wetland delineation, developed Water Quality Monitoring and Mitigation Plans, St. Croix

Reverse Osmosis Facility St. John, V.I. Water and Power Authority, Environmental Assessment Report , St. John

Seven Hills Development, Robin Bay Partners, Environmental Assessment Report, developed Water Quality Monitoring Plan, Terrestrial Mitigation Plan, wetland delineation, St. Croix

Improvements to the Molasses Dock, V.I. Port Authority, Environmental Assessment Report for dredging and making improvements to the roll-on-roll-off facility, the plan included mitigative efforts to protect the mangrove shoreline to north. Monitoring and Mitigation Plans, Sediment Sampling, St. Croix

Dredging of the Charlotte Amalie Harbor and the Channel and the Filling of Lindbergh Bay,

West Indies Corporation, Environmental Assessment Report for the dredging and widening of the Charlotte Amalie Harbor to accommodate the Oasis class ships at WICO docks, and dispose of the dredge spoils in the old historic dredging hole in Lindbergh Bay Developed Mitigation and Monitoring Plans, conducted baseline study, St. Thomas

Fueling Station, V.I. Water and Power Authority, Environmental Assessment Report for the installation of a vehicle fueling station in the Richmond Plant, Terminal Facility License, St. Croix

ENVIRONMENTAL ASSESSMENT REPORTS 2005 -2008

Port of Mandahl, MSJ Realty, Environmental Assessment Report for the development of the marina and resort in Estates Mandahl, developed mitigation and monitoring plans, St. Thomas

North Sound Yacht Club, Environmental Assessment Report for the development of a marina and yacht club in North South, developed and implemented water quality monitoring plans, Victor International, Virgin Gorda, BVI

Reconstruction of the Frenchman's Cove Dock, Marriott Ownership Vacation Club, Inc., Environmental Assessment Report for the reconstruction and expansion of a damaged dock in Charlotte Amalie harbor, St. Thomas

Thatch Cay Development, Environmental Assessment Report for the development of a resort community and marine infrastructure on Thatch Cay, for Thatch Cay, LLC, Conducted intensive ESA species surveys and developed mitigation and monitoring plans include those for ESA listed coral species, St. Thomas

Smith Bay Development, Environmental Assessment Report, Smith Bay Developers, Inc. Smith Bay, St. Thomas

Subdivision of Great St. James, Christian Kejer, Environmental Assessment Report for development of a residential community on Great St. James, including marine infrastructure for access, developed mitigation and monitoring plans, Great St. James Island, St. Thomas

Subdivision of Inner Brass, Green Island Developers, Environmental Assessment Report for the development of a residential community on Inner Brass, including marine infrastructure for access, developed mitigation, and monitoring plans, Inner Brass Island, St. Thomas

Subdivision of Inner Brass, Bryan Family, Environmental Assessment Report for the subdivision of lots for a residential community on Inner Brass, including development of the dock for access. Inner Brass Island, St. Thomas

Cabrita Point, Cabrita Point Partners, Lionstone LLC, Environmental Assessment Report for the development of a resort community, mitigation, and monitoring plans for the Endangered Virgin Islands Tree Boa, mitigation and monitoring plans for a reverse osmosis intake, dock and swim platform, Cabrita Point, St. Thomas

Subdivision of 77 Acres in Hansen Bay, St. John Flamboyant Realty, Environmental Assessment Report, for roads and subdivision, development, and implementation of water quality monitoring plans and environmental monitoring plans, St. John

Subdivision of 14 Acres in Hansen Bay, St. John Hansen Bay Development Group, Environmental Assessment Report for roads and subdivision, development of water quality monitoring plans and wetland delineation of Waters of the U.S., St. John

Expansions and Improvements to the Ritz Carlton Hotel, William Karr and Associates, Environmental Assessment Report for expansion and renovations to the Ritz Carlton Hotel, including the development and implementation of water quality monitoring plans, St. Thomas

Modification to Carden Beach Condominiums, Environmental Assessment Report for the Development of Zero Lot Line Homes at the Carden Beach property, TK Properties, Inc. St. Croix

Development of Betty's Hope, V.I. Port Authority, Environmental Assessment Report and Wetland Delineations for the development of the south shore property for commercial and or residential use, St. Croix

Expansion of the Compass Point Marina, Margate Management, Environmental Assessment Report for the addition of docks at the Compass Point Marina, Benner Bay, St. Thomas

Improvements, Expansions and Maintenance, HOVENSA, Environmental Assessment Reports for: Construction of Maintenance Buildings, Replacement of Existing Stacks, Construction of the LSF Facility, Construction of Modular Buildings, Construction of Housing in Estate Blessing, permitting of an Existing Borrow Pit, HOVENSA, St. Croix

Installation of a Permanent Barge Landing Facility on Lovango Cay, Joseph Markus Trust, Environmental Assessment Report, development and implementation of mitigation and monitoring plans, including compensatory mitigation for endangered coral species, Lovango Cay

Relocation of the Existing Barge Landing and Construction of a Swim Dock and Beach Enhancing Devices on Little St. James LSJ, LLC, Environmental Assessment Report and development and implementation of monitoring and mitigation plans, Little St. James

Development of Affordable Housing in Calabash Boom, Reliance Housing, Environmental

Assessment Report and TPDES Permits, development and implementation of monitoring plans, St. John

Demineralized Water System and Storage Tank Upgrades, V.I. Water and Power Authority, Environmental Assessment Report for the installation of a new storage tank and a demineralizer, St. Croix

Development of a Pizza Bar and Miniature Golf Course, Divi Carina Bay Resort, Environmental Assessment Report for development of amenities at the Divi Resort, St. Croix

Placement of Fuel Pipelines on the Ann E. Abramson Pier, Royal Caribbean Cruise Lines, V. I Port Authority, Environmental Assessment Report for the installation of fuel lines on the Frederiksted Pier, St. Croix

Development of a Marina and Related Infrastructure, Coral Bay Marina LLC, Environmental Assessment Report for the dredging and development of a marina in Coral Bay, worked with USACE on alternative analysis to reduce impacts, developed extensive mitigation and monitoring plans, St. John

Development of a Marine Mammal Encountered Facility, Environmental Assessment Report for the development of a sealion encounter facility, developed mitigation and monitoring plans, Coral World VI, St. Thomas

Improvements to The "Doc" James Race Track, Environmental Assessment Report for improvement to the racetrack facility, wetland delineations, TRAXCO, St. Croix

Maintenance Dredging and the Permitting of Permanent Moorings, Environmental Assessment Report for the dredging of the existing channel and around the dock and the installation of mooring, developed and implemented mitigation and monitoring programs, Westin Resort, St. John

ENVIRONMENTAL ASSESSMENT REPORTS 2000-2004

Compass Point Marina Expansion, Expansion of the Compass Point Marina, of the existing marina with Springline Architects, developed water quality monitoring plans, St. Thomas

Emergency Electrical Cable St. Thomas-St. John, Environmental Assessment Report for the placement of a new submarine power cable between St. Thomas and St. Croix for the V.I. Water and Power Authority, developed cable route and developed and implemented monitoring and mitigation programs, St. Thomas/St. John

Richmond Sand Channel Dredging, Environmental Assessment Report for the maintenance dredging of the Sand Channel for the V.I. Water and Power Authority, developed and implemented water quality and environmental monitoring and mitigation plans, St. Croix

Hassel Island Electrical Cable Replacement, Environmental Assessment Report for the installation of a new submarine cable between St. Thomas and Hassel Island for the V.I. Water and Power Authority, developed and implemented monitoring plans for installation, St. Thomas

Golden Resort Hotel Casino Resort, Environmental Assessment Report, wetland delineation, developed water quality and environmental monitoring and mitigation plans, St. Croix

Crown Bay Marine Terminal Improvements, Environmental Assessment Report with Adams, Inc., St. Thomas

Global Crossings Point of Presence, Environmental Assessment Report for the Placement of a Point of Presence (tower,) in Frederiksted, St. Croix

Burial of Fiber Optic Cables, Innovative Telephone Environmental Assessment Report for the Burial of Fiber Optic Cable on the North Shore of St. Croix

Burial of Fiber Optic Cables on the West End of St. Croix, Innovative Telephone Environmental Assessment Report for the Burial of Fiber Optic Cable on the West End of St. Croix

Callaloo Club Blowing Point, Environmental Assessment for the development of a marina on Anguilla, BWI

Installation of Waterline Between St. Thomas and St. John, V.I. Water and Power Authority Waterline Environmental Assessment for a waterline between St. Thomas and St. John, developed route, and developed and implemented monitoring and mitigation plans.

Installation of a Submarine Cable to Little St. James, V.I. Water and Power Authority Powerline Environmental Assessment for a utility line between St. Thomas and Little St. James

South American Crossing Cable Station, Global Crossings Environmental Assessment Report for the South American Crossing Cable Station at Estate Northside, St. Croix

Water Island Ferry Dock, Environmental Assessment Report for the construction of a ferry dock on Water Island for the V.I. Department of Public Works, development and implementation of mitigation and monitoring plans, Water Island

Cuisanart, Environmental Impact Assessment for Beach Renourishment, Anguilla, BWI

Cinnamon Bay, Environmental Impact Assessment for Development of a Marine Facility, Anguilla, BWI

Crown Bay Benthic Habitat Survey of Crown Bay and Gregerie Channel, conducted for V.I. Port

Authority as a supplement to the USACE Feasibility Report for

Frederiksted Pier Improvements, Environmental Assessment Report for the Improvements to the Existing Frederiksted Pier, St. Croix

Little St. James, Environmental Assessment Report for a Private Dock on Little St. James Island

Phase II of the Christiansted Boardwalk, Government of the Virgin Islands Environmental Assessment Report for Phase II of the Christiansted Boardwalk, developed water quality and mitigation plans, St. Croix

Beal Aerospace Environmental Assessment Report for Construction of the World Headquarters Estate Great Pond, St. Croix

ENVIRONMENTAL ASSESSMENT REPORTS 1988-2000

Divi Hotel, Environmental Assessment Report for the reconstruction of a dock after damage associated with Hurricane Hugo, St. Croix

Global Crossing Cable Terminal, Environmental Assessment Report for the construction of a Cable Terminal Building and a corridor for 8 submarine fiber optic cables. Frederiksted St. Croix, assisted in beach landfall study and developed cable routes

Construction of a Coker and Coker Dock, HOVENSA Environmental Assessment Report for the Construction of a Coker and Coker Dock at the HOVENSA Refinery, St. Croix

