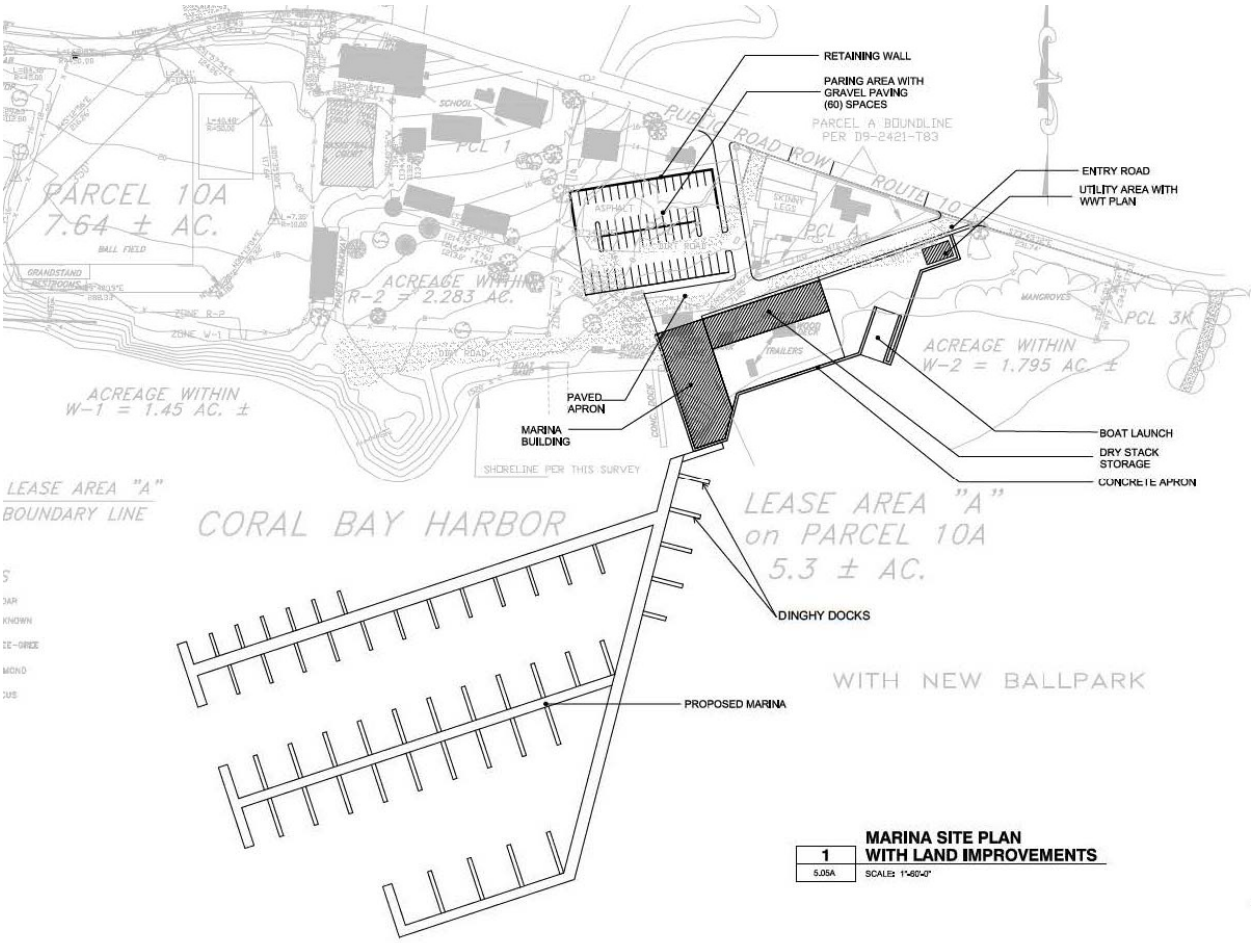
Environmental Assessment Report
For
Sirius Marina
Lease Area "A" – Parcel 10A, Estate Emmaus
St. John, USVI



CZM Application
June, 2015
By
T-Rex St. John LLC & Moravian Church VI Conference

Prepared by
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1.00 NAME AND ADDRESS OF APPLICANT

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T-Rex St. John, LLC will be the developmental entity and responsible for financing and managing the construction and operation of the Marina.

2.00 LOCATION OF PROJECT

The proposed Sirius Marina.is located on a portion of Lease Area A on Parcel 10A, Estate Emmaus, No 2 Coral Bay Quarter. Parcel 10A is located at the northeast corner of Coral Bay, St. John, Virgin Islands. The land-side of the Marina is located on a 1.795 +/- acre portion of Parcel 10A and is zoned W-2 Waterfront Industrial

The proposed Marina is bounded by:

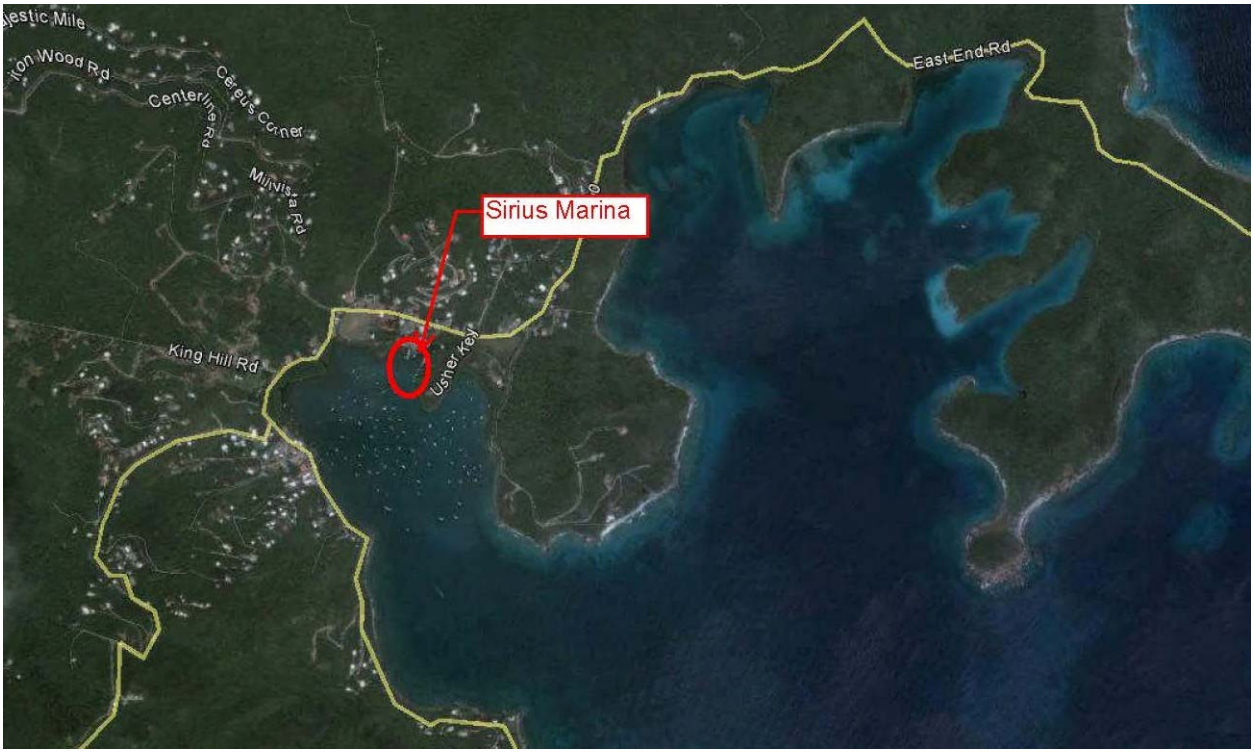
North: Estate Emmaus

East: Estate Emmaus

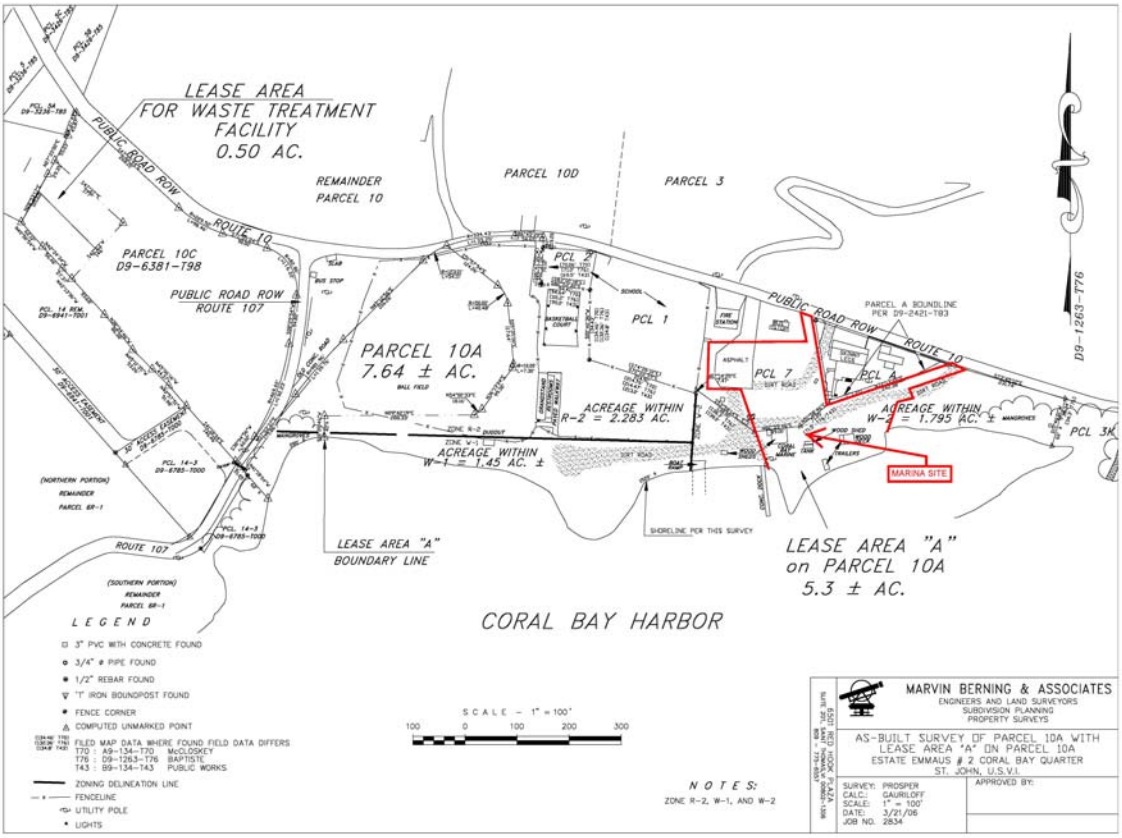
South: Coral Bay

West: Coral Bay

St. John, USVI



Location Map

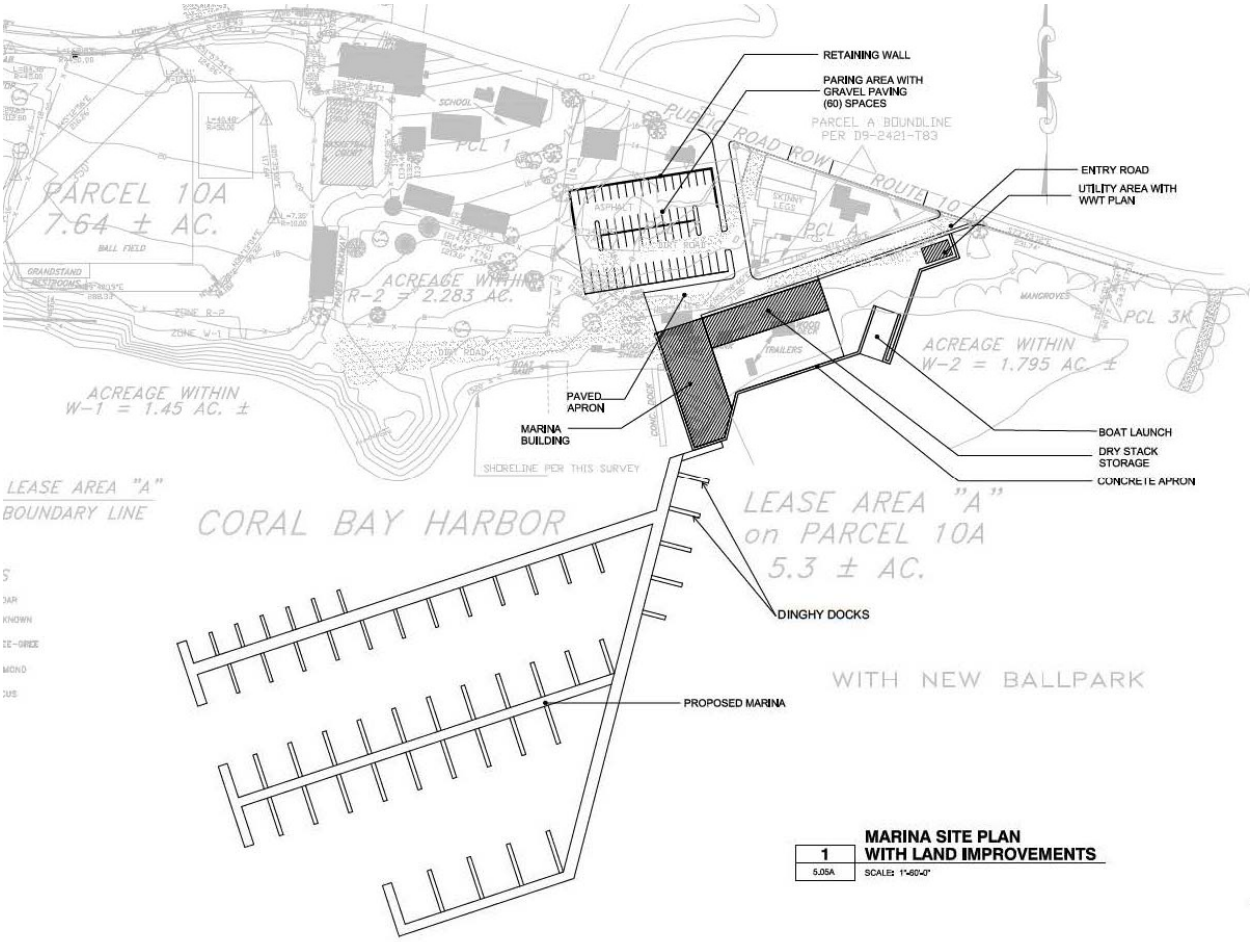


Property Map

3.00 ABSTRACT

T-Rex St. John LLC and the Moravian Church VI Conference want to develop its property in Coral Bay that is Zoned W-2, Waterfront Industrial to conform to its zoning and provide needed Marina, Dry Dock and Dry Stack storage to the Coral Bay and greater Virgin Islands communities. The property is presently underutilized.