Mooring Dolphin, V.I. Port Authority Environmental Assessment Report for the construction of a Mooring Dolphin at the Frederiksted Pier, St. Croix

Seaplane Terminal, Environmental Assessment Report for the Development of a Seaplane Terminal at the old Seaplane Ramp, St. Croix

Forest Bay, Environmental Assessment Report for the Development of a Marina and related facilities in Forest Bay Anguilla, BWI

META Resorts, Environmental Assessment Report for the development of a Dolphin Lagoon at Meads Bay Anguilla, BWI

Construction of the Christiansted Boardwalk, Government of the Virgin Islands Environmental Assessment Report for the Construction of a boardwalk in Christiansted, St. Croix

Runway Extension Henry E. Rohlsen Airport, V.I. Port Authority Environmental Assessment Report for the runway extension at the Henry E. Rohlsen Airport under subcontract to LPA Group, St. Croix

Red Hook Marine Terminal Expansion, V.I. Port Authority Environmental Assessment Report for the expansion of the Red Hook Marine Terminal, Bioimpact, Inc also developed and implemented mitigation and monitoring plans, St. Thomas

Enighed Pond Marine Terminal, V.I. Port Authority Environmental Assessment Report for the creation of the Enighed Pond Marine Facility. Bioimpact, Inc. also developed and implemented mitigation and monitoring plans, St. John

Submerged Lands Renewal, Coral World (VI), Inc. Environmental Assessment Report for the renewal of the submerged land lease for the Coral World Facility, St. Thomas

Construction of a Seawall, Cowpet Bay Environmental Assessment Report for the modification of the existing permit for construction of a seawall, St. Thomas

Riprap Revetment Installation, Watergate East Villas Environmental Assessment Report for the Construction of a Rip-Rap Revetment, St. Thomas

Improvements to the Fuel Dock, V.I. Water and Power Authority Environmental Assessment Report for Improvements to the fuel dock at the Power Generating Facility, St. Thomas

La Domaine, Environmental Assessment Report for the subdivision of 40 Acres of Land in Estate Misngunt, St. Thomas

Expansion of the Alexander Hamilton Airport and Highway 64 Relocation, V.I. Port Authority Environmental Assessment Report for the expansion of the Alexander Hamilton Airport Terminal and Highway 64 Relocation, including the wetland delineation of waters of the US and development and implementation of wetland mitigation plans, St. Croix

AT&T Cable Landing Facility, Environmental Assessment Report for the Cable Landing Facility at Estate Northside, St. Croix, Assisted in Beach Land Fall Studies, Cable Routing, and water quality and environmental monitoring and mitigation.

Dredging of the Sand Channel, DEVCON Environmental Assessment Report for the Dredging of the Christiansted Sand Channel, St. Croix

Expansion of the Red Mud Storage Ponds, VIALCO Environmental Assessment Report for the Expansion of the Red Mud Storage Ponds, VIALCO Alumina Facility, St. Croix

Stormwater Drainage System VIALCO, Environmental Assessment Report for the creation of a stormwater drainage system, VIALCO Alumina Facility, St. Croix

Permitting of a Caliche Mine at VIALCO, Environmental Assessment Report for the Mining of

Caliche, VIALCO Alumina Facility, St. Croix

Molasses Dock Expansion, VI Port Authority Consulting on the Environmental Assessment Report for the Molasses Dock Terminal at the Third Port Facility, subcontracted by Frank Torrez, and the V.I. Port Authority, St. Croix

SELECTED ENVIRONMENTAL ASSESSMENT REPORTS 1988 -1993

St. Croix by the Sea, Environmental Assessment Report for beach renourishment and the construction of jetties, St. Croix

Vieques Shrimp Mariculture Project, Environmental Assessment Report for the creation of a shrimp farm in Puerto Ferro, Vieques, Puerto Rico

MSRC Dock, Environmental Assessment Report for the construction of a pier in the HOVIC West Turning Basin, St. Croix

Eden Beach, Proposed hotel and condominium project Environmental Assessment Report, St. Croix

Tamarind Reef, Proposed reconstruction and expansion of the Tamarind Reef Hotel, Hotel, St. Croix

Gas Turbines, Third Port, V.I. Water and Power Authority Environmental Assessment Report and U.S. Corps of Engineers Application for the construction of two gas turbines at the Third Port Site, St. Croix

Lovango Cay, Environmental Assessment Report for the creation of a subdivision on Lovango Cay Placement of a private dock, St. Thomas

Well Water Collection System, Environmental Assessment Report for the construction of a well water gathering system for wells at the Virgin Islands Alumina Corporation's Plant, St. Croix

Crawl Cay, Environmental Assessment Report, Wetlands Delineation and Hammock Studies of Crawl Cay, Florida, for Monroe County

Jack's Bay Subdivision, Environmental Assessment Report for the subdivision of approximately 300 Acres into 64 lots at Estate Jack's and Isaac's Bays, St. Croix

Bauxite Building, Environmental Assessment Report for the Expansion of the Bauxite Building at the Virgin Islands Alumina Corporation's Alumina Facility, St. Croix

Carambola Beach Club, Environmental Assessment Report for the repair and improvement of

The Carambola Beach Club facility prepared for Danested, St. Croix

Salt River National Park, Environmental Impact Statement for the proposed National Park at Salt River, St. Croix, prepared for the National Park Service

Desalination Unit, V.I. Water and Power Authority Environmental Assessment Report for the Construction of a desalination unit on St. John, prepared for the V.I. Water and Power Authority, St. John

Carmel by the Sea, Environmental Assessment Report for the Construction of a 95 unit condominium at Estate Turner's Hole, St. Croix

VLBA, Environmental Assessment Report and Landscaping Plan for the Very Long Baseline Array, St. Croix

Buccaneer Hotel Room Expansion, Environmental Assessment Report for 20 room addition to the Buccaneer Hotel, St. Croix

Ritz Carlton Hotel, Zoning Application and Environmental Assessment Report for a 350 report for a 350 room Hotel, Estate Davis Bay, St. Croix

Frederiksted Pier Expansion, Environmental Assessment Report for the construction of a second pier in Frederiksted, St. Croix

Kingston Hotel, Environmental Assessment Report for Hotel and Condominium Construction, Kingston, Tortola

Airport Warehouse, Environmental Assessment Report for construction of a Warehouse Facility at the Alexander Hamilton Airport, St. Croix

Great Pond Resort, Environmental Assessment Report, Zoning Application, and USACE Permit Application for a Hotel and Condominium Project at Estate Great Pond, St. Croix

ENVIRONMENTAL ASSESSMENT REPORTS 1986-1988

St. Croix	St. Thomas	St. John
Columbus Landing, St. Croix	Blue Beards Beach, St. Thomas	Concordia, St. John
Grapetree Beach, St. Croix		
St. Croix by the Sea, St. Croix		

Ensenada, St. Croix
Virgin Grand, St. Croix
Sugar Bay, St. Croix
Turtle Run, St. Croix
Palm Shores, St. Croix
Baobab, St. Croix
Reflection Bay, St. Croix
Coakley Bay, St. Croix
Green Cay, St. Croix
Turquoise Bay St. Croix
Eagle Bay, St. Croix
Granard, St. Croix
Concordia, St. John

WIDER CARIBBEAN

Southeast Peninsula, St. Kitts
Divi Dive Canal, Nassau, Bahamas

ENVIRONMENTAL CONTAMINATION ASSESSMENTS

Sampling of USTs for Gasoline Service Station on St. Thomas, and St. Croix 2016-2022
Sampling of the LUSTs at the VIPA's Seaplane Ramp, St. Croix 1994, 2011, 2012-2016, on-going
Sampling for REC Estate Donoe, St. Thomas 2020-on going
Sampling for REC Estate Anna's Hope, St. Croix 2012-2016
Sampling for petroleum products at gasoline stations and industrial sites in St. Croix 2006-2016
Sampling for chemical contamination in cisterns in St. Croix 2000- present
Sampling for mold Renaissance Hotel, St. Thomas
Sampling for REC residential and commercial properties St. Croix, St. Thomas, St. John and Puerto 1990 - 2022

A BATEMAN CIVIL SURVEY COMPANY

BCSC DOSPIVA

ENGINEERS • SURVEYORS • PLANNERS

Jeffrey L. Bateman, PE, PLS

Summary of Professional Experience

Mr. Bateman is responsible for a multi-disciplined staff of engineers, construction managers, environmental specialists, surveyors, and technical and administrative support staff. His experience includes the design and calculation of residential, commercial, agricultural and industrial development projects including stormwater and utility extensions; surveying for transportation and construction projects utilizing subsurface utility engineering (SUE) and global positioning systems (GPS), and Planning actions including rezonings, amendments and variances.

Education

- B.S./1987/Surveying Engineering/The Ohio State University, Columbus, Ohio
- B.S./1988/Civil Engineering/The Ohio State University, Columbus, Ohio
- 40 Hour OSHA Hazwopper, Transportation Workers Identification Credentialed

Professional Registrations

- Professional Engineer/1992/**North Carolina**, No. 18663, **Florida**, No. 45142
- Professional Engineer/1995/**Ohio**, No. 59299
- Professional Engineer/1996/**South Carolina**, No. 17216
- Professional Engineer/1997/**Virginia**, No. 030873
- Professional Engineer/1999/**Kentucky**, No. 21120, **Georgia**, No. 26573
- Professional Engineer/2003/**New Jersey**, No. 24GE04476100
- Professional Engineer/2009/**US Virgin Islands**, No. 1052 E
- Professional Engineer/2010/**Alabama**, No. 31139-E

- Professional Surveyor & Mapper/1991/**Florida**, No. 4884
- Professional Land Surveyor/1992/**North Carolina**, No. L-3502
- Professional Land Surveyor/1995/**South Carolina**, No. 17216, **Ohio**, No. 7748
- Professional Land Surveyor/1996/**Virginia**, No. 001301
- Professional Land Surveyor/1999/**Kentucky**, No. 3490
- Professional Land Surveyor/2002/**Georgia**, No. 2904
- Professional Land Surveyor/2009/**Virgin Islands**, No. 1053, **Alabama** 30807-S
- Professional Land Surveyor/2010/**Mississippi**, PS-3161

Project Experience

- **2002 – 2018**: President, Bateman Civil Survey Company, PC / BCSC Dospiva, LLC

- Watergate Villas East Condominium Association, Estate Bolongo, St. Thomas, VI. BCSC Dospiva performed field surveys, Environmental Assessments, civil engineering and construction administration services for this project which involved designing a solution to a severe erosion issue. This project is situated directly on the beach and ultimately involved the construction of a toewall, installation of plantings on the beach and in the water, sand replenishment and all associated permitting through DPNR, CZM, Fish & Wildlife, and the local Building Permit process.

- Rattan Road (Rt 74) Route Surveying and Level B Subsurface Utility Engineering, Christiansted, St Croix. BCSC Dospiva is performing a route survey of approximately 3.5 miles of Rattan Rd including location of all underground utilities for a drainage and safety improvement project. This work is being performed under an on-call contract with the Department of Public Works.

- Brookman Quarry, St. Thomas, VI. BCSC Dospiva is currently performing engineering duties to address USEPA concerns at the quarry complex. Project Improvement plans, SWPPP, SPCC, IPWW TPDES permits and associated exhibits have been prepared. New topography was performed using sUAS (small Unmanned Aircraft System) at both St Thomas and St Croix facilities.

- Coastal Interceptor Relocation, Christiansted, St Croix. BCSC Dospiva is performing boundary, topographic and planimetric surveys for the design build of this sewer relocation project. Underground utilities were also located in portions of the project.

- University of the Virgin Islands Athletic Field Construction, Kingshill, St. Croix, VI. BCSC Dospiva performed boundary verification and topographic surveys, coordinated the archeological and environmental permitting, and the geotechnical evaluations, designed the FIFA Soccer Facility and practice fields including, erosion and sedimentation control, grading, drainage, field underdrains, turf and lighting specifications, irrigation and the preparation of a Stormwater Pollution Prevention Plan, and the administration and observation of the construction process

- Metro Motors, St. Thomas and Centerline Auto Rentals, St. Croix. BCSC Dospiva was part of design build teams for each of these projects Services provided include site planning, grading, erosion control, utility services and construction observation.

- Subsurface Utility Engineering: BCSC has performed Level A and Level B SUE services on various projects for environmental consulting firms, construction companies and professional engineering firms, including the use of Ground Penetrating Radar on several power/chemical industrial facilities. BCSC currently provides 24/7 On-Call SUE services for the US Army at Ft. Stewart and Hunter Army Air Field in Savannah, GA.

- Communication Facility Surveys: BCSC has completed numerous surveys for communication tower facilities including FAA 1A and 2C certifications, as well as boundary and topographic surveys, balloon tests, and zoning and title research, for projects throughout the southeastern US, Puerto Rico and the US Virgin Islands.

- **1993-1995, 2002-2006**: Instructor, Wake Technical Community College, Raleigh, North Carolina: Conducted full semester classes in the Civil Engineering and

Surveying curriculums. Specific courses included Drafting, CADD 1 & 2, Hydrology, Photogrammetry/GPS, Surveying 1, 2 & 3, Surveying Law, Business Management and Operations, Statics & Strength of Materials, and Soil Mechanics.

- **1999 – 2002**: Regional Manager, Draper Aden Associates, Apex, NC. Performed regional office management duties including opening regional office, client development, project management, accounts payable and receivable, project development and human resources.

- **1994-1999**: Regional Manager, Taylor Wiseman & Taylor, Raleigh, North Carolina: Performed client development, project management, accounts payable and receivable, project development and human resources. Directed over $2.5 million of contracts with the North Carolina Department of Transportation, including Subsurface Utility Engineering, Route Surveying, GPS Surveys, and Roadway Design. Performed civil design of residential and commercial projects, directed boundary surveys as large as 850 acres, managed construction surveys of major roadway, industrial and residential projects, certified county-wide GPS survey of Wake County, NC for aerial mapping project, landfill closures and construction, wireless communication sites, and houseline services with major homebuilders.

- **1993-1994**: Office Manager, Geotrack, Raleigh, North Carolina: Performed Resident Professional Engineering / Surveying and Project Management duties for Subsurface Utility Engineering contract with the North Carolina Department of Transportation. Responsibilities included scoping meetings, estimate preparation, supervision of work products, submittals and contract administration.

- **1991-1993**: Senior Engineer, Collier County Government, Naples, Florida: Performed the review of all land development projects. Areas of review responsibility included review for South Florida Water Management District regulations, environmental review including wetlands and endangered species, water and sanitary sewer extensions, and construction conformance with development ordinances. Represented County Development Services on the County Environmental Advisory Board, which conducted public meetings for major projects. Selected to sit on Quality-Plus committees.

- **1989-1991**: Project Engineer, Brown Collins Incorporated, Ft. Myers, Florida: Performed engineering calculations and design of residential, commercial and agricultural projects. Design included stormwater management, utility design, grading and permitting. Performed occasional surveying project management.

- **1988**: Project Engineer, Hoppes Engineering, Springfield, Ohio: Performed calculations for stormwater management, utility design of water and sewer extensions, and grading of residential and commercial projects.

- **1977-1982:** Surveyor, Taylor, Wiseman & Taylor, Mt. Laurel, NJ: Performed survey functions as rodman, instrument operator and junior party chief. Also performed Business Office duties including Accounts Receivable preparation and collections.

APPENDEX II

ENVIRONMENTAL AND WATER QUALITY MONITORING
FOR THE
IMPLEMENTATION OF MEASURES TO PRESERVE
THE BEACH
GREAT BAY, ST. THOMAS, ST. THOMAS
U.S. VIRGIN ISLANDS

INTRODUCTION

The following is the proposed water quality monitoring program for the implementation of measures to preserve the beach at the Ritz-Carlton Club on Great Bay, St. Thomas, U.S. Virgin Islands. The proposal includes the installation of two separate components intended to protect the shoreline.

Geotubes are proposed parallel to the offshore in approximately 5ft of water. Eleven geotubes 51' in length, 9' wide, 22' in circumference, and 4ft in height will be placed offshore. These all have 27' wide scour aprons between 55' – 70' in length. These will be placed parallel to the shoreline 40 to 60ft offshore. The geotextile scour aprons are attached to the seafloor with post that will be driven into the seafloor to hold them in place during filling. The installation of the geotubes will have the potential to impact water quality and are proposed to be monitored as part of this plan

The installation of sargassum diversion berms is also proposed. A trail conducted in 2021 showed that the sargassum can be directed successfully into one corner of the beach. It was also found that the barrier angle may need to shift due to wave approach to best accomplish the movement of the sargassum along the barriers. The Club is therefore requesting permission to install up to 750ft of boom offshore and up to 75ft of barrier as a "catch" barrier to prevent sargassum from moving back along the beach to the south. The barrier installed will be the Smooth Blue beach bouncer barrier which has a 24" skirt to prevent sargassum from moving below the barrier. The barrier would be installed utilizing 3ft screw anchors and secured by floating lines. Screw anchors would be installed every 25ft, paired anchors will be used to minimize wave impacts. The Club would like permission to install up to sixty-five (65) 3' screw anchors to allow for adjustment of the angle as necessary. Quick releases will be installed on barriers so they maybe rapidly removed or deployed. The screw anchors will remain in place year-round, but the barriers would only be deployed as necessary to prevent sargassum inundation on the beach. The installation of the screw anchors and barriers should not create turbidity and should not require water quality monitoring.

The Club is also proposing to install green fencing on the northern end of the beach to minimize the visual impact of the collected Sargassum, shielding the piles from The Club beach and the public road and adjacent shoreline. This should be a minimally impacting activity and should not require water quality monitoring.

In any marine construction the potential for negative impacts to marine life and degradation of water quality exist**.** When sediments are suspended in the water column through pile socketing, drilling, concrete pouring, or grouting these suspended sediments add to the turbidity of the water. The lowering of the transparency of seawater can greatly affect sessile marine organisms that rely on the transmission of the light for their existence. Settling sediments can also smother coral colonies and prevent larval sediment of reef organisms. There are coral colonized reefs to the northeast and south

the project site which contain federally listed threatened species. Through careful planning and monitoring, such potential impacts can be minimized and abated.

To ensure that water quality is maintained this water quality monitoring program will be implemented during the installation of geotubes. This plan will monitor turbidity and to look at the effectiveness of the sedimentation control. If any degradation of water quality is detected immediate measures will be taken to abate the impacts.

The purpose of this monitoring plan is to document any degradation in water quality or in the health of the benthic community and detail a course of action that can be immediately implemented to abate that degradation if significant changes are observed.

WATER QUALITY MONITORING

Prior to the start of construction, a baseline of water quality conditions will be established. A total of 3 sampling location will be established along the shoreline (geotube locations) and 2 controls control sampling sites. The monitoring samples will be placed in the areas most likely to be impacted by activities associated with the geotube installation. The control sites will be placed in areas which should be exposed by the same ambient conditions but should not be impacted by the geotube installation.

At each site the turbidity expressed as NTUs will be sampled. Samples will be taken on a weekly basis for 2 months prior to the start of construction.

Baseline data will be used to compare with data collected during the construction project to help assess whether readings are a result of the installation process or are due to ambient conditions.