Coral Bay has no marina and as such the Bay has many scattered private moorings, both permitted and un-permitted. The area and its residences need a well-designed marina to offer services that are not presently in Coral Bay and to improve the water quality in the Bay by offering sewerage pump-out capabilities. In addition, the general cruise industry is looking for services in southeastern St. John.



Site Plan

It is recognized that the St. John Marina has been proposed for the western side of Coral Bay and its proposed location and size has been considered during the design of the Sirius Marina. The Marina has been positioned to provide a clear 125' passage way between the two marinas.

4.00 STATEMENT OF OBJECTIVES SOUGHT BY THE PROPOSED PROJECT

The objective of the Proposed Marina is to provide boating services to the greater Coral Bay community, cruising industry and increase tourism to St. John and Coral Bay. In addition, it would provide needed financial support to the Emmaus Moravian Church and the Moravian Church VI Conference.

It is proposed that the Objective be accomplished by:

- 92 wet slips for vessels from 35 to 70 feet in length
- 30 dry storage slips for vessels under 35 feet
- Sewerage pump-out facilities
- Fuel facilities
- Use of wave-attenuation panels
- Flexibility to accommodate a few vessels up to 150 feet
- Accommodations for transient boaters and dinghies
- Retains marine service capability
- Public boat ramp and navigational channel to the bay
- Dock master building with associated retail and provisioning
- Parking

5.00 DESCRIPTION OF THE PROJECT

5.01 Summary of Proposed Activity

Major construction will consist of the marina docks, the Marina Building, Dry-stack Building, boat ramp and dingy access. An access road, parking, overflow parking area, fuel tanks, wastewater treatment plant (WWTP), brackish wells with an R/O and an emergency generator will be also be constructed.

Prior to any construction, the existing shacks, trailers and debris on the site will be removed.

Approximately 34,125 sf of bottom will be dredged to an average depth of 1.5' or 1,780 cy in the furthermost northeast corner of the project area.

5.02 Proposed Method of Construction

Construction of the docks will consist primarily of concrete or steel piles tied together with precast concrete pile caps supporting a concrete decking. Attenuation panels will be placed on the south dock. Access to the marina will be via a single controlled walkway to the fixed docks. Transit visitors and the public will be able to tie up to two dinghy docks.

The Marina Building will be constructed of reinforced concrete foundation and concrete block walls with a wood truss roof and Standing Seam Metal roofing. The Dry-stack Building will be pre-fabricated metal. The aprons and ramps will be of reinforced concrete. The access road and parking will be asphalt with the parking area of gravel. All construction will meet VI Building Code requirements.

The boat launch channel would be mechanically dredged from the channels' seaward points landward. The dredged materials will be stored on the barge and transported in trucks to Parcel 10A (LaLa Land) for final deposition. Turbidity curtains and water quality monitoring would be employed around the dredge plant during operations. Silt fencing will be installed around the spoils stockpiles on Parcel 10A.

5.03 Erosion and Sediment Control Methods

During the dredging operation, turbidity curtains will encircle the dredge and barge to minimize the spreading of suspended sediment within Coral Bay. Mechanical dredging equipment will be used. The spoils will undergo dewatering on the barge prior to hauling to Parcel 10A in watertight trucks. A Water Quality Monitoring Plan, see Section 6.05.3, has been prepared to insure there is no adverse effects on Coral Bay while dredging.

For the upland-side construction, the existing vegetative cover that is removed prior to site work will be mulched and saved for landscaping. For Parcel 10A, the existing vegetative that will be removed will be used to create a berm paralleling the silt fence that encloses the disposal area Silt fencing will be placed around all construction activities. All silt fencing will consist of metal posts, wire mesh and silt fence fabric and will be installed prior to start of ant earthwork. Upon final grading, all worked areas will be landscaped or covered with erosion control blankets and natural vegetation will be allowed to re-grow.

5.04 Construction Schedule

It is anticipated that dredging will start four months after all permits are received and dredging will be continuous until completed. Dredging time frame is estimated to be four months.

Construction of the upland facilities will start within six months of receiving all permits and is estimated to take 12 months.

5.05 Drawings: See Appendix A

Marina Layout Plan
Army Corps of Engineers Drawings

6.00 Setting and Probable Impacts on the Natural Environment

6.01 Climate and Weather

The Virgin Islands of the United States lie directly in the belt of sub-tropic easterly trade winds. The climate is maritime tropical and is characterized by generally fair weather, steady winds, and slight but regular seasonal and diurnal ranges in temperature.

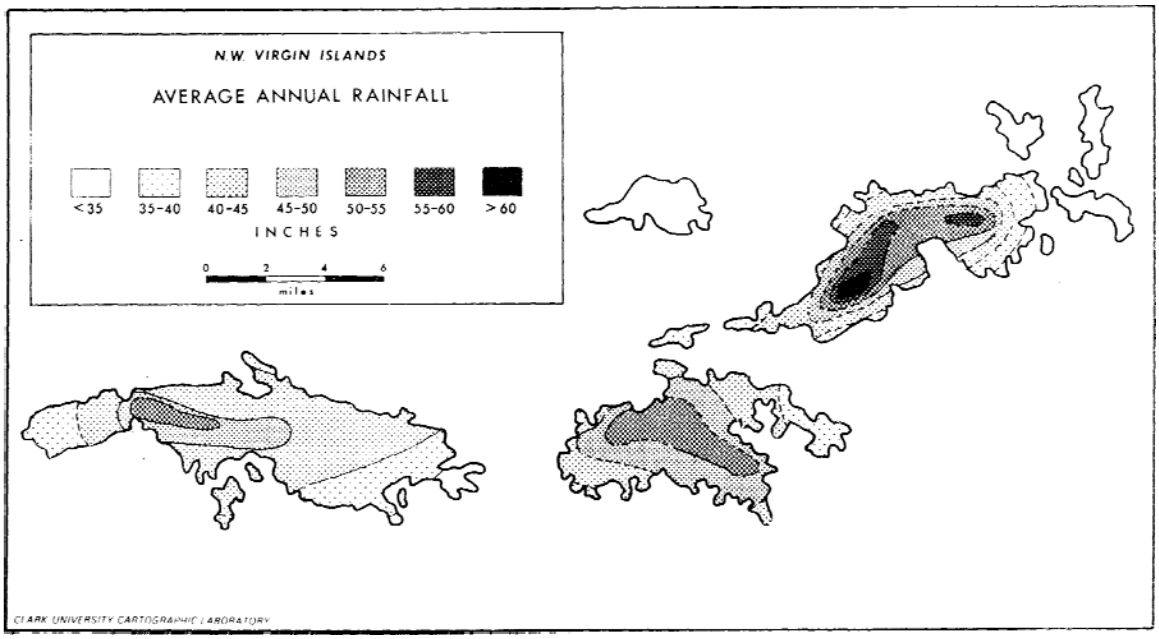
Temperatures remain relatively constant throughout the year. Temperatures normally range from 70 to 85 degrees, with a mean of 79 degrees. Highest temperatures occur in August and September, and the lowest in January or February. Seldom does the temperature drop below 70 degrees or rise far above 90 degrees.

Lying directly in the path of the trade winds, the Virgin Islands generally receive an easterly wind. According to the U.S. Naval Oceanography Office, the easterly winds range from 11 to 20 knots about 60 percent of the time. Winds above 20 knots occur more frequently in winter than in other seasons.

The islands are occasionally affected by tropical storms and hurricanes. The generally acknowledged storm season occurs from August through October, with peak activity occurring in September. At least 33 hurricanes, which have sustained winds over 74 miles per hour, have passed within 50 miles of the Virgin Islands since 1876. Hurricanes Hugo and Marylyn, 1989 and 1995, respectively, were both Category II hurricanes that struck the Virgin caused serious damage throughout the Territory.

Average annual rainfall for St. John ranges from 35” at eastern St. John to 55” at the higher elevations, with an Island average of 45 inches. The lifting of moist air over the hilly terrain is the most common cause of rainfall, causing the amount of rainfall generally to increase with elevation. The Coral Bay area has an annual rainfall of approximately 40”.

During dredging operations if weather makes the turbidity barriers ineffective the dredging will stop until the weather improves.



Rainfall Map

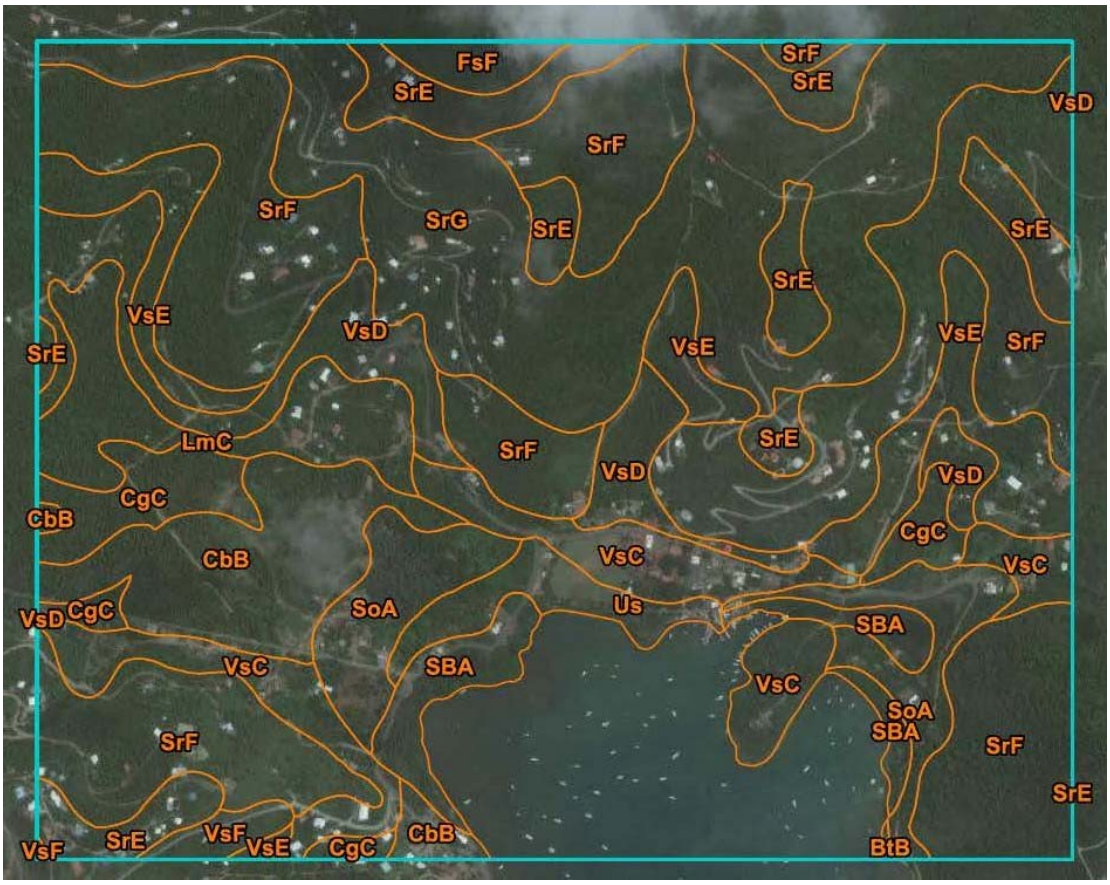
6.02 Soils, Drainage & Flooding

Soils

The general soil series of the area is Southgate — Victory — Cramer. These are soils that are well-drained soils of moderate permeability, with low available water capacity. The erosion hazard is severe. Depth to bedrock is 10-40 inches. More detailed descriptions associated with map units in various section of the property are given below.

The major portion of the property on the northern half of the land area stretch west to east is classified as Victory Southgate Complex (VsC), 2-20 % slopes, very stony. On the seaward edge of the VsC boundary are soils highly altered from their natural condition by human activity, such as cutting and filling, and are termed "Ustorthents". There are some very local soils in the central coastline that have not been classified. These support a small scrub thicket. The low area on the property's eastern section bears two small, but distinctive soil units: 1) Sandy Point and Sugar Beach (SBA) soils, 0-2% slope, frequently flooded, and 2) Solitude (SoA) gravelly fine sandy loam, 0-2% slope, frequently flooded. The SBA soils run along the waters edge on the eastern section, just landward of the fringe mangrove. Landward of these soils are the Solitude series. The SBA soils typically occur on nearly level salt marshes, saline flats, and salt ponds adjacent to the sea. Solitude soils occur in adjacent to salt marshes, saline flats, in this case on the landward edge of the SBA.

Fig. 1. Soil map of the property. Source: USDA, NRCS Soil Survey of the United States Virgin Islands.

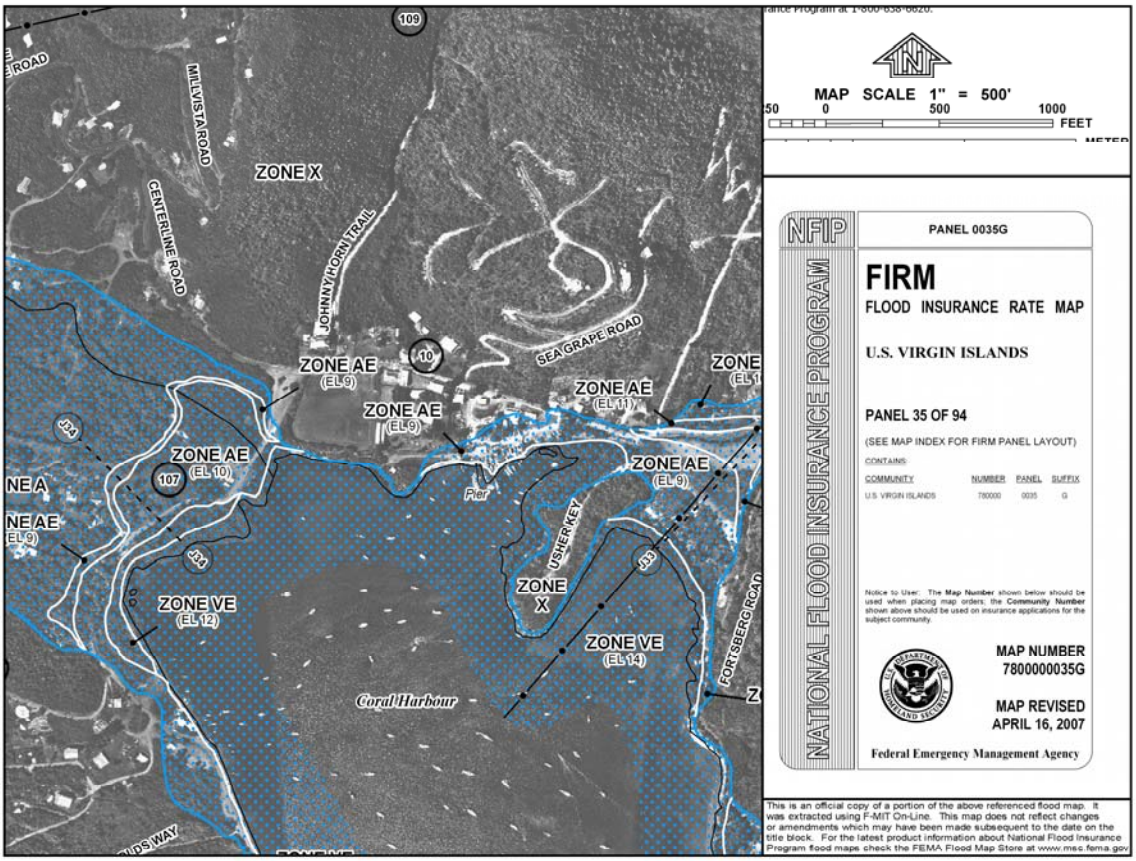


Drainage

The land side of the Marina has a moderate slope with elevations from 14' to sea level. The site slopes south to the bay. Very little stormwater enters the site as the Public Road, Route 10, to the north, intercepts all the upland runoff and directs it to the east, by-passing the site. There is a small gut to the west, but it is located between the Fire Station and School and is just to the west of our parking area and we will nit interfere with its flow.

Flooding

The typical wave and wave patterns usually have minimal affect Coral Harbor due to its constricted nature. The site is well projected by Usher Key. The marina and upland portions of the site are in Zone AE9 where flood elevations for the 100 year storm have been determined to be 9 ft.(Flood Insurance Rate Map, Panel 35 of 94, revised April 16, 2007.



FEMA Flood Map

6.03 Construction Methods

6.03.1 Marina

Most of the land-side facilities will be constructed on previously developed terrain, but filling a small area of wetlands would also be unavoidable in order to site the facilities in an area with the least impact while maximizing the efficiency and use of the facility and available real estate.

The land-side facility will consist of a one story 9,100 sf Marina Building containing a 50,000 gal cistern, dock master office, locker and bathrooms, retail shop and a provisioning store. There will be a 4,000 gal/day WWTP, brackish wells on Parcel 10A with a R/O plant, two 10,000 double walled underground fuel tanks and a 350 KW Emergency Generator. In front of the dry-stack storage will be a concrete apron and immediately to the east will be boat ramp and three dingy docks open to cruisers and the public. The dry-stack building will be 6,200 sf and 35' high. The Marina Building will be reinforced concrete foundations and concrete block walls with a wood and metal roof. The Dry-stack will be a pre-fab metal framed building.

Construction of the docks will consist primarily of 18 " concrete or coated steel piles tied together with precast concrete pile caps supporting concrete decking. Access to the marina will

be via a single controlled walkway to the fixed docks. Two 5' x 30' floating public dinghy dock will be located at the north end of the marina dock. The outer most docks will have wave attenuators. The docks will be a total of about 45,000 sq. ft. with approximately 420 piles spaces 20' on-center

All slips will have water, power and communications pedestals. There will be a fuel dock with sewerage pump-out capability

6.03.2 Dredging:

Dredging

The boat launch channel would be mechanically dredged from the channels' seaward points landward (approximately 1,780 cubic yards). Turbidity curtains and water quality monitoring would be employed around the dredging operation during operations. The shoreline edge for the Marina building and apron will be a sheetpiled bulkhead.

A thorough characterization of subsurface material within the dredge footprint is critical to determining dredge method, production, and timeframe. Due to the small volume of dredging, mechanical method of dredging will be used. Spoils testing was done by Biological Research Associates. The proposed dredging will be in the area of their sample CB-1, see appendix B. Sample CB-1 was comprised of 19% sand, 67% silt and 14% clay. Concerning metals, all metals except for copper were well below the Effects Range Low Thresholds. CB-1 copper readings were 100 mg/Kg which is still below the Predicted Effects Level (PEL). Since the all dredge spoils test levels were had low concentrations of metals, the ecological impact from the observed concentrations will be negligible.

Dredging Methods

Mechanical (crane/bucket or backhoe) dredge equipment will be used to remove material from the dredge area. Mechanical excavation (clamshell or backhoe dredge) has the inherent advantage of directly loading low water content material into disposal barges.

Clamshell Dredge Equipment

Large Backhoe Dredge Equipment

The dredged material will be placed onto a barge with 3 feet high steel knee wall to allow for dewatering prior to transporting to Parcel 10C. The dredge material would be stacked 2 to 3 feet above the deck within the deck surface surrounded by the knee wall. A filter fabric will be installed on the inside of the wall and the spoils will dewater on the barge allowing the excess water to drain back into the dredge area where it will be contained by the turbidity curtains. The material will be allowed to dry until it has lost at least 90% of it moisture. At that time, the material will be off-loaded onto waterproof trucks for hauling it to Parcel 10C.

Disposal

The dredged spoils will be hauled from the Marina site to Parcel 10C where it will be stockpiled and allowed to completely dry out. Once dried out, it will be spread out over 24,000 sq. ft. at a depth of 2'.

6.03.3 Turbidity Controls & Erosion Sediment Control

Best management practices (BMP) shall be employed during dredging to reduce the potential for adverse environmental impacts. The highest level of attention to environmental quality will be given to this project. The dredge contractor shall be required to employ standard BMPs for dredging in coastal waters, such as daily inspection of equipment for conditions that could cause spills or leaks; cleaning of equipment prior to operation near the water; proper location of storage, refueling, and servicing sites; and implementation of adequate spill response procedures, stormy weather preparation plans, and the use of floating turbidity barriers and other containment devices.

Floating turbidity barriers shall be deployed during all in-water activities to isolate the dredging activity and avoid degradation of marine water quality and impacts to the marine ecosystem. Turbidity barriers will completely enclose the dredge area and the dredge equipment and disposal barge will be inside the containment area. The turbidity curtain will consist of nylon reinforced PVC fabric panels supported by closed cell solid plastic foam floatation. Vinyl sheathed steel cables on the top of the panel and galvanized steel channel at the bottom would

link each panel, with a slotted PVC connector pipe to maintain panel spread. The floating barrier would extend below the surface of the water to the bay bottom. In-water construction shall be curtailed during sea conditions that are sufficiently adverse to render the turbidity curtains ineffective.

See Appendix C for examples of the turbidity curtains materials.

Erosion Sediment Control

Reinforced Silt Curtains will put in place prior to any earthwork commencing and around the dredge spoils containment area on Parcel 10C. All silt fencing will consist of metal posts, wire mesh and silt fence fabric.

6.04 Fresh Water Resources

Parcel 10C is at the bottom of a major watershed and it is proposed that wells be drilled and the water used for processing thru an R/O system to produce the potable water needs for the Marina operation. A total of 4,000 gal/day is required for the Marina operation.

A preliminary assessment by HydroSource Associates indicate that wells constructed on Parcel 10A would exceed 30,000 gal/day and that there are multiple environments that could host 'low' salinity/brackish groundwater or, potentially, directly potable freshwater supplies. These include brackish wells within the alluvial aquifer, less brackish/potable freshwater wells within the alluvial aquifer at inland locations on Parcel 10C, or less brackish/potable freshwater wells within fractured bedrock associated with the fault systems within the Coral Bay Gut drainage.

In summary, the geologic setting appears conducive to development of productive well sources, as is the presumed available recharge given the annual rate of precipitation. It is conceivable, if not likely, that wells targeting fracture networks in the local bedrock could produce from a few to up to several hundred thousand gallons per day of fresh or brackish water each. Regardless of where the wells are sited, given the island setting, it will be critical to properly site, construct and operate wells to prevent excessive water level drawdown during pumping, and so that upcoming and capture of highly saline water (sea water) does not occur. Possible hydraulic impact on other nearby well sources, if any exist nearby, would also need to be taken into consideration so that such instances can be appropriately avoided, where necessary. See Appendix D for Report

HydroSource Associates will be retained to investigate, site and develop the well field needed to meet the Marina demands and the future Resort.

6.05 Oceanography & Water Quality

6.05.1 Oceanography

Sea Bed Alteration

The Sirius Marina will be dredging approximately 34,100 sf of sea bottom and the 420 piles will displace approximately 750 sf. The Marina Building and Apron will displace 14,955 sf of sea

bottom. The ramp is 30' wide and extends out into the bay 63' feet, impacting 1,890 sf of sea bottom.

Tides

The Virgin Islands coastal areas are not subject to significant tidal ranges or tidal currents. Due to the small size of the islands, 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 Coral Bay are primarily semi-diurnal in nature as is the case with the southern shore of St. Thomas, with two cycles of high and low water every 24 hours. The mean tides range from 0.8 ft to 1.0 ft and the spring tidal ranges reach up to 1.3 ft (IRF 1977). There are locally driven tidal currents in the bay and current shifts can be noted with the rising and falling tides due to the constriction of the basin.

Currents:

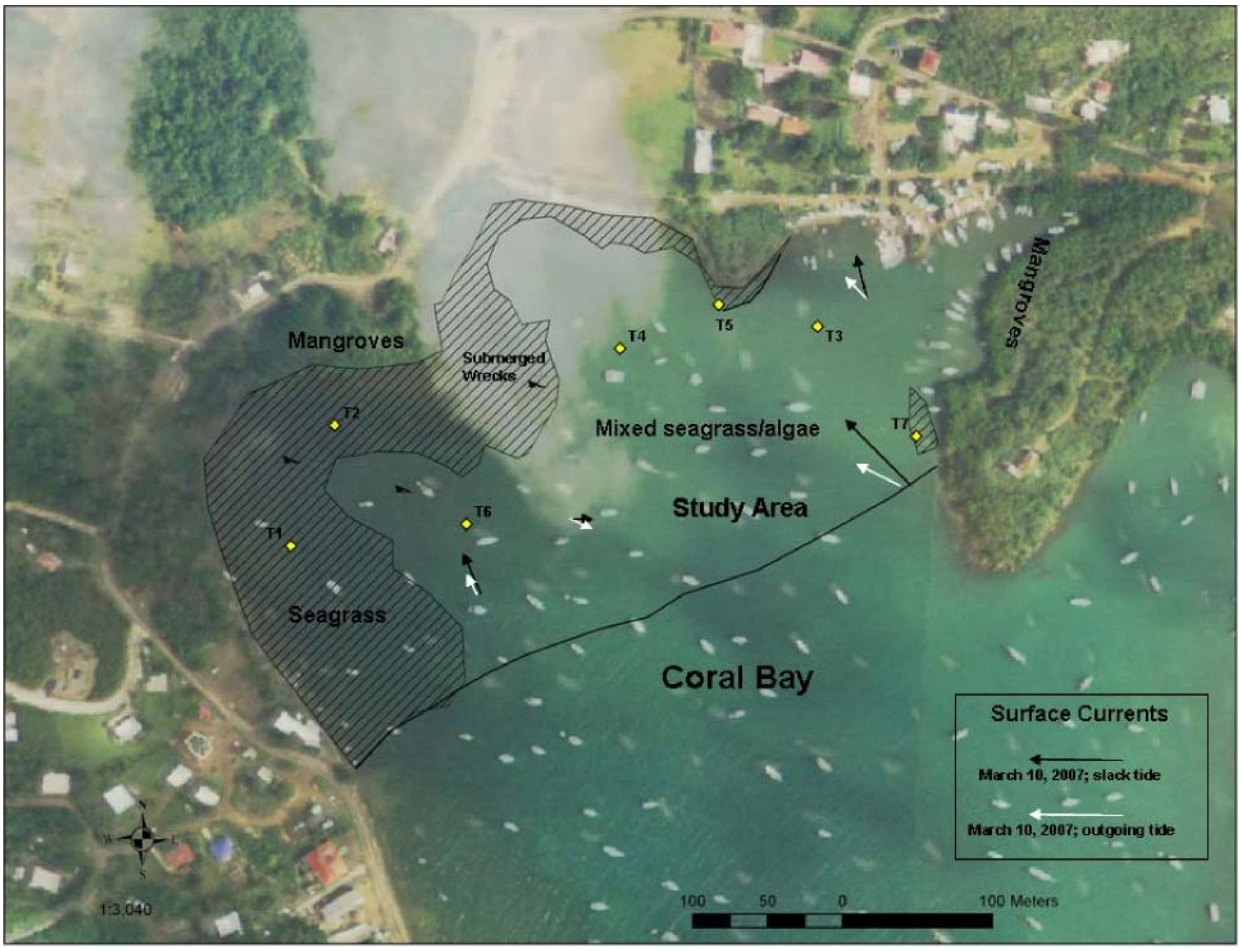
The surface currents throughout the Caribbean are driven by the North Equatorial Current that runs through the islands west-northwest and then joins the Gulf Stream. These currents change very little from season to season with the currents originating more from the south during the summer months.