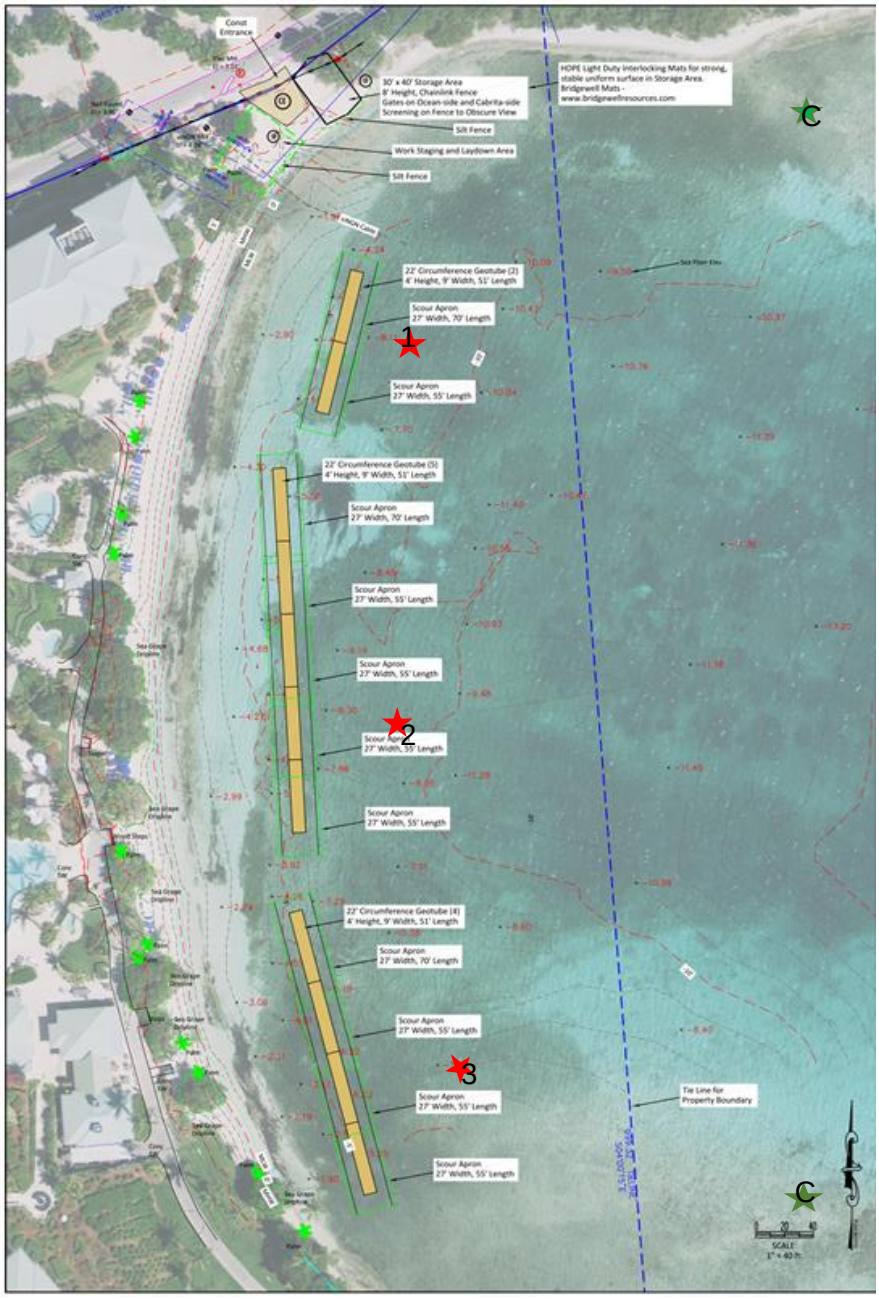


Figure 1: Water Quality Monitoring Locations.

DURING CONSTRUCTION

During geotube installation, 3 samples will be taken around the area of in-water work; these samples will be taken in a radial pattern around the area of work at a distance of 5 meters outside the turbidity booms. Samples will be taken 1 meter below the surface and will be analyzed by either a Hach 2100 Turbidity meter or a YSI Multi-meter for turbidity expressed as NTU. Samples will be taken twice for each 8-hour shift worked. Work will only be done during day light hours.

The control samples will be utilized to determine whether elevated turbidity is a function of the project or due to ambient conditions. As per the Virgin Islands Code, visual depth visibility readings (Secchi disk measurements) should not fall below 1 meter.

Baseline samples will be utilized to determine if elevated readings are the result of sea conditions.

Wind speed and direction, wave height and direction, and rainfall will be recorded at the time of sampling.

During installaton if the water samples show NTUs readings in excess of the allowable limits, DPNR, DEP, the Contractor, and USACE will be notified, in writing. The baseline samples will be utilized to determine if an increase in turbidity is a result of natural phenomena or if the monitoring sample is elevated above the ambient background as a result of the construction project. If it is determined that the elevated turbidity is the result of the installation project, the source of the problem will be identified, and methods worked out to reduce suspended sediments. Someone must always be on hand at the construction site who has the authority to implement sediment control devices, so that problems can be solve or resolved by the monitor, DEP, DPNR, and USACE.

When elevated readings are encountered the installation activity will stop and if any deficiencies in the deployed turbidity control are encountered, they will need to be corrected. Work may resume once turbidity has fallen to allowable levels. If there are no deficient in the deployed turbidity control, additional curtains will need to be deployed or the work may need to be slowed. Work will have to stop until turbidities reach allowable levels before resuming. If the additional measures cannot be deployed which are adequate to control turbidity, then work will have to be shut down every time readings become elevated over acceptable ranges.

In-water work will not be performed when sea conditions are such that the turbidity barriers become ineffective, and turbidity is noted to start escaping the curtains. A turbidity limit of 3 NTU will be enforced and any time the turbidity exceeds 3 NTU work will be stopped until measures have been undertaken to prevent the escape of turbidity and water quality has returned to ambient. Measures would include fixing turbidity barriers, moving barriers, adding additional barriers or slowing the activity. If measures do not seem to work well, the activity will have to stop everything water quality readings exceed 3NTU.

REPORTING OF DATA

In the event of any emergency or noted increase in any of the water quality parameters above the allowable limit, the Contractor, Owner, DPNR, DEP, COE, and NMFS will be immediately notified by e-mail or by hand delivery. Weekly water quality reports will be delivered to the agencies. A report will be filed after the completion of all work summarizing any impacts noted.

MITIGATION PLAN FOR
CONSTRUCTION OF GEOTUBES
GREAT BAY, ST. THOMAS, U. S. VIRGIN ISLANDS
ST. THOMAS, U.S. VIRGIN ISLANDS

PREPARED BY

BIOIMPACT, INC
P.O. BOX 132 KINGSHILL
ST. CROIX, U.S. VIRGIN ISLANDS

FEBRUARY 2022

TABLE OF CONTENTS

This plan follows the compensatory mitigation guidelines as set forth in 40 CFR Part 230, Compensatory Mitigation for Loses of Aquatic Resources: Final Rule. The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to the waters of the United States authorized by DA permits.

I. INTRODUCTION

The following is the proposed minimization and compensatory mitigation program for the installation of geotubes off the Ritz-Carlton Club, St. Thomas, U.S. Virgin Islands. To stem this loss and to accelerate the accreting of sand along the shoreline, The Club is proposing the placement of Geotubes® ("geotubes") offshore parallel to the shoreline to effectively stop the loss of sand into deeper water. Geotubes are proposed parallel to the offshore in approximately 5ft of water. Eleven geotubes 51' in length, 9' wide, 22' in circumference, and 4ft in height will be placed offshore. These all have 27' wide scour aprons between 55' – 70' in length. These will be placed parallel to the shoreline 40 to 60ft offshore. The geotextile scour aprons are attached to the seafloor with post that will be driven into the seafloor to hold them in place during filling.

Based on the benthic survey, there will impact to benthic resources as a result of the installation of geotubes. There are no corals or ESA coral critical habitat or hardbottom within the footprint of the geotubes. There is dense coverage of *T. testudinum* in the shallow nearshore areas of survey area which will be affected by geotube installation. The eleven geotubes will affect approximately15,390 square feet (0.14 ha – 0.346ac) of seagrass. It is estimated that 90% of this seagrass is *Thalassia testudinum*, and 10% is composed of both *S. filiforme* and invasive *H. stipulacea.* Approximately ½ or 0.07 ha or 0.173 ac of seagrass is not mixed with *H. Stipulacea* and will be transplanted.

II. OBJECTIVES

The objective of this mitigation plan is to minimize the impact of the geotube installation and to compensate for unavoidable impacts.

III. SITE SELECTION

The plan proposes to transplant the seagrasses into blowouts and scars to the east of the beach which were partially created by the passage of the 2017 hurricanes. The site is in the immediate vicinity and the transplant would serve to restore the seagrass bed which serve as habitat for both fish and invertebrates. Figure 1 shows the location of the proposed recipient site.

Figure 1. Location of transplant site shown by the red box, the approximate location of the geotubes is shown.

The proposed seagrass recipient site is scattered *Thalassia testudinum* beds with interspersed *Syringodium filiforme*. Any *Halophila stipulacea* within the area will be culled.

IV. SITE PROTECTION INSTRUMENT

No work would be allowed without a permit from the Department of Planning and Natural Resources and the U.S. Army Corps of Engineers.

V. BASELINE INFORMATION

GENERAL

The Ritz Carlton proposes to install geotubes, or geotextile bags, along the shoreline to the Ritz Carlton club beach in Great Bay, St. Thomas. Geotubes are commonly used in shoreline erosion control for coastal protection, dewatering of dredge spoils, and for flood control, among other applications. The Ritz Carlton club beach has experienced continued erosion, exacerbated by sargassum removal along the beach. The Ritz Carlton has conducted a trial utilizing sargassum barriers to redirect the flow or sargassum, and is asking as a part of this application to install them in the future when needed and proposes to install geotubes to prevent further shoreline erosion caused by hurricane and storm events. Geotubes have been utilized in over 50 countries, including in the Dominican Republic and Mexico.

A trail conducted in 2021 showed that the sargassum can be directed successfully into one corner of the beach. It was also found that the barrier angle may need to shift due to wave approach to best accomplish the movement of the sargassum along the barriers. The Club is therefore requesting permission to install up to 750ft of boom offshore and up to 75ft of barrier as a "catch" barrier to prevent sargassum from moving back along the beach. The barrier in stalled will be the Smooth Blue beach bouncer barrier which as a 24" skirt to prevent sargassum from moving below the barrier. The barrier would be installed utilizing screw anchors and would utilize floating lines. Screw anchors would be installed every 25ft, and pair anchors will be used to minimize wave impacts. The Club would like permission to install up to sixty-five (65) 3' screw anchors to allow for adjustment of the angle as necessary. A quick release has been designed into the barriers, so they maybe rapidly removed or deployed. The screw anchors will remain in place year-round, but the barriers would only be deployed as necessary to prevent sargassum inundation on the beach.

A Google Earth aerial caught an excellent picture of the sargassum barriers while they were deployed during the trial.


Figure 1. Google Earth September 2021

Geotubes are proposed parallel to the offshore in approximately 5ft of water. Eleven geotubes 51' in length, 9' wide, 22' in circumference, and 4ft in height will be placed offshore. These all have 27' wide scour aprons between 55' – 70' in length. These will be placed parallel to the shoreline 40 to 60ft offshore. The geotextile scour aprons are attached to the seafloor with post that will be driven into the seafloor to hold them in place during filling.

Benthic Habitat Description

General

The Ritz Carlton is located in Great Bay, St. Thomas. Great Bay is located on the east end of St. Thomas and is an eastern facing bay. Because it is eastern-facing, Great Bay experiences high wind energy and is susceptible to large influxes of Sargassum. The deep embayment has two sandy beaches surrounding a rock promontory. There are coral colonized hard bottoms which line both the northern and southern sides of the bay. Offshore bay supports seagrass beds composed of *Thalassia testudinum, Syringodium filiforme, Halodule beaudettei, Halophila decipiens* and more recently *Halophila stipulacea*. There are ESA listed coral species which occur on the reefs that fringe each side of the bay and the rocky promontory. The Ritz-Carlton Club beach is approximately 850 feet long and is separated from the Ritz-Carlton Hotel beach to the south by a rocky point.