BioImpact did some currents studies for the St. John marina just outside the entrance to Coral Bay at 18°20.417'N, 64°42.463'W every two weeks between April and August of 2009. Measurements were taken 1 meter below the surface and 1 meter off the seafloor. Current velocities were generally low at both the surface and at depth. Surface currents were primarily driven by wind and wave approach and moved in a counterclockwise direction around the basin. Currents at depth were found to travel in both a westerly and easterly direction likely reflecting the tidal influence near the sea floor.

Current Velocity Measurements at the Mouth of Coral Bay

Date	Surface Current Velocity (-1 Meter)	Current Velocity at Depth (-5 Meter)
04/08/2009	0.3 m/s W	0.3 m/s W
04/15/2009	0.2 m/s W	0.2 m/s E
04/28/2009	0.2 m/s W	0.3 m/s E
05/05/2009	0.1 m/s W	0.2 m/s W
05/20/2009	0.3 m/s W	0.3 m/s E
06/01/2009	0.2 m/s W	0.2 m/s W
06/25/2009	0.1 m/s E	0.1 m/s E
07/21/2009	0.3 m/s W	0.3 m/s W
08/19/2009	0.2 m/s W	0.3 m/s W
08/26/2009	0.2 m/s W	0.2 m/s E

The movement of water in and out of Coral Bay is complicated; however, some factors were apparent in the survey done by Kadison (2007). The shallowness of the bay and wave action indicates that thorough mixing of the water column occurs. The water moving across the very shallow areas of the bay (along the shorelines) and on the surface is wind driven. Coral Bay is open to a predominantly southeast wind which pushes surface water inshore. The water presumably leaves the bay through the deeper central and eastern channels. Surface currents in our general Marina location, measured over five min at 4 sites ranged from 0.15 m/sec to 0.02 m/sec during outgoing tide (10:32-11:15 am) and 0.18 m/sec to 0.08 m/sec at slack tide (2:44-3:05 pm). The wind throughout the day was ESE at 12-18 knots. The direction and relative speed of measured currents are diagrammed below.



A map of Coral HarborBay outlining the study area, habitat types found, and the direction of surface currents (from Kadison 2007).

Waves

Deep water waves around St. John are primarily driven by the northeast trade winds that blow for the majority of the year. Waves generally range from 1 to 3 ft in height and are predominantly from the east. Larger waves from the southeast, approximately 1 to 12 feet in height, may occur in late summer and fall when trade winds blow from the east or with the passage of tropical storms and hurricanes to the south of the island. Based on the orientation of Coral Bay and the protection by Usher Key, the Marina is very well protected and has a limited fetch.

6.05.2 Water Quality

USVI waters are classified into three (3) groups based on designated uses: Class A, B. and C: Class A waters are for the preservation of natural phenomena requiring special conditions with existing natural conditions that shall not be changed. Class A water standards are the most stringent of the three (3) classes because of its pristine or near pristine state. Class B and C waters are for the propagation of desirable species of marine life and for primary contact recreation. Class C waters have less stringent water quality standards than Class B. All waters of the Virgin Islands are designated for fish consumption, aquatic life support, swimming, and secondary contact uses pursuant to the Virgin Islands Water Quality Standard, Title 12, Chapter 7, §1861 of the Virgin Islands Rules and Regulations (VIRR).

The water in the Coral Bay project area on St. John is classified as "Class B Waters." Class B Waters requires that water quality criteria allow "for maintenance and propagation of desirable species of aquatic life (including threatened, endangered species listed pursuant to section 4 of the federal Endangered Species Act and threatened, endangered and indigenous species listed pursuant Title 12, Chapter 2 of the Virgin Islands Code) and for primary contact recreation (swimming, water skiing, etc.). This Class allows minimal changes in structure of the biotic community and minimal changes in ecosystem function. Virtually all native taxa are maintained with some changes in biomass and/or abundance; ecosystem functions are fully maintained within the range of natural variability." Water quality criteria for Class B waters are listed below.

The project site is within the Coral Bay Watershed, encompasses a total of some 3,003 total upland acres. The Department of Planning and Natural Resources Division of Environmental Protection takes quarterly water quality samples at station STJ-53 within Coral Bay. The results of these samples have been previously discussed (Summer's End 2014). These data (Table 1) show a highly variable, impacted system.

Table 1: Coral Bay Water Quality Data, Station STJ-53 (from Summer's End 2014).

Date	TSS (mg/L)	Turbidity (NTU)	Fecal Coliform (#/100mL)	Enterococci (#/100ml)	Temp (C)	Salinity (ppt)	D.O. (mg/L)
3/27/09	10.1	1.91	2	8	25.08	37.41	
6/29/09	35	1.63	0	0	29.92	36.23	6.40
10/8/09	2.6	1.99	1	0	29.97	35.72	8.67
6/16/10	4.2	4.17	0	2	29.70	36.15	
3/30/11	3.1	3.58	4	1	28.22	37.10	6.35
7/28/11	4.3	2.24	1	3	29,92	36.25	6.11
6/6/12	11.7	4.64	6	3	30.35	36.57	5.89
7/17/12	20.5	1.23	0	0	30.32	35.44	6.03
8/20/12	23.4	4.23	1	0	30.82	35.49	6.37
12/6/12	18.1	4.64	1	2	28.19	35.49	6.20

Water quality criteria for Class B Waters in the USVI.

Criterion	Class B
Dissolved Oxygen	Not less than 5.5 mg/l from other than natural conditions
pH	<8.3 Tolerable Limit >7.0
Temperature	Not to exceed 32° Celsius at any time
Bacteria	A geometric (log) mean of 70fecal coliforms per 100 ml by MF or MPN count Not to exceed a geometric mean of 35 enterococci per 100 mL., not to exceed a single sample maximum of 104 per 100 mL at any time.
Chlorine	The 4-day average concentration of Chlorine shall not exceed 7.5 ug/l. The 1-hour average concentration of Chlorine shall not exceed 13 ug/l
Phosphorus	Not to exceed 50 ug/L any coastal waters
Suspended, colloidal or settleable solids	None from waste water, which would cause deposition or be otherwise deleterious.
Oil and Floating substances	No residue attributable to waste water. No visible film; no globules of grease
Radioactivity	**Gross Beta:** 1000 picocuries per liter, in the absence of Sr 90 and alpha emitters **Radium-226:** 3 picocuries per liter **Strontium-90:** 10 picocuries per liter
Taste and Odor	None in amounts to interfere with use for primary contact recreation, potable water supply or to render undesirable taste or odor to edible aquatic life
Color and Turbidity	• A secchi disc shall be visible at a minimum depth of one meter • A maximum nephelometric turbidity unit reading of three (3)

Present Conditions

To better understand the present ambient water quality in Coral Bay, measurements were made during a site visit in May 2015. Water quality samples were taken from a small boat at GPS

points corresponding to the start, middle and end of each of the seagrass transect lines used for mapping SAV distribution within Coral Bay (Figure 1).

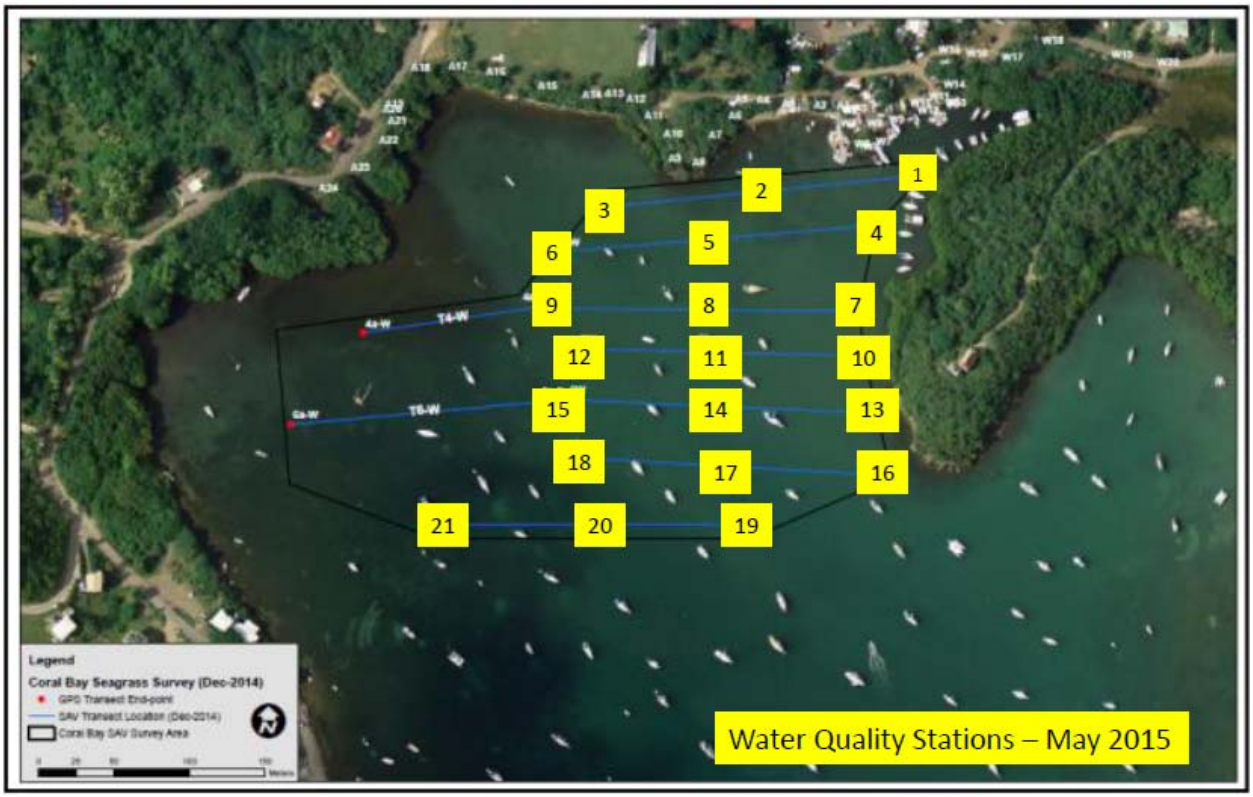


Figure 1: Location of water quality samples, May 2015.

In total, water quality measurements were taken at 21 individual stations in and around the proposed project area (Table 2).

Table 2: Water quality monitoring data measured across sites in May 2015.

Sample	*Temperature ^{0}C*	*Salinity ppt*	*pH*	*ChL mg/L*	*Clarity (Secchi Disk in m)*	*DO mg/L*
1	*27.12*	*36.77*	*8.34*	*0.67*	*0.4*	*5.88*
2	*27.15*	*36.12*	*8.41*	*0.55*	*0.9*	*6.45*
3	*27.22*	*36.74*	*8.29*	*0.48*	*1.1*	*7.66*
4	*27.43*	*36.68*	*8.39*	*0.71*	*0.5*	*5.74*
5	*27.22*	*36.45*	*8.40*	*0.57*	*0.9*	*6.44*
6	*27.90*	*36.38*	*8.40*	*0.42*	*1.2*	*7.65*
7	*27.96*	*36.66*	*8.42*	*0.68*	*0.5*	*5.11*
8	*27.88*	*36.54*	*8.39*	*0.57*	*0.9*	*6.56*
9	*27.54*	*35.91*	*8.38*	*0.44*	*1.2*	*7.79*
10	*26.99*	*36.22*	*8.42*	*0.70*	*0.6*	*5.00*
11	*27.80*	*36.68*	*8.41*	*0.60*	*1.0*	*6.33*
12	*27.11*	*36.65*	*8.41*	*0.48*	*1.2*	*7.38*
13	*27.32*	*36.59*	*8.43*	*0.78*	*0.5*	*6.98*
14	*27.45*	*36.60*	*8.44*	*0.57*	*1.1*	*6.11*
15	*27.54*	*36.62*	*8.43*	*0.45*	*1.3*	*7.34*
16	*27.65*	*36.58*	*8.43*	*0.70*	*0.6*	*5.12*

17	***27.33***	***36.67***	***8.43***	***0.56***	***0.9***	***6.67***
18	***27.17***	***36.65***	***8.42***	***0.43***	***1.1***	***6.00***
19	***27.23***	***36.68***	***8.43***	***0.61***	***0.9***	***6.34***
20	***27.74***	***36.66***	***8.42***	***0.49***	***1.1***	***6.10***
21	***27.72***	***36.65***	***8.41***	***0.48***	***1.1***	***6.22***

The data listed in Table 3 reveals that Coral Bay is highly impacted water body. The reduction of water clarity is significant and is probably associated with untreated surface water runoff that is laden with sediments. This includes fine grained terrigenous sediments due to runoff from the Coral Bay watershed. Water quality is further impacted by boat anchoring and mooring which serve to resuspend fine bottom sediments. These moored vessels also discharge vast quanities of "gray" water, including raw wastewater directly into the bay and have been, in many instances, for decades. Spring Ghut discharges directly into Coral Bay and the footprint of the discharge is readily visible in the marine environment in the northwestern most portions of the bay.

There are dense seagrass beds in the shallow, well flushed areas on the westernmost margins of the bay; these seagrass diminish as ones moves east due to a decrease in water clarity (turbidity) caused by suspended sediments, high nutrients levels and high levels of Chlorophyll A. This poor water clarity is exacerbated by poor circulation in the northern and northeastern most portions of the bay (see Figure 2).

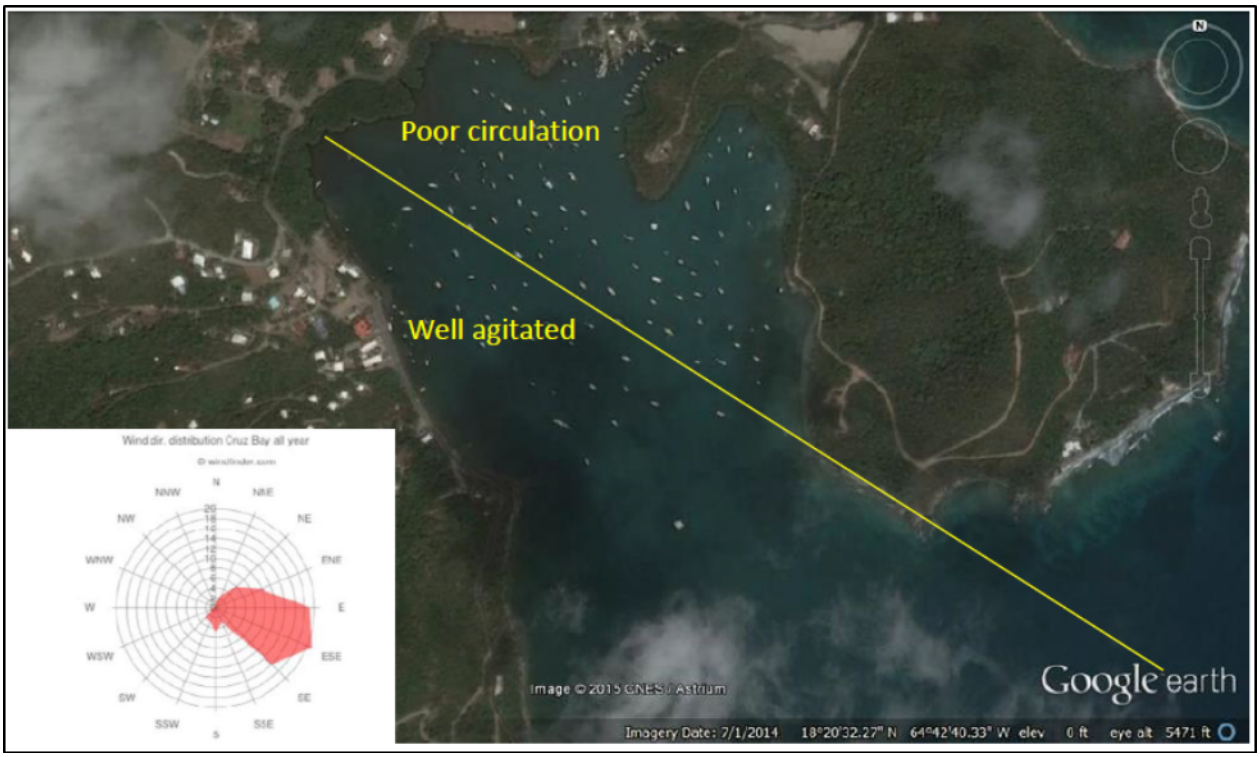


Figure 2 Wind driven circulation within Coral Bay. Yellow lines depict well agitated area to the southwest from areas of poor circulation in the leeward, northern and northeastern reaches of the bay.

Impact of the Proposed Marina Project

During construction, the project will require the driving of 420 piles and the dredging of an channel near the boat ramp through soft sediments. These in-water activities will result in minor short-term impacts including the resuspension of sediment. Vessel movement and spudding of barges in shallow waters may also result in the resuspension of sediments. To minimize impacts from sediments, turbidity barriers will be deployed and installed around the entire work area. Tugs, barges, and all work vessels will be required to move dead-slow in the water when working in shallow-water environments to minimize impacts. During construction, a Water Quality and Environmental Monitoring Program will be implemented.

The installation of pump-out facilities within the marina should have a long-term positive impact on water quality throughout the bay by reducing in the total input of both nutrients and fecal coliforms.

6.05.3 Water Quality Monitoring Plan

The following is the proposed water quality monitoring program for the development of the Sirius Marina in Coral Bay, St. John.

The proposed project involves direct impacts to the seabed through the installation of pilings for the construction of the marina as well as the dredging of an entry channel. In marine construction programs the potential for negatively impacting marine life and degrading water quality. When sediments are suspended in the water column from construction activities, these suspended sediments add to the turbidity of the water. The lowering of the transparency of seawater can adversely affect sessile marine organisms that rely on the transmission of the light for their existence. Settling sediments can also smother seagrasses, sponges, and corals as well as preventing larval sediment of reef associated organisms.

In order to ensure that water quality is maintained throughout construction a water quality monitoring program will be implemented. This plan is designed to assess turbidity and address the efficacy of sedimentation control during dredging activities. 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. This plan will also monitor the benthic community adjacent to and within the potential impact area of the proposed project.

Water Quality Monitoring

Prior to the start of construction a baseline of water quality conditions will be established. A total of no less than six (6) sampling locations will be established in the project area and an additional six (6) control sampling sites. The monitoring samples will be placed in the areas most likely to be impacted by the project. The control sites will be placed in areas which should be exposed to essentially the same ambient conditions, but should not be directly impacted (within the footprint of) by the marina project.

At each site the turbidity expressed as NTU's 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 construction project or are due to natural variability related to local conditions. A final sample shall be taken at six months after construction has been completed.

Monitoring During Construction

During construction at least six (6) samples will be taken around the area of in-water work at least three times per day of construction; these samples will be taken throughout the project footprint, Samples will be taken 1 meter below the surface and will be analyzed by a turbidity meter (turbidity will be expressed as NTU's). In addition, samples will be taken after every rainfall event of 1" or more in a 24 hour period during construction. If the samples indicated high turbidity, samples will be taken at the control points.

The control samples will be utilized to determine whether elevated turbidity is a function of the project or due to natural variability related to local conditions. As per the Virgin Islands Code, visual depth readings (Secchi disk measurements) should not fall below 1 meter. Class B waters has an allowable turbidity level of 3 NTU. Allowable limits will be determined from the baseline survey and approved by DEP/CZM and the federal reviewing agencies prior to the start of construction.

Wind speed and direction, wave height and direction, and rainfall will be recorded at the time of sampling. During construction if the water samples show NTU's readings in excess of the allowable limits, DPNR, USACE and DEP will be notified, in writing. If it is determined that the elevated turbidity is the result of the marina construction, we will identify the source of the problem and determine the best methods to reduce and/or ameliorate turbidity and suspended sediments. We will authorize a site representative to implement sediment control measures, so that problems can be addressed immediately.

If any elevated turbidity readings are encountered, the construction will be stopped immediately. Deficiencies encountered in the deployed turbidity control measures will be corrected as quickly as possible. Construction may resume only when the elevated turbidity has fallen to allowable levels. If there are no deficiencies identified in the deployed turbidity control measures, additional curtains will need to be added during dredging or pile driving operations may need to be slowed.

Environmental Monitoring

Benthic organisms that may be affected by the project shall be surveyed and monitored. Accordingly, a minimum of ten (10) permanently marked meter square photo-quadrats will be established on the adjacent seagrass beds which are within the area of potential impact of the construction project. Location of the photo-quadrats will be set in conjunction with the VI Fish & Wildlife Division and NOAA Fisheries.

PVC stakes with known GPS positions will be inserted into the substrate to serve as markers for the photo-quadrats. Each photo will be taken at the same location, orientation and distance from the bottom to insure the exact replication of the photograph in repetitive sampling events. Seagrass abundance and health will be assessed visually by trained scientific divers. The quadrats will be established and monitored monthly for a period of two months prior to the commencement of the project to establish a baseline. The photo-quadrats will then be monitored

on a weekly basis during in-water work and compared to the baseline data. All visible changes will be documented and the potential cause for these changes assessed. Photographs and detailed survey information containing the above listed parameters will be given to the Department of Planning and Natural Resources (DPNR), Division of Environmental Protection (DEP) on a monthly basis. However, if a deterioration of health of any of the organisms are noted the agencies will be notified immediately.

Reporting Of Data

In the event of any emergency or noted increase in any of the water quality parameters above the allowable limit, VIPA, DPNR, DEP, COE, and NMFS will be immediately notified by e-mail or by hand delivery (within 24 hours of event). Weekly water quality reports will be delivered to all applicable regulatory agencies. The photo-quadrat reports will be delivered on a monthly basis to the agencies. A final water quality report will be filed some six (6) months after the completion of all construction and the last test has been analyzed. This report will combine both water quality measurements with the results of the benthic community monitoring program.

Sediment Loading

Four sediment traps will be placed surrounding the area of dredging. These will be double traps modeled after the methodology currently used by the National Park Service in St. John with a cup at the sea floor and one located approximately 1 meter from the sea floor to catch newly introduced or in this case re-suspended or deposited sediment from the in-water work. Once in-water work begins traps will be sampled on a biweekly basis. The traps will be placed as shown in Figures 1 The traps will be deployed 2 months prior to dredging and will be sampled on a bi-weekly basis to establish a baseline to compare during project catchment.

6.06 Marine Resources

6.06.1 Submerged Aquatic Vegetation

6.06.1.1 Introduction

Coral Bay lies in the northwestern corner of Coral Bay on the southeastern side of St. John U.S.V.I. (Figure 1). Presently Coral Bay is used as a mooring field for more than 100 vessels, primarily private sailboats. Much of the remainder of Coral Bay, to the south and east, is part of the St. John National Park. This marine resource survey described herein was done as part of the planning and design of a marina which is proposed for the northern end of the Bay (Sirius Marina).

6.06.1.2 Methods

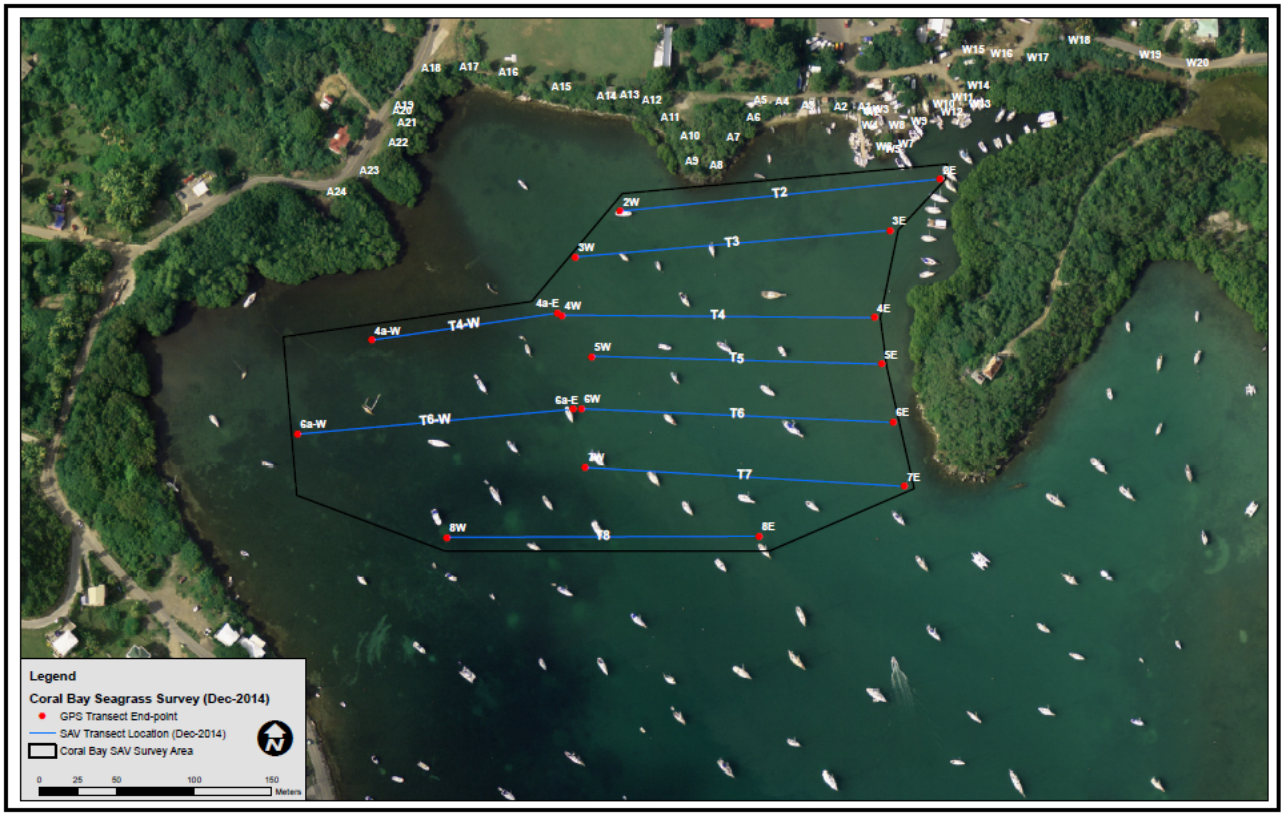
This section describes the methods used to collect and analyze data associated with the submerged aquatic vegetation (SAV) surveys at the proposed marina site in the northernmost portion of Coral Bay. SAV surveys were conducted from December 1 through December 4,