The NOAA NOS Benthic habitat map depicts the rocky promontory to the south of the sandy beach as reef colonized bedrock nearshore and then reef colonized pavement with channels further offshore grading into seagrass 10 to 30% colonization. This is fairly accurate description of the benthic habitats within the area. The NOAA NOS map follows.

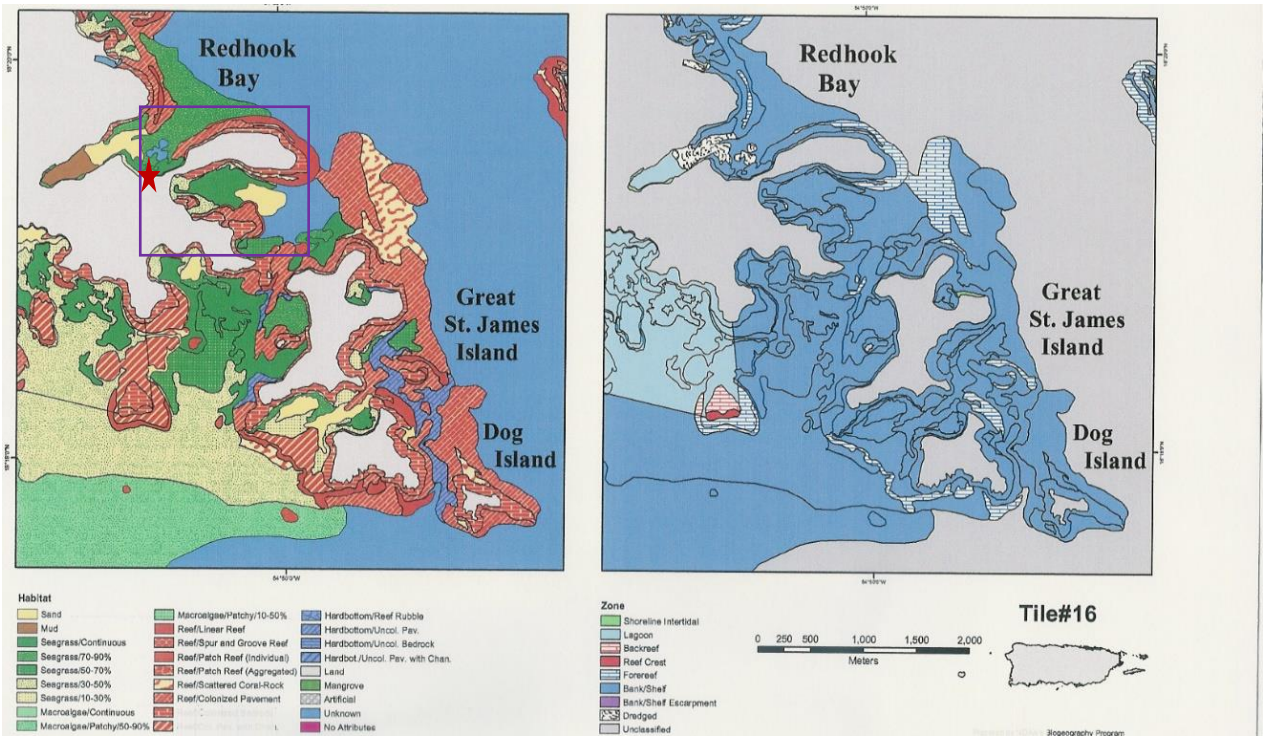


Figure 2. NOS Benthic Habitat Map Tile 16. Great Bay is shown within the blue box, and the project site is indicated by the red star.

METHODS

In December 2021 and January 2022 divers conducted roving benthic surveys within the survey area in Great Bay to locate and identify benthic resources within the survey site. Benthic substrate, presence/absence of corals, and the locations of seagrass beds were recorded. A Garmin GPSMAP 78 handheld marine GPS device was used to mark the location of seagrass boundaries as well as to mark the locations of coral species listed as endangered in the Endangered Species Act (ESA) of 1973. Photos and videos were taken to document the benthic survey.

Figure 3. Benthic Survey Area: Great Bay, St. Thomas

FINDINGS

The survey site is a 7.42-hectare area located within Great Bay, St. Thomas. The survey area contains both soft and hard bottom areas with colonization of corals and seagrass. Soft bottom areas within the survey site are mostly colonized by *Thalassia testudinum* (turtle grass). There is also colonization by *Syringodium filiforme* (eel grass) and *Halophila stipulacea* (invasive seagrass). Shallow areas (< 15 feet) are primarily colonized by *T. testudinum* and *S. filiforme*, while the deeper areas (> 15 feet) contain *H. stipulacea* interspersed with *T. testudinum.* There are some sand patches within and around seagrass colonization. Hard bottom areas include consolidated hardbottom near the shoreline and patchy boulder reefs.

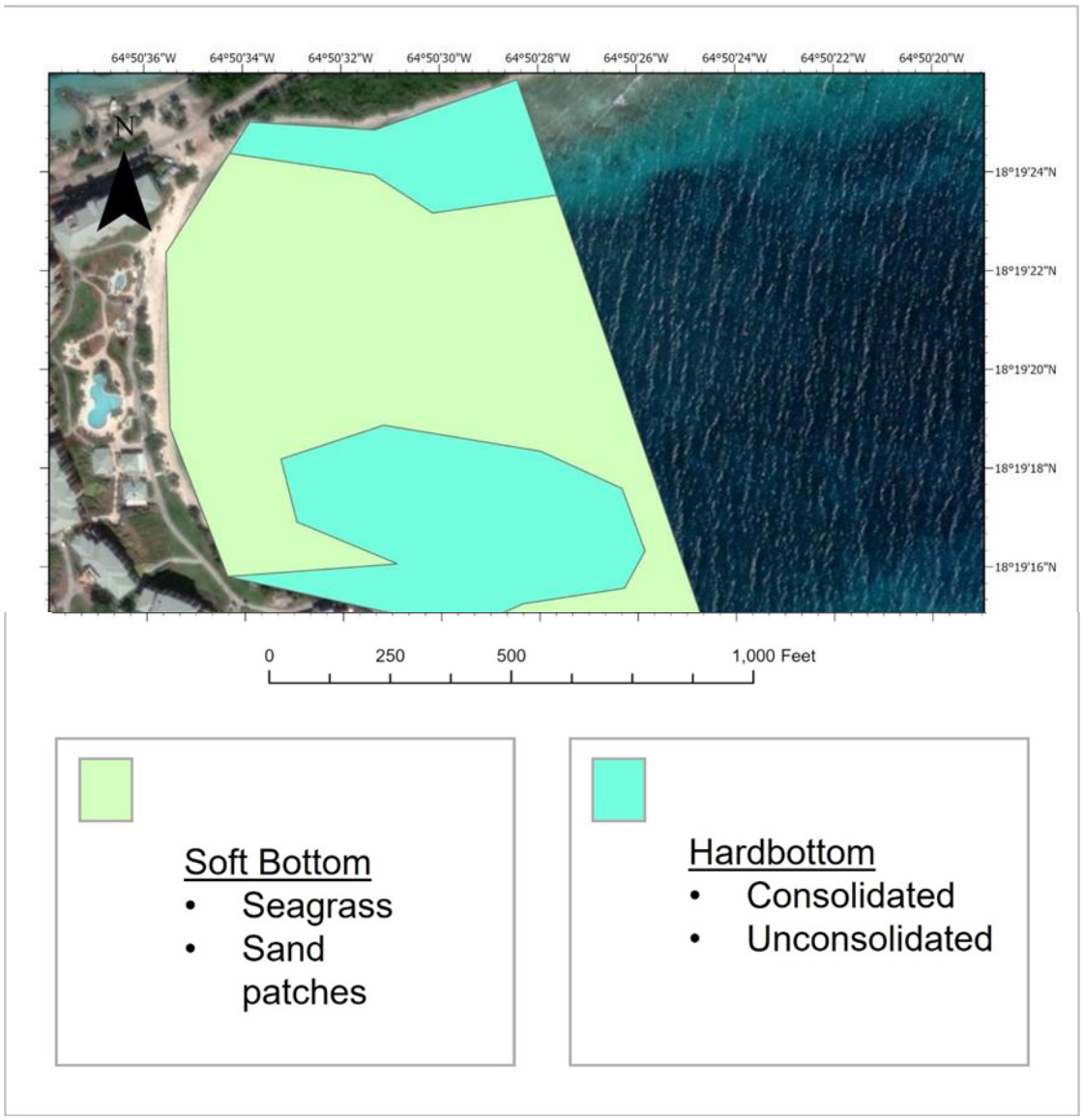


Figure 4. Hard and Soft Bottom Habitats identified in Benthic Survey: Great Bay, St. Thomas

Sixty three ESA corals from five species were identified in the survey area. *Acropora palmata* (Elkhorn coral) and *Acropora prolifera* (Elkhorn/Staghorn hybrid) were seen in some of the shallow portions of the

study site while *Orbicella annularis*, *Orbicella faveolata,* and *Orbicella franksii* in both shallow and deeper reefs within the study site. Corals were concentrated over hard bottom areas, particularly on the reef located to the south of the Club beach and on the reef to the north of the Club beach.