2014. The weather was breezy, warm and sunny all days.

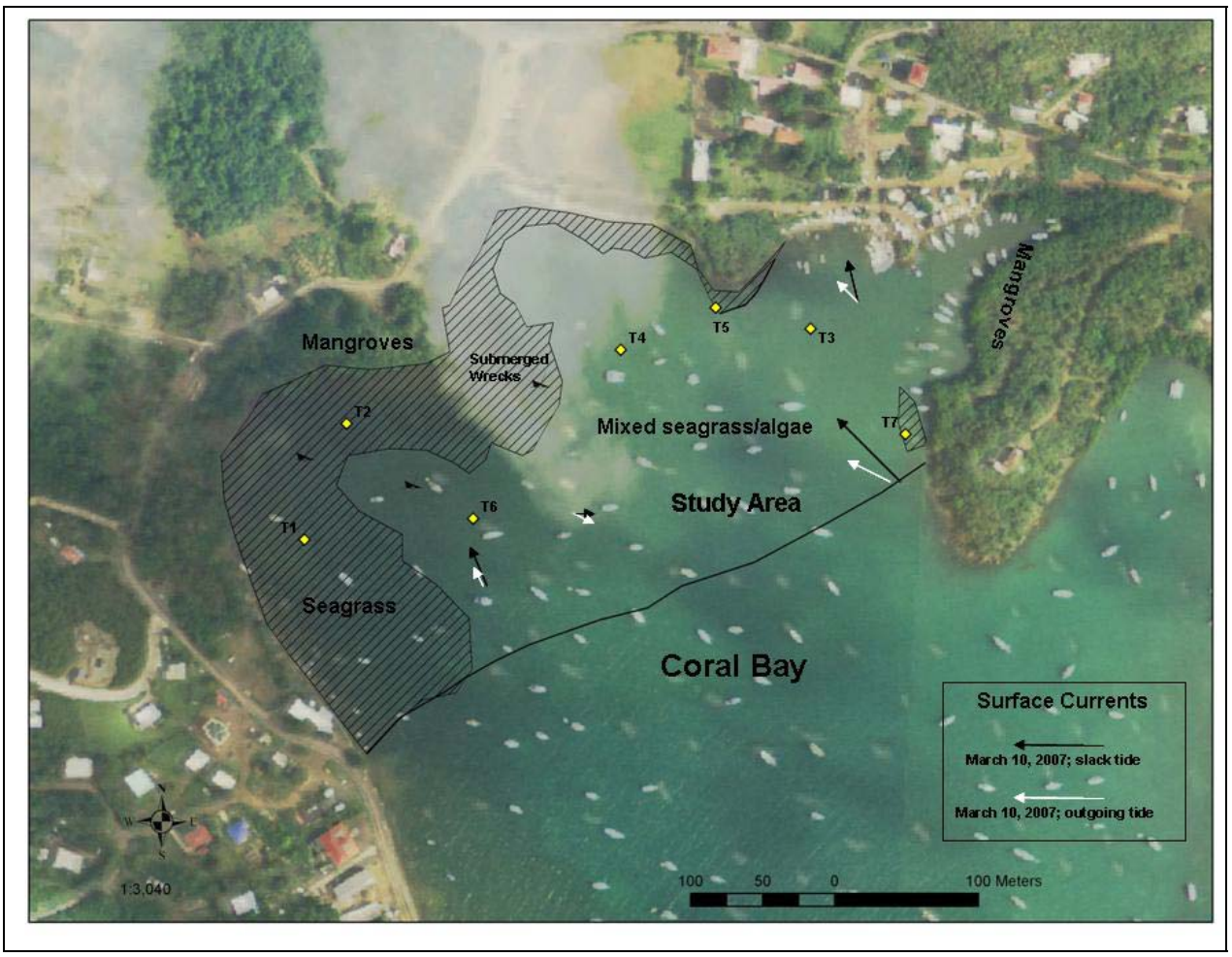
6.06.1.2.1 SAV Survey Methods

Eight (8) transects were sampled using scuba to assess the distribution of seagrasses within the proposed project area in Coral Bay. SAV transects were spaced throughout the site as shown below. All transects were run east-to-west. Survey lead-line was placed on the bottom following pre-determined coordinates. Transects origins and ends were recorded using a Differential Global Positioning (DGPS). Transects 2, 3, 5, 7 and 8 were each 200 m in length. Transects 4 and 6 were longer (370m and 400m in total length respectively). These longer transects overlapped with previous seagrass studies performed within Coral Bay; Kadison 2007). Depth ranged from 2 feet to 10 feet across transects. Scientific divers from Dial Cordy & Associates (DCA) collected quantitative and qualitative benthic data along the length of the transect lines using techniques similar to those described in NMFS (2010). Representative underwater photographs were taken along each transect. Areas outside of the survey transects were also qualitatively evaluated by DCA divers.

Quantitative data within quadrats ($1m^2$) was collected every 5m only in areas where seagrass occurred. Quantitative data included seagrass species frequency of occurrence, or the number of occupied sub-units within a quadrat; Braun-Blanquet abundance score (Table 1; Braun-Blanquet 1965); and density of seagrasses. Qualitative data included the transition of habitats (i.e. sand, seagrass) within 2m of the transect line.



SAV transect locations within project area.



Seagrass distribution from earlier surveys performed in by Kadison (2007).

Depth soundings within proposed project area.

Table 1 Braun-Blanquet Abundance Score Values

0	Species absent from quadrat
0.1	Species represented by a solitary shoot, <5% cover
0.5	Species represented by a few shoots, <5% cover
1.0	Species represented by many shoots, <5% cover
2.0	5% - 25% cover
3.0	25%- 50% cover
4.0	50%- 75% cover
5.0	75%-100% cover

Scientific diver performing seagrass cover analysis. Note exceedingly poor water clarity.

6.06.1.3 Results

Results for the SAV survey are presented below, including photographs and discussion of results.

6.06.1.3.1 Seagrass Results

Seagrasses documented along survey transects included *Halophila decipiens* (Figure 6), *Syringodium filiforme* (Figure 7), *Thalassia testudinum* (Figure 8), and the recently introduced invasive exotic seagrass *Halophila stipulacea* (Willette et al. 2014, Rogers et al. 2014; Figure 9). Interestingly, no shoots of *H. stipulacea* had been identified in any previous studies of Coral Bay (Kadison 2007; Summer's End 2014) indicating the rapidity of the invasion. The predominant seagrasses in the westernmost portions of Coral Bay were beds of *T. testudinum*. *H. stipulacea* were found displacing other seagrasses including *T. testudinum* throughout the central corridor of the project area (Figure 10 and 11). Macroalgae was also a common benthic constituent and was found comingled with seagrasses, especially in the westernmost portions of the Bay. Common genera of macroalgae included *Halimedia, Caulerpa* (Figure 12), *Udotea, Avrainvillea, Penicillus, Laurencia, Hypnea and Dictyota.*

A monospecific bed of *H. stipulacea* was found colonizing areas previously identified as barren bottom. Barren soft bottoms in the eastern portion of the project site are dominated by vast areas

of uncolonized sand and mud and covered in places by mats of cyanobacteria and volcano-shaped mounds made by burrowing organisms (Figure 13).

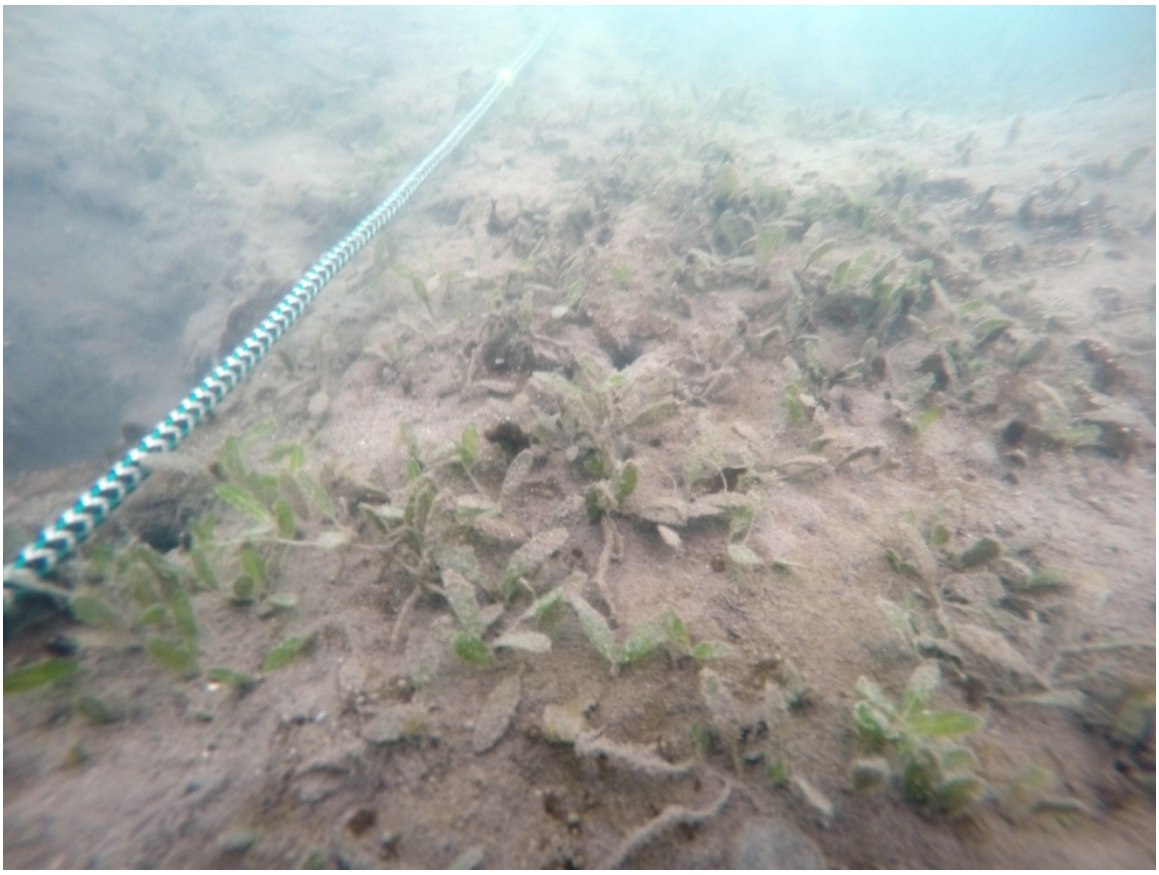


Figure 6. Area colonized by the seagrass *Halophila decipiens.*

Figure 7. The seagrass *Thalassia testudinum* mixed with occasional shoots of the seagrass *Syringodium filiforme* due west of the project site.

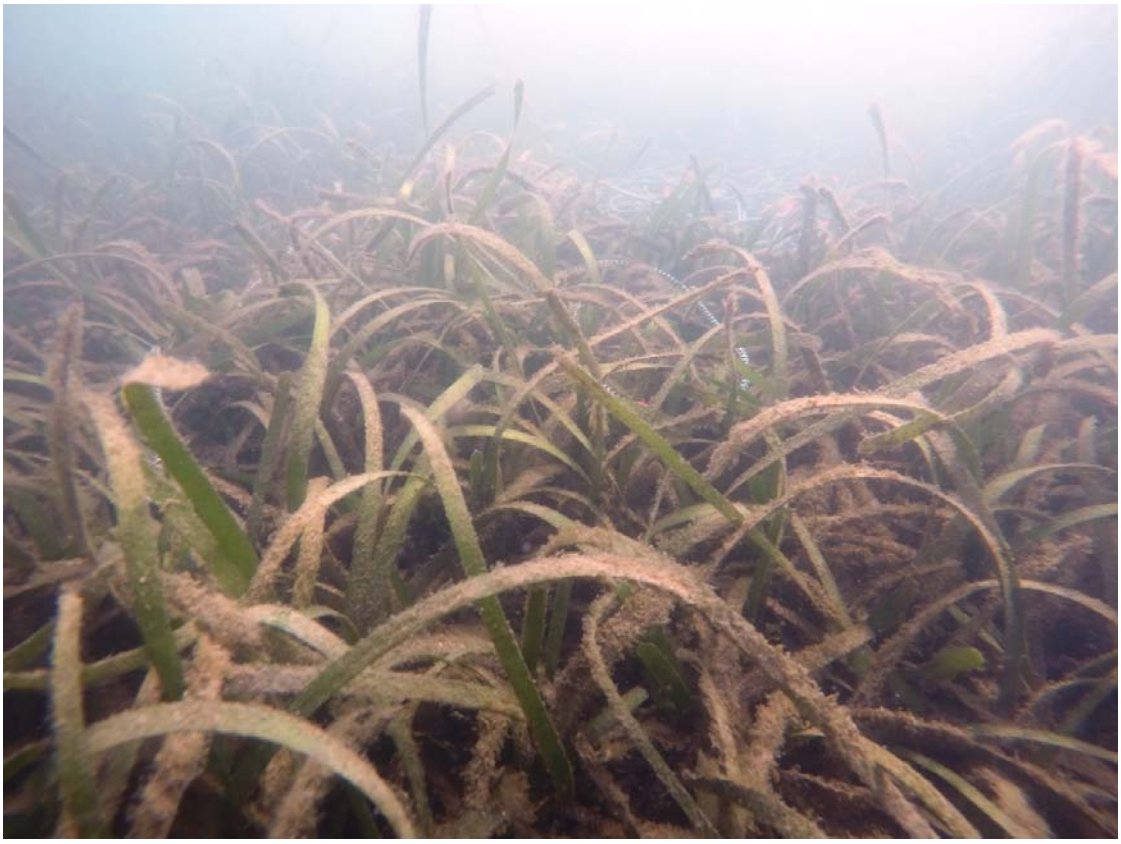


Figure 8. Area west of project site dominated by the seagrass *Thalassia testudinum.*

Figure 9. Area in western portion of project area colonized by the invasive seagrass *Halophila stipulacea.*

Figure 10. The seagrass *Thalassia testudinum* (top) being displaced by the invasive seagrass *Halophila stipulacea*.