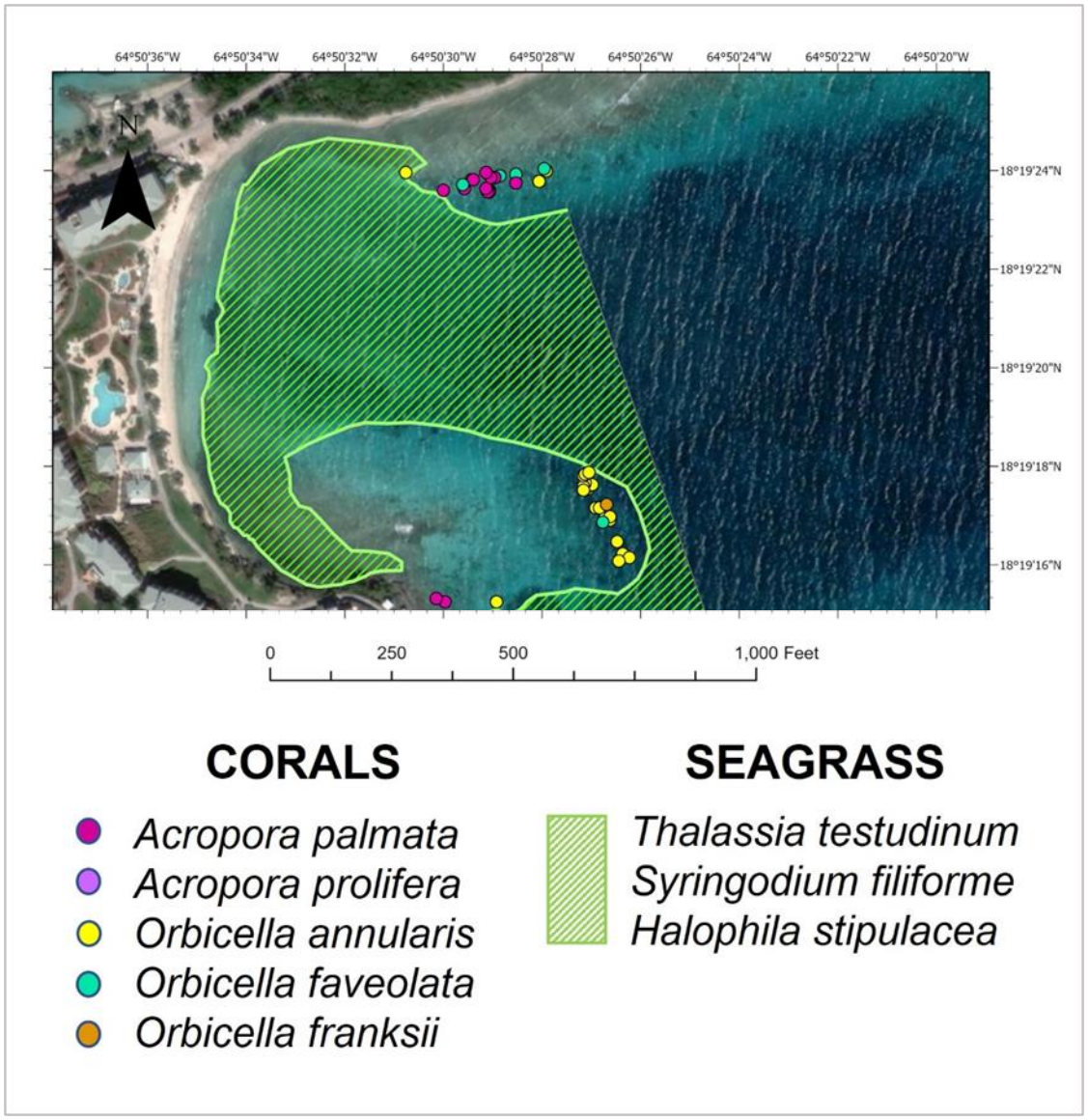
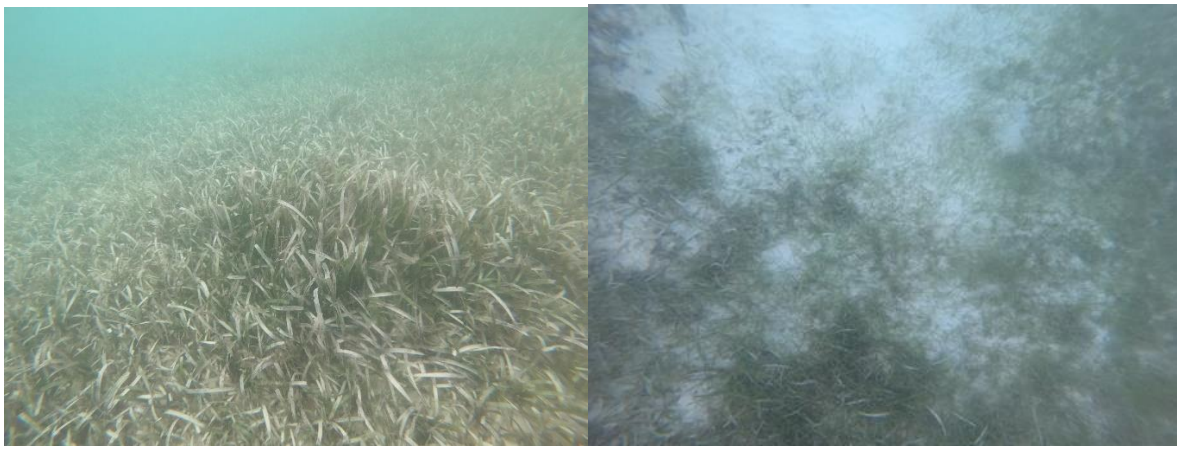


Figure 5. ESA-listed corals and seagrasses identified in Benthic Survey: Great Bay, St. Thomas

Other corals and algae also are present within the study site. Non-endangered corals such as *Siderastrea siderea, Porites porites, Porites astreoides, Pseudodiploria strigosa,* and *Pseudodiplora clivosa.* Algae species were identified within the seagrass and among the hard bottom areas. *Halimeda monile*, *Udotea* spp., *Caulerpa spp.,* and *Turbinaria spp.* were found among the seagrass and several species of *Dictyota* were found among the hard bottom and coral reef areas.

One ESA listed fish species was found within the study area. A small (~35 cm) Nassau grouper was seen on the deeper reef to the south of the Club beach.

BENTHIC SURVEY PHOTOS



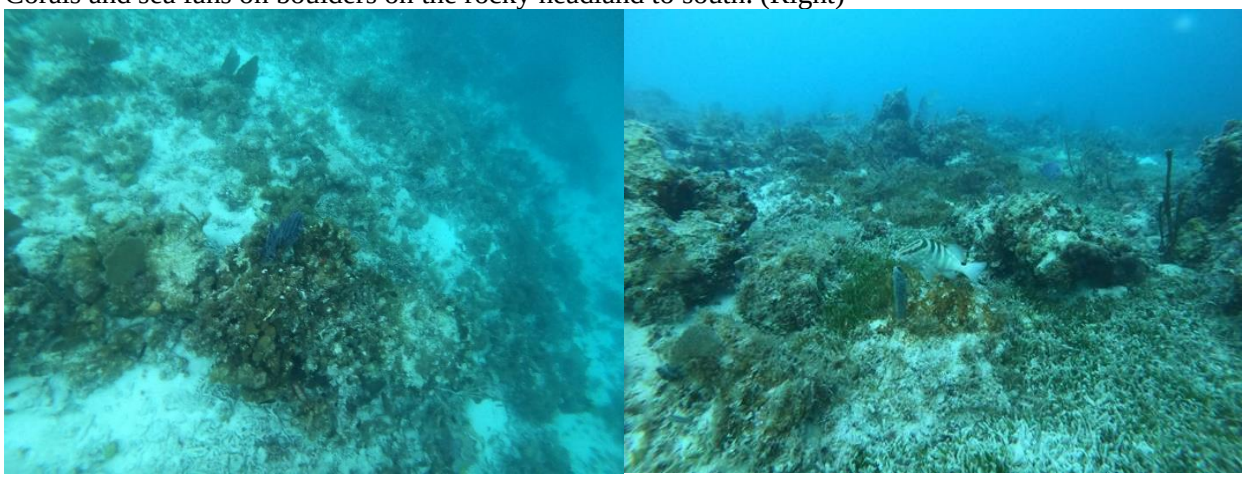
Thalassia testudinum (Turtle grass)(Left) - *Thalassia testudinum* (Turtle grass) and *Syringodium filiforme* (eel grass)(Right)

Orbicella annularis in seagrass (*T. testudinum* -north)(Left) - *T. testudinum* (Turtle grass) in shallows near the Club beach (Right)

Patches of *H. stipulacea* (invasive seagrass) within *T. testudinum* (Turtle grass) (Left) -
S. filiforme (Eel grass) near southern shoreline on Ritz Club beach (Right)

Acropora palmata colonies along the northern reef edge (Left) - *Porites porites* mound along northern reef edge (Right)

Acropora palmata and other corals in shallow water by RO intake pipe to south of the Club Beach (Left) - Corals and sea fans on boulders on the rocky headland to south. (Right)



Large *O. annularis* colony on deeper reef (~25 feet) between the two beaches (Left) - Nassau Grouper on deep reef south of the Club

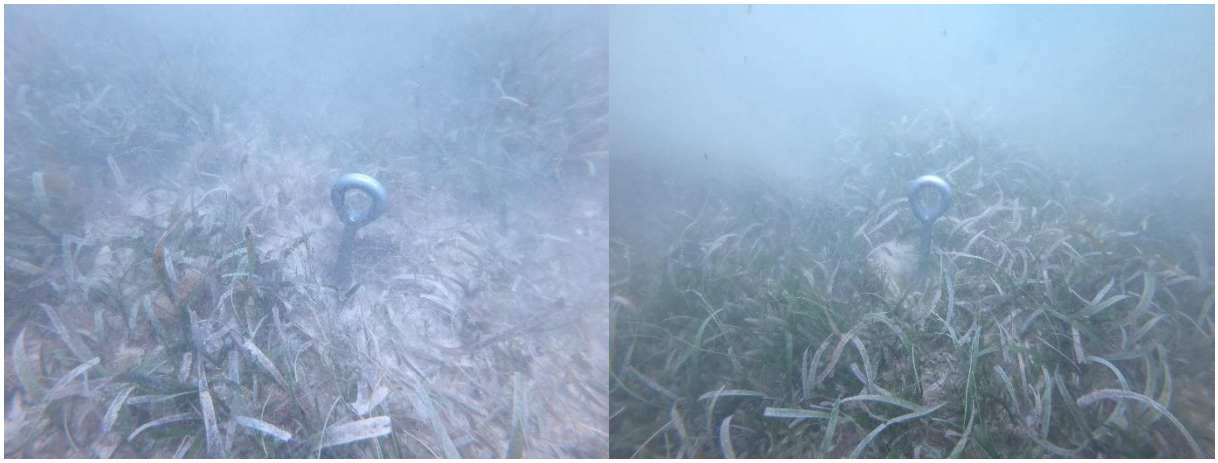
Table 1 List of Endangered Species off the Ritz Club Area