Figure 11. The native seagrass *Halophila decipiens* (top) and the invasive seagrass *Halophila stipulacea* (bottom). Note the greater biomass of the exotic *Halophila* species.

Figure 12. The green alga *Caulerpa mexicana* mixed with seagrass in westernmost portion of project area.

Figure 13. Barren softbottom habitat void of seagrass with areas of cyanobacterial mats in center and easternmost portions of project area. Water clarity was very limited in this portion of the Bay with Secchi disk readings of <1m.

In total, some 11.306 ac. (4.575 ha) acres of seagrasses occur within the project area. The distributions of these seagrasses are shown in Figure 14. Within the mappped boundaries, we identified some 2.808 acres of *H. stipulacea*, 1.099 acres of mixed *H. stipulacea* and *T. testudinum,* 1.071 acres of mixed *H. decipiens* and *H. stipulacea*, and 0.201 acres of *T. testudinum.*

6.06.1.3.2 Seagrass Impacts

The marina design prepared by Moffet & Nichol for the project was developed using the Dial Cordy seagrass distribution map (Figure 14). This seagrass map assisted the marina planners with avoiding and minimizing impacts to native seagrasses (Figure 15). Using the marina design overlaid on the seagrass distribution map, we directly calculated the potential impacts from shading to existing seagrasses from the dock structures (Figure 16).

As noted, some 11.306 ac. (4.575 ha) acres of seagrasses occur within the mapped area. The total surface area of the dock structures is 1.060 ac. Thus, only 0.415 ac. that is presently colonized by seagrasses will be impacted by the proposed dock structures. We assumed 100% of

seagrass due to shading under the dock structures. However, the impacts to seagrasses are significantly reduced if you remove the impact to the invasive exotic *H. stipulacea*. Accordingly, the total area of seagrass (excluding monospecific beds of *H. stipulacea*) under proposed docks is only 0.183 ac.

An area of dredging is proposed for an entrance channel to the marina and is located over barren soft-bottom habitat. This area is shown in Figure 15. As previously noted the proposed dredge channel is positioned over barren soft-bottom and its position will not directly impact any seagrasses or submerged aquatic vegetation.

In addition, the project will also impact approximately 217.8 m^2 of seagrass due to the emplacement of approximately 420 piles ranging from 14-18" in diameter. To minimize the direct impact of pilings, seagrasses within the piling footprints will be removed prior to emplacement of the piles and transplanted as part of the seagrass mitigation measures (see below).

Boats utilizing the marina slips will also impact seagrasses through vessel shading. We have used maximum occupancy as a most conservative estimate for secondary shading impacts. We then assumed that each vessel shaded approximately 90% of the bottom within each slip. Using these assumptions we then used the marina design overlaid on the seagrass distribution map to calculate shading impacts. In total, 1.447 ac. (0.586 ha.) of bay bottom will impacted by vessel shading. Of this, only 0.797 ac are presently covered by seagrass. When you remove the area covered solely by *H. stipulacea*, the seagrass area shaded by vessels is further reduced leaving only 0.319 ac of seagrass impact.

Impact	**Total area of Seagrass to be Impacted**	**Total impact area of exotic seagrass *H. stipulacea***	**Total "actual" area of EFH seagrass impacts**
Piles	0.024 ac.	0.013 ac.	0.010 ac.
Dock Shading	0.415 ac.	0.231 ac.	0.183 ac.
Vessel Shading	0.797 ac.	0.478 ac	0.319 ac.
Dredging	0.00 ac.	0.00 ac.	0.00 ac.
Total Area	**1.236 ac.**	**0.722 ac.**	**0.512 ac.**

Finally, some seagrasses could also be indirectly impacted by construction related turbidity impacts such as the dredging of the area near the boat ramp. These potential impacts will be reduced if not totally eliminated by sediment and siltation abatement control measures including turbidity curtains and barriers coupled with extensive contractor training and stringent turbidity monitoring.

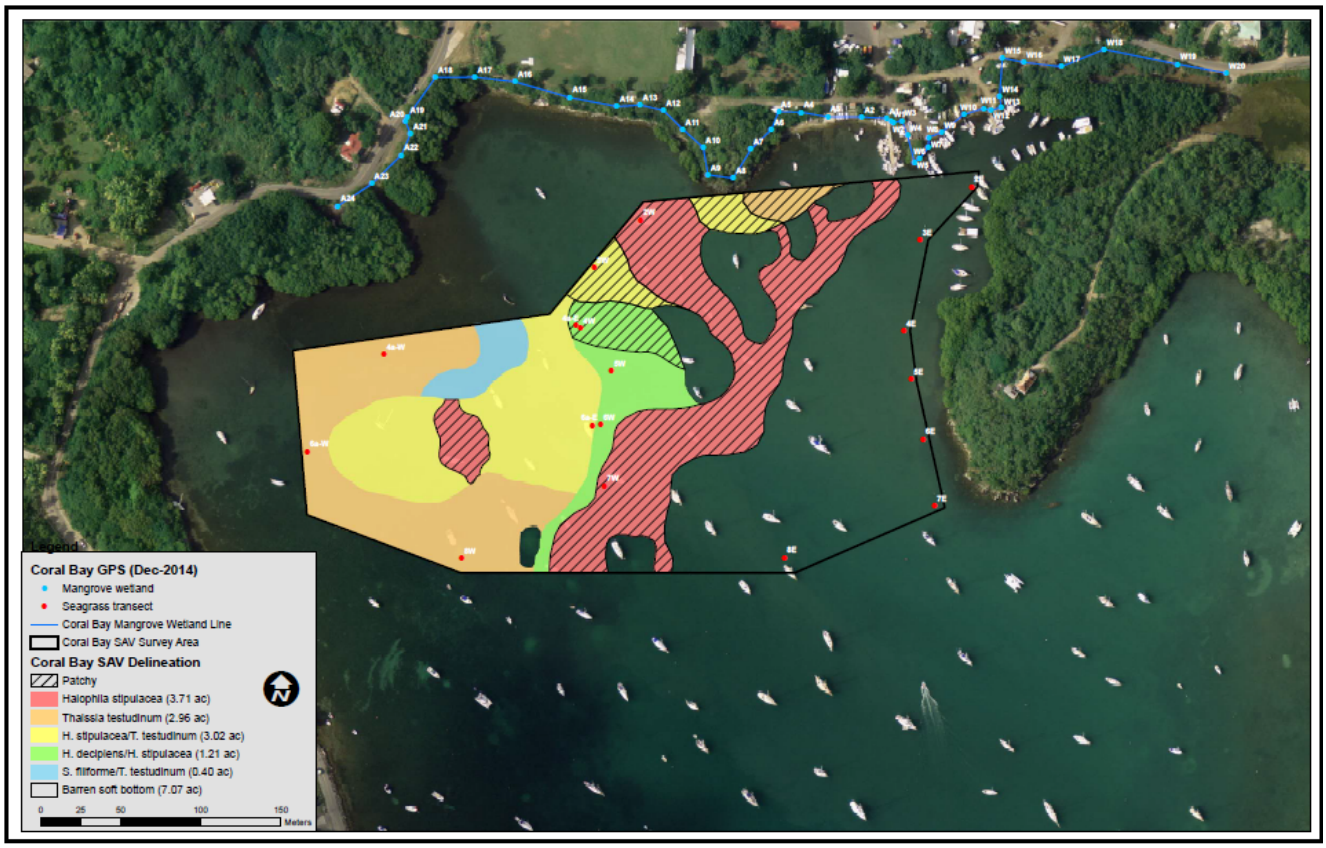


Figure 14. Delineation and distribution of seagrasses within the project area. Areas with no "color shading" within project area are devoid of seagrass (barren soft bottom habitat).

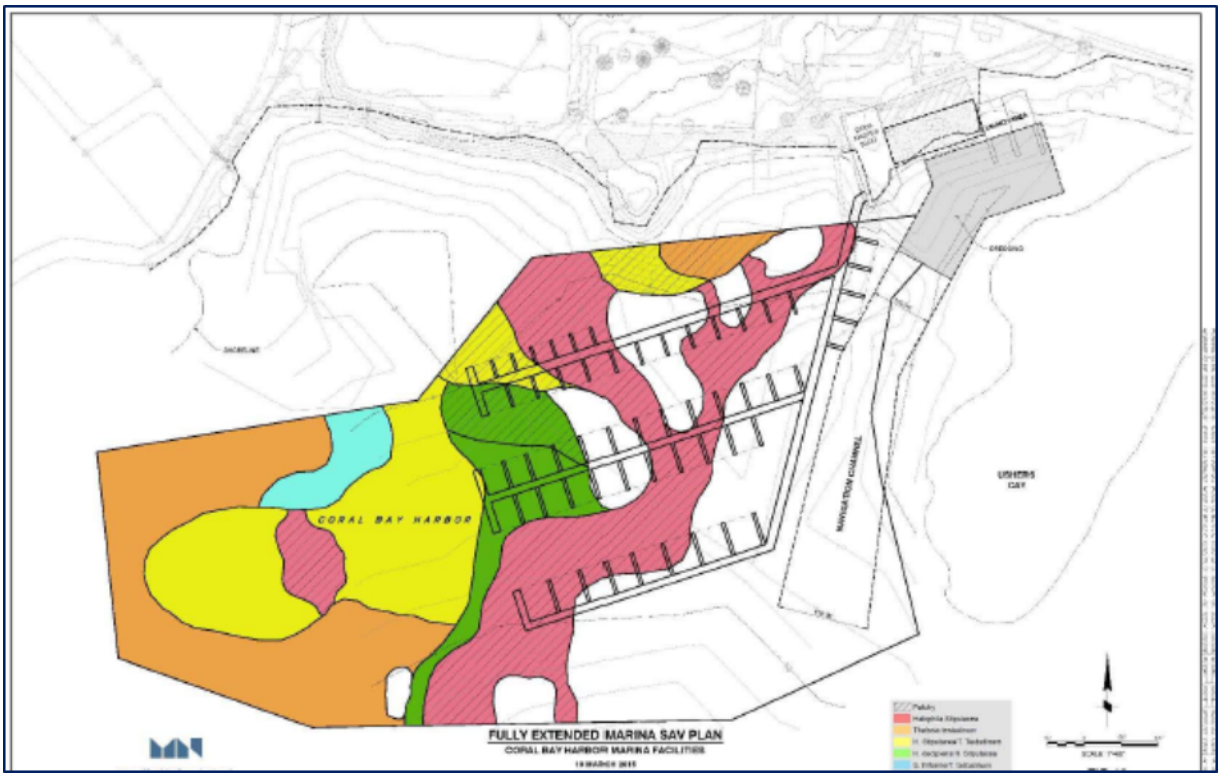


Figure 15. Delineation and distribution of seagrasses within the project area with an overlay of the proposed marina design (dock layout) and area to be dredged (entrance channel). Note the avoidance of native seagrasses under the proposed dock structures.

Figure 16. Seagrasses located directly under proposed dock structures. The "colored/shaded" areas under docks form basis of direct seagrass impact calculations.

6.06.1.3.3 Seagrass Mitigation

Using the current marina design, we anticipate a total of 0.512 ac of seagrass impacts from the proposed project. This includes 0.183 ac of seagrass located directly under the dock structures, 0.010 ac of impacts under the footprint of the pilings, and 0.319 ac of indirect impacts associated with the shading of boats occupying the marina slips.

To mitigate for these seagrass impacts we proposed a four-part seagrass restoration program.

(1) Restore vessel prop-scars within seagrass beds throughout the northernmost portions of Coral Bay (Figure 17). This will be done by placing plugs of seagrass at approximate ½m spacing along and throughout the length and width of the scars.
(2) Once the present mooring fields have been removed or replaced, the scars left in the seagrass beds (Figure 18) from the current mooring anchors and chains are to be restored using techniques similar to those described for the vessel scars noted above.
(3) Any remaining sunken, derelict vessel within the project area (Figure 19) will be removed and any impacts to the underlying seagrasses will be restored and replaced.