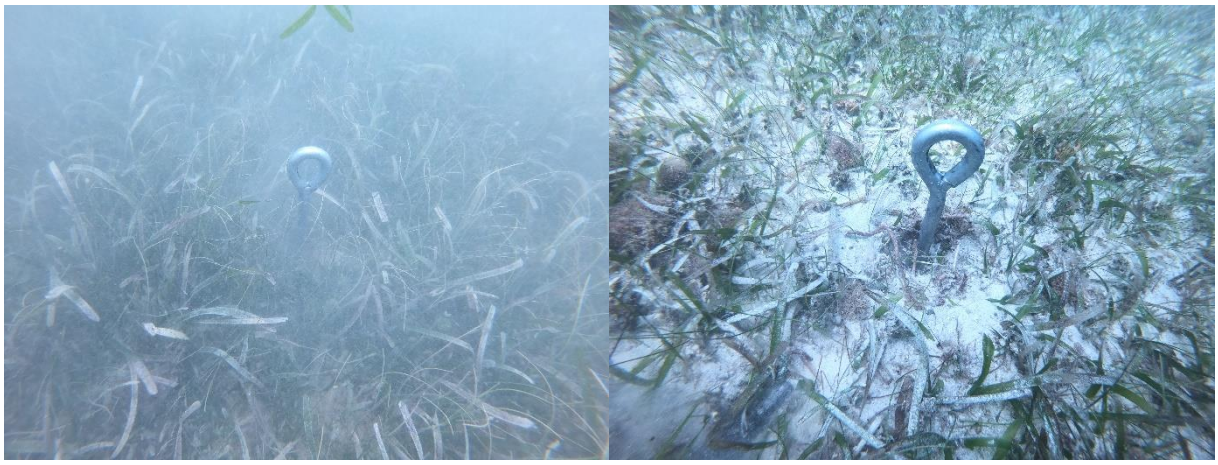
ID	Species	Lat	Lon	Length (ft)	Width (ft)
1	Orbicella faveolata	18.32330	-64.84127	1.5	1.0
2	Orbicella annularis	18.32327	-64.84113	1.0	1.0
3	Orbicella annularis	18.32327	-64.84113	1.0	1.0
4	Orbicella annularis	18.32333	-64.84109	2.0	1.5
5	Orbicella faveolata	18.32334	-64.84110	2.0	1.5
6	Orbicella faveolata	18.32331	-64.84126	1.5	1.0
7	Acropora palmata	18.32326	-64.84126	2.0	1.5
8	Orbicella faveolata	18.32330	-64.84135	1.5	1.0
9	Acropora palmata	18.32329	-64.84138	2.5	1.0
10	Acropora palmata	18.32329	-64.84140	4.0	1.5
11	Acropora palmata	18.32322	-64.84141	0.5	0.5
12	Acropora palmata	18.32322	-64.84141	0.5	0.5
13	Acropora palmata	18.32322	-64.84141	0.5	0.5
14	Acropora palmata	18.32322	-64.84141	1.0	0.5
15	Acropora prolifera	18.32321	-64.84141	0.5	0.5
16	Acropora prolifera	18.32321	-64.84141	0.5	0.5
17	Acropora prolifera	18.32321	-64.84141	0.5	0.5
18	Acropora palmata	18.32321	-64.84141	1.0	0.5
19	Acropora palmata	18.32321	-64.84142	1.0	1.0
20	Acropora palmata	18.32321	-64.84142	0.5	0.5
21	Acropora palmata	18.32321	-64.84142	1.0	0.5
22	Acropora palmata	18.32323	-64.84143	1.0	1.0
23	Acropora palmata	18.32323	-64.84143	1.5	1.0
24	Acropora palmata	18.32323	-64.84143	1.0	0.5
25	Acropora palmata	18.32332	-64.84143	1.5	1.0
26	Acropora palmata	18.32328	-64.84151	3.0	1.5
27	Acropora palmata	18.32328	-64.84150	1.5	1.0
28	Acropora palmata	18.32323	-64.84155	1.5	1.0
29	Orbicella annularis	18.32325	-64.84156	0.5	0.5
30	Orbicella faveolata	18.32325	-64.84156	1.0	0.5
31	Acropora palmata	18.32322	-64.84167	0.5	0.5
32	Orbicella annularis	18.32332	-64.84188	2.0	1.0
33	Orbicella annularis	18.31999	-64.84000	0.5	0.5
34	Acropora palmata	18.32090	-64.84166	3.5	2.0
35	Acropora palmata	18.32092	-64.84171	3.0	2.5
36	Orbicella annularis	18.32077	64.84153	2.0	1.5
37	Orbicella annularis	18.32090	-64.84137	0.5	0.5
38	Orbicella annularis	18.32117	-64.84066	2.5	2.0
39	Orbicella annularis	18.32115	-64.84062	1.5	1.0
40	Orbicella annularis	18.32113	-64.84068	2.0	2.0
41	Orbicella annularis	18.32124	-64.84069	1.0	1.0

42	Orbicella annularis	18.32137	-64.84076	2.0	2.0
43	Orbicella annularis	18.32136	-64.84073	2.0	1.5
44	Orbicella annularis	18.32138	-64.84073	1.5	1.5
45	Orbicella faveolata	18.32135	-64.84077	1.0	0.5
46	Orbicella annularis	18.32143	-64.84081	1.0	1.0
47	Orbicella annularis	18.32143	-64.84079	3.0	1.5
48	Orbicella faveolata	18.32145	-64.84075	1.5	1.0
49	Orbicella franksi	18.32145	-64.84075	0.5	0.5
50	Orbicella annularis	18.32155	-64.84087	4.0	2.5
51	Orbicella annularis	18.32153	-64.84087	2.5	2.5
52	Orbicella annularis	18.32154	-64.84085	2.5	2.0
53	Orbicella annularis	18.32155	-64.84085	2.0	1.5
54	Orbicella annularis	18.32156	-64.84087	2.5	1.5
55	Orbicella annularis	18.32157	-64.84088	2.0	1.5
56	Orbicella annularis	18.32155	-64.84088	3.0	2.5
57	Orbicella annularis	18.32156	-64.84083	2.5	2.5
58	Orbicella annularis	18.32157	-64.84087	2.5	1.0
59	Orbicella annularis	18.32155	-64.84088	2.0	1.0
60	Orbicella annularis	18.32153	-64.84088	1.5	1.0
61	Orbicella annularis	18.32161	-64.84088	2.5	1.5
62	Orbicella annularis	18.32162	-64.84087	3.5	3.0
63	Orbicella annularis	18.32163	-64.84085	2.0	2.0

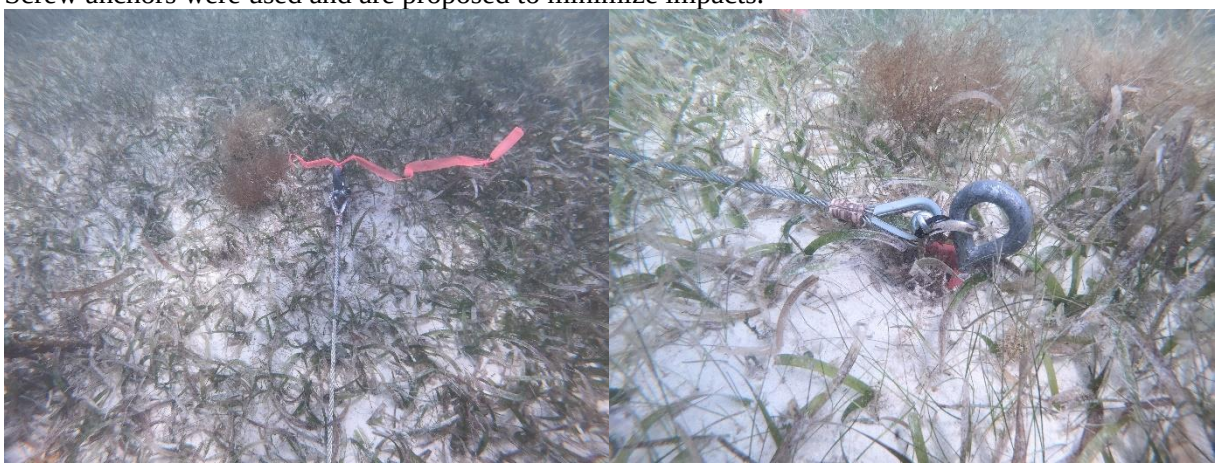
IMPACT OF INSTALLATION OF SARGASSUM BARRIERS AND GEOTUBES

The installation of the sargassum barriers should have a negligible impact on the offshore seagrass beds. No impacts to these beds were noted during the trial.





Screw anchors were used and are proposed to minimize impacts.



Elastec's proposed anchor placements were well out from the curtains which resulted in the cables being close to the bottom near the anchors. During the trials it was found that shifting to the floated lines proved a better installation method not only to protect the seagrasses but for ease of installation.

By stopping the buildup of sargassum on the shoreline it may prevent impact to shallow seagrass along the shoreline which is smothered and scoured when the floating sargassum builds up along the shoreline and sinks.

Based on the benthic survey, there will impact to benthic resources as a result of the installation of geotubes. There are no corals or ESA coral critical habitat or hardbottom within the footprint of the geotubes. There is dense coverage of *T. testudinum* in the shallow nearshore areas of survey area which will be affected by geotube installation. The eleven geotubes will affect approximately15,390 square feet (0.14 ha – 0.346ac) of seagrass. It is estimated that 90% of this seagrass is *Thalassia testudinum*, and 10% is composed of both *S. filiforme* and invasive *H. stipulacea.* Approximately ½ or 0.07 ha or 0.173 ac of seagrass is not mixed with *H. Stipulacea* and will be transplanted.

The geotubes will result in the buildup of sand near shore but this will be a slow enough process for the seagrass to survive the buildup.

VI. MITIGATION WORK PLAN

Prior to the start of the geotube footprints will be marked by GPS. *Thalassia* and *Syringodium* will then be collected by divers from each geotube footprint in large sod units using trowels to cut completely through the root mass, the ideal unit size is approximately 1 sq. ft. and 8"-10" in depth. The sod units will be place in underwater binds and carried to the recipient site. During collection

divers will also collect starfish, conch and any other non-sessile marine animal which might not be able to get out of the piling footprint when activity begins.

A small depression will be made for each sod unit and once fitted in place the excavated sand will be filled back in around the unit, sea grass staples will be placed in each unit to assist in stability. The units will be placed starting at the leading edge of the blow out working towards the trailing edge. The units will be placed in as close of proximity to assist in stability of the new bed. All seagrass will be planted the same day it is removed.

Any *Halophila stipulacea* within the recipient site will be culled. Culling of *Halophila* will continue throughout the monitoring of the transplant area.

Compensatory Mitigation

To compensate for unavoidable impacts a minimum of 1000ft^2 of debris within Great Bay will be collected and properly disposed of.

VII. MAINTENANCE PLAN

Once the transplant is completed, the recipient site will be surveyed on a bimonthly basis for a period of two months. If seagrass have become uprooted, they will be re-buried and additional seagrass staples added as necessary. After the first 2 months, the recipient site will be monitored monthly for the remainder of the first year.

VIII. ECOLOGICAL PERFORMANCE STANDARDS

The object of this mitigation is to minimize impact to benthic resources which provide high quality habitat to marine species. In order to objectively evaluate the mitigation project, ecological performance standards must be established. The performance standards will include viability of the transplanted seagrass.

It is the intent of the seagrass transplanting program to meet a minimum of 85% survival of the transplanted seagrass. The Guidance on Surveys for Submerged Aquatic Vegetation Compensatory Mitigation Projects 2020 states objective of mitigation is to achieve viable and sustainable ecological and hydrological functions like those that were provided by the impacted SAV community.

The applicant is committed to put forth the greatest effort to see that the relocation is successful and that they obtain the greatest potential survival of transplanted seagrass.

IX. MONITORING REQUIREMENTS

Monitoring the compensatory mitigation project site is necessary to determine if the project is meeting its performance standards, and to determine if adaptive measures are necessary to ensure that the project does meet its objectives.

Immediately following the seagrass planting, the number and spacing of the planting units transplanted to the mitigation site shall be reported to document planting was completed in compliance with the mitigation plan and an As-built Report will be prepared. One month after

the completion of the transplant a report will be prepared documenting the condition of the transplant area which includes assessment of the survival and coverage area of the planting. For the following 4 years Annual Reports will be prepared which include a visual assessment of site conditions, line intercept surveys along transects and the collection of quantitative data on the cover-abundance of SAV in quadrats The mitigation site will be surveyed annually for at least five years. If success has not been achieved by year 5, but success appears imminent, then annual monitoring shall continue until the mitigation site achieves success criteria. If it does not appear that the transplant will meet the success criteria, the agencies will be notified, and additional compensatory mitigation determined.

To document the cleanup a report will be prepared showing the debris and the cleared footprints from which the material was removed.

X. ADAPTIVE MANAGEMENT PLAN

If there are difficulties with the mitigation or if the mitigation is deemed unsuccessful as planned, the applicant is prepared to take additional steps to see that compensatory mitigation goal is achieved. If necessary, extended monitoring and maintenance or marking of the site will be undertaken in order to meet the mitigation goal.

XI. FINANCIAL ASSURANCES

The applicant is committed to conduct this minimization and compensative mitigation plan and will guarantee that the mitigation plan, maintenance, and monitoring will occur as proposed. The applicant will secure a performance bond or some other type of financial guarantee that is accessible to the U.S. Army Corps of Engineers in the amount necessary to complete the transplant and required monitoring. The bond will be prepared following the guidance set forth in the U.S. Army Corps of Engineers Regulatory Guidance Letter No. 05-1 dated 14 February 2005 SUBJECT: Guidance on the Use of Financial Assurances, and Suggested Language for Special Conditions for Department of the Army Permits Requiring Performance Bonds.

SARGASSUM BARRIER INCLEMENT WEATHER PLAN

The installation of sargassum diversions barriers is being proposed the Ritz-Carlton Club. A trail conducted in 2021 showed that the sargassum can be directed successfully into one corner of the beach. It was also found that the barrier angle may need to shift due to wave approach to best accomplish the movement of the sargassum along the barriers. The Club is therefore requesting permission to install up to 750ft of boom offshore and up to 75ft of barrier as a "catch" barrier to prevent sargassum from moving back along the beach to the south. The barrier proposed to be installed will be the Smooth Blue beach bouncer barrier which has a 24" skirt to prevent sargassum from moving below the barrier. The barrier would be installed utilizing 3ft screw anchors and secured by floating lines. Screw anchors would be installed every 25ft, paired anchors will be used to minimize wave impacts. The Club has request permission to install up to sixty-five (65) 3' screw anchors to allow for adjustment of the angle as necessary. Quick releases will be installed on barriers, so they maybe rapidly removed or deployed. The screw anchors will remain in place year-round, but the barriers would only be deployed as necessary to prevent sargassum inundation on the beach.

One of the issues investigated was the ease of deployment and removal. As we are well aware in the Virgin Islands storms frequently occur and often with little warning therefore it is critical that the barriers can be removed and redeployed in an fast efficient process.

During the trial, it became evident that the heavy shackle, wire cable installation and removal method was not easy and was difficult to deploy and remove. A much easier plan of quick release clips and floating lines was found to be easy to install and easy to remove.

Locking carabiner clips will be used to attach to anchors and to the barriers themselves. These can be quickly attached or released.

INCLEMENT WEATHER

STANDARD OPERATING PROCEDURE

Two days prior to anticipated arrival of a tropical storm or hurricane, divers will begin the removal process. Sections will be unclipped and pull ashore. Quick inspections will be made as the barrier come ashore but the repair and maintenance which occurs during normal removal procedures will not be undertaken and the removal of the barriers will be of utmost importance. Based on the experience during the previous removal it should take no more than 1 day to remove the barriers and a day buffer is proposed to ensure adequate time.

POST STORM

Divers will survey the screw anchors ensuring that no damage has occurred. Barriers will be inspected and cleaned as they are redeployed repairing and replacing worn and damaged parts.

SARGASSUM BARRIER MONITORING AND MAINTENANCE PLAN

The installation of sargassum diversions barriers is being proposed the Ritz-Carlton Club. A trail conducted in 2021 showed that the sargassum can be directed successfully into one corner of the beach. It was also found that the barrier angle may need to shift due to wave approach to best accomplish the movement of the sargassum along the barriers. The Club is therefore requesting permission to install up to 750ft of boom offshore and up to 75ft of barrier as a "catch" barrier to prevent sargassum from moving back along the beach to the south. The barrier proposed to be installed will be the Smooth Blue beach bouncer barrier which has a 24" skirt to prevent sargassum from moving below the barrier. The barrier would be installed utilizing 3ft screw anchors and secured by floating lines. Screw anchors would be installed every 25ft, paired anchors will be used to minimize wave impacts. The Club has request permission to install up to sixty-five (65) 3' screw anchors to allow for adjustment of the angle as necessary. Quick releases will be installed on barriers, so they maybe rapidly removed or deployed. The screw anchors will remain in place year-round, but the barriers would only be deployed as necessary to prevent sargassum inundation on the beach.

MONITORING AND MAINTENANCE PLAN

Prior to deployment of the barriers divers will swim and mark the screw anchors to which the barriers will be attached to facilitate deployment. All barriers, ropes and connectors will be check prior to deployment. As barriers are pulled offshore connections will be checked and fixed as they are pulled out. Once installed a survey will be made to ensure all ropes are off the seafloor and no components are dragging.

During the trial it was noted that algal growth appeared on the barriers within a two-week period. To minimize growth on the barriers a snorkeler will swim the barriers on a weekly basis to wipe the barriers down and prevent the build up of algal and growth on the barriers. Every two weeks a diver will wipe the lines and fittings to minimize growth and to facilitate removal when the barriers are taken in.

Once the threat of sargassum has past the barriers will be disconnected and pulled to shore. All components will be checked and cleaned, and any worn or damaged parts will be replaced prior to storage. Barriers will be power washed and dried before storage in a container until need again.

Vessel Strike Avoidance Measures and Reporting for Mariners NOAA Fisheries Service, Southeast Region

Background

The National Marine Fisheries Service (NMFS) has determined that collisions with vessels can injure or kill protected species (e.g., endangered and threatened species, and marine mammals). The following standard measures should be implemented to reduce the risk associated with vessel strikes or disturbance of these protected species to discountable levels. NMFS should be contacted to identify any additional conservation and recovery issues of concern, and to assist in the development of measures that may be necessary.

Protected Species Identification Training

Vessel crews should use an Atlantic and Gulf of Mexico reference guide that helps identify protected species that might be encountered in U.S. waters of the Atlantic Ocean, including the Caribbean Sea, and Gulf of Mexico. Additional training should be provided regarding information and resources available regarding federal laws and regulations for protected species, ship strike information, critical habitat, migratory routes and seasonal abundance, and recent sightings of protected species.

Vessel Strike Avoidance

In order to avoid causing injury or death to marine mammals and sea turtles the following measures should be taken when consistent with safe navigation:

1. Vessel operators and crews should maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species.

2. When whales are sighted, maintain a distance of 100 yards or greater between the whale and the vessel.

3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.

4. When small cetaceans are sighted while a vessel is underway (e.g., bow-riding), attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

5. Reduce vessel speed to 10 knots or less when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity; therefore, prudent precautionary measures should always be exercised. The vessel should attempt to route around the animals, maintaining a minimum distance of 100 yards whenever possible.

6. Whales may surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel and when safety permits, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

Additional Requirements for the North Atlantic Right Whale

1. If a sighted whale is believed to be a North Atlantic right whale, federal regulation requires a minimum distance of 500 yards be maintained from the animal (50 CFR 224.103 (c)).

2. Vessels entering North Atlantic right whale critical habitat are required to report into the Mandatory Ship Reporting System.

3. Mariners should check with various communication media for general information regarding avoiding ship strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, and Notices to Mariners. Commercial mariners calling on United States ports should view the most recent version of the NOAA/USCG produced training CD entitled "A Prudent Mariner's Guide to Right Whale Protection" (contact the NMFS Southeast Region, Protected Resources Division for more information regarding the CD).

4. Injured, dead, or entangled right whales should be immediately reported to the U.S. Coast Guard via VHF Channel 16.

Injured or Dead Protected Species Reporting

Vessel crews should report sightings of any injured or dead protected species immediately, regardless of whether the injury or death is caused by your vessel.

Report marine mammals to the Southeast U.S. Stranding Hotline: 877-433-8299
Report sea turtles to the NMFS Southeast Regional Office: 727-824-5312

If the injury or death of a marine mammal was caused by a collision with your vessel, responsible parties should remain available to assist the respective salvage and stranding network as needed. NMFS' Southeast Regional Office should be immediately notified of the strike by email (takereport.nmfsser@noaa.gov) using the attached vessel strike reporting form.

For additional information, please contact the Protected Resources Division at:

NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
Tel: (727) 824-5312
Visit us on the web at http://sero.nmfs.noaa.gov

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
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