Debris and litter will be removed from the seagrass beds throughout the project area (Figure
(1) 20) and any impacts to the underlying seagrasses will be restored and replaced.

The applicant will also be providing wastewater pump-out facilities and solid waste receptacles which will significantly reduce the indirect impacts caused by vessels currently utilizing Coral Bay. These facilities do not presently exist in Coral Bay. As previously noted, water quality in the northernmost reaches of Coral Bay are of great concern and these facilities should have a significant impact on reducing water clarity, nutrients, Chlorophyll A, Total Suspended Solids (TSS), and fecal coliform bacteria. Ultimately, the improvements to water quality will certainly have long-term positive impacts on the benthic habitat throughout the Bay.

Figure 17. Vessel prop-scar within monospecific bed of *T. testudium* in western portion of mapped area. Note denuded swath of seagrass bisecting the seagrass bed. These scars need to be restored by planting them with transplant plugs from surrounding donor beds or from seagrasses slated to be impacted directly as part of the marina construction.

Figure 18. Aerial photograph highlighting barren, sandy areas within seagrass beds on western-side of Bay. These areas have been denuded of seagrasses by the swinging of anchor chains around the basal attachment of semi-permanent boat moorings in the Bay. These "barren" areas are slated to be restored following the removal and decommissioning of the moorings. Seagrass plugs and transplants will be used to re-establish seagrasses in these denuded areas.

Figure 19. Underwater photograph showing components of sunken, derelict sailboat on seagrass. While the abandoned structure does attract some larger fish, the impact to the seagrass under the wreckage is significant. Any sunken vessels in the vicinity of the project should be removed prior to or during construction. Some areas may need to be replanted with seagrass plugs as part of the restoration effort.

Figure 20. Underwater photograph of discarded trash within project area. Note the area of denuded seagrass adjacent to plastic container. A significant amount of litter and debris is strewn about the current mooring fields within the Bay. A large-scale underwater trash removal effort should be undertaken throughout the northern reaches of the Bay during marina construction.

6.06.2 Coral Resources

The scientific divers that performed the seagrass surveys in the project area identified no living coral resources in the northernmost reaches of Coral Bay. The NOAA benthic habitat classification for northern Coral Bay is mapped as mud (Figure 21). The closest corals to project site are noted in Figure 22 (see also Summer's End 2014). This includes the locations of the closest observed coral species listed as "Threatened" under the Endangered Species Act (ESA). Scientific divers from Dial Cordy confirmed the presence of these corals (Figures 23 through 26) while performing numerous timed swims at the reef areas identified in Figure 22 in December 2014. The closest coral resources are location more than 1km from the proposed marina in northern Coral Bay. Accordingly, no direct impacts to coral resources are anticipated. Albeit small, the possibility does exist that an increase in boater activity may cause an increase in vessel strikes with coral resources as shown in Figure 22. To decrease this risk, the mitigation for any indirect impacts to coral resources should be in the form of informational signage within the marina that highlights proper boating and anchoring methods in the vicinity of coral resources. In addition, signage highlighting the protection of ESA listed species should be installed at key locations within the marina.

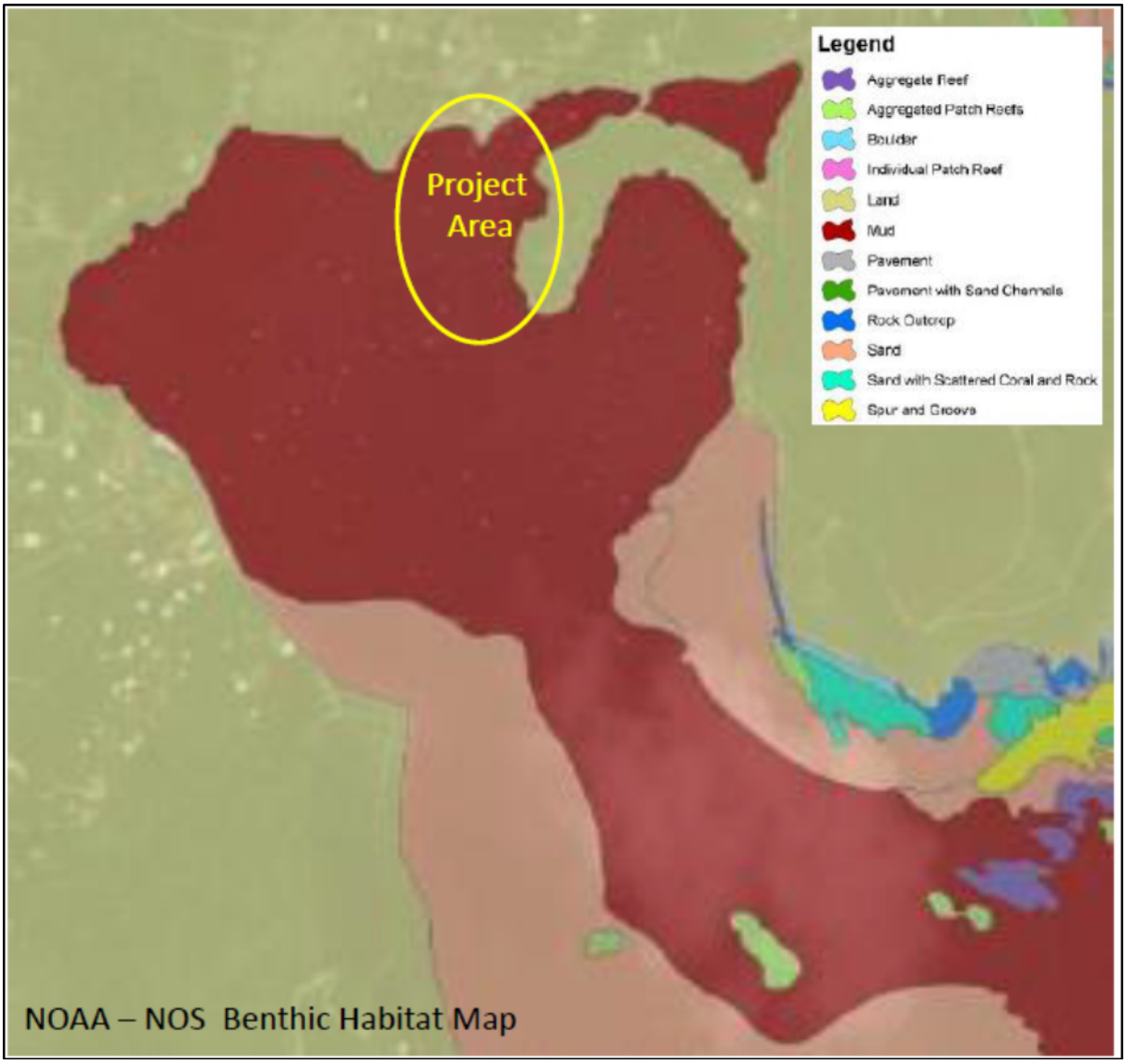


Figure 21. Benthic habitat classification map for Coral Bay, St. John (CCMA 2014).

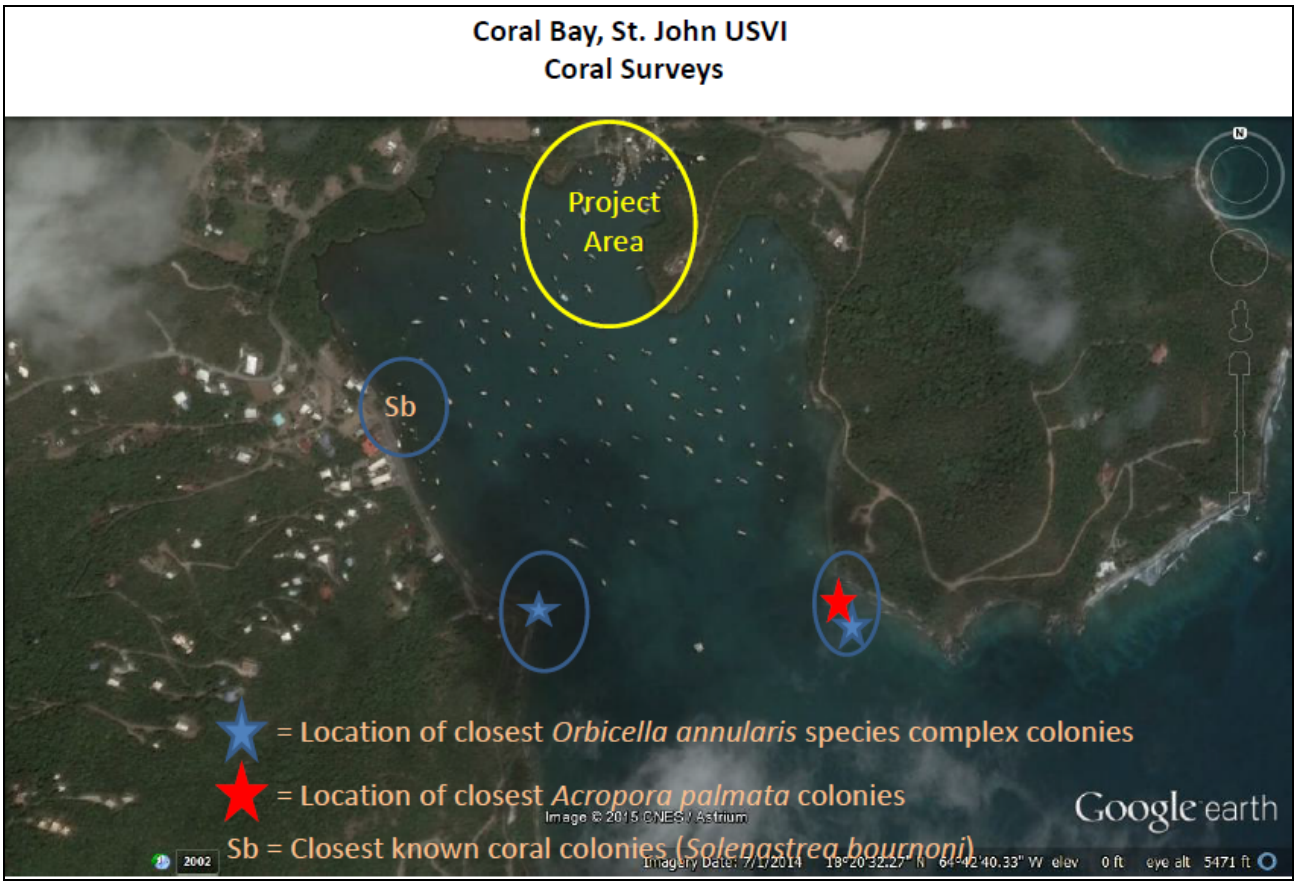


Figure 22. Location of closest coral resources to the proposed project. Aerial photograph from Google earth.

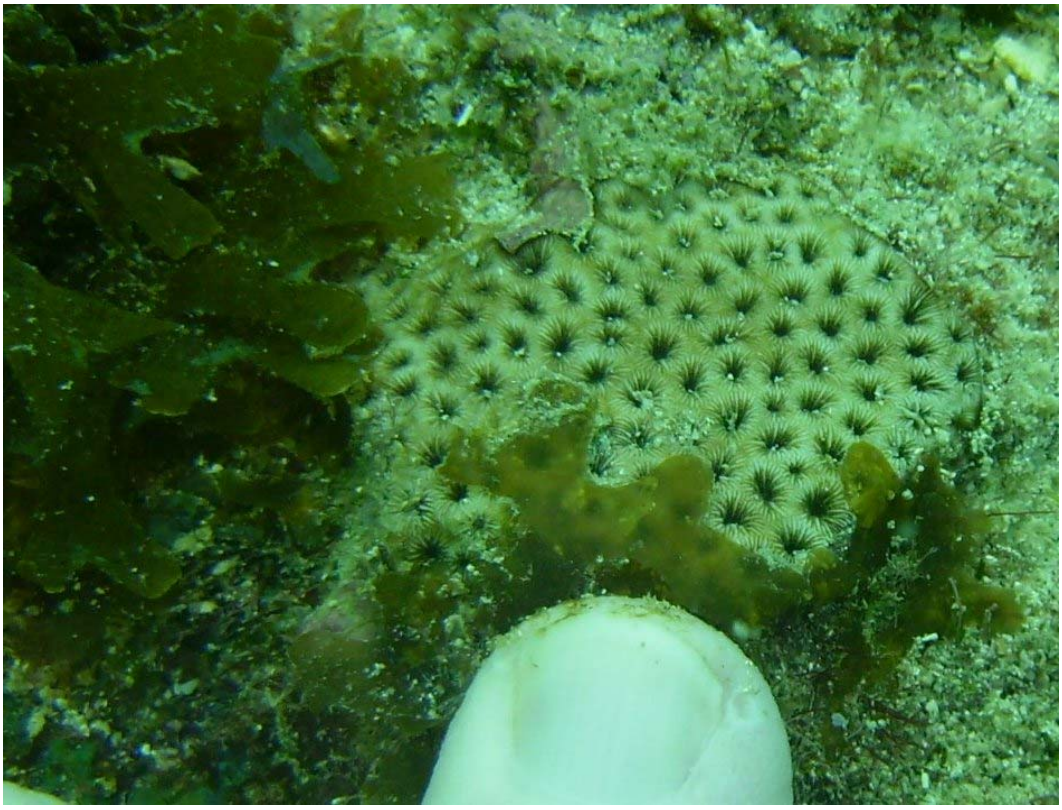


Figure 23. Small encrusting colony of *Siderastrea radians* in the southwestern portion of Coral Bay.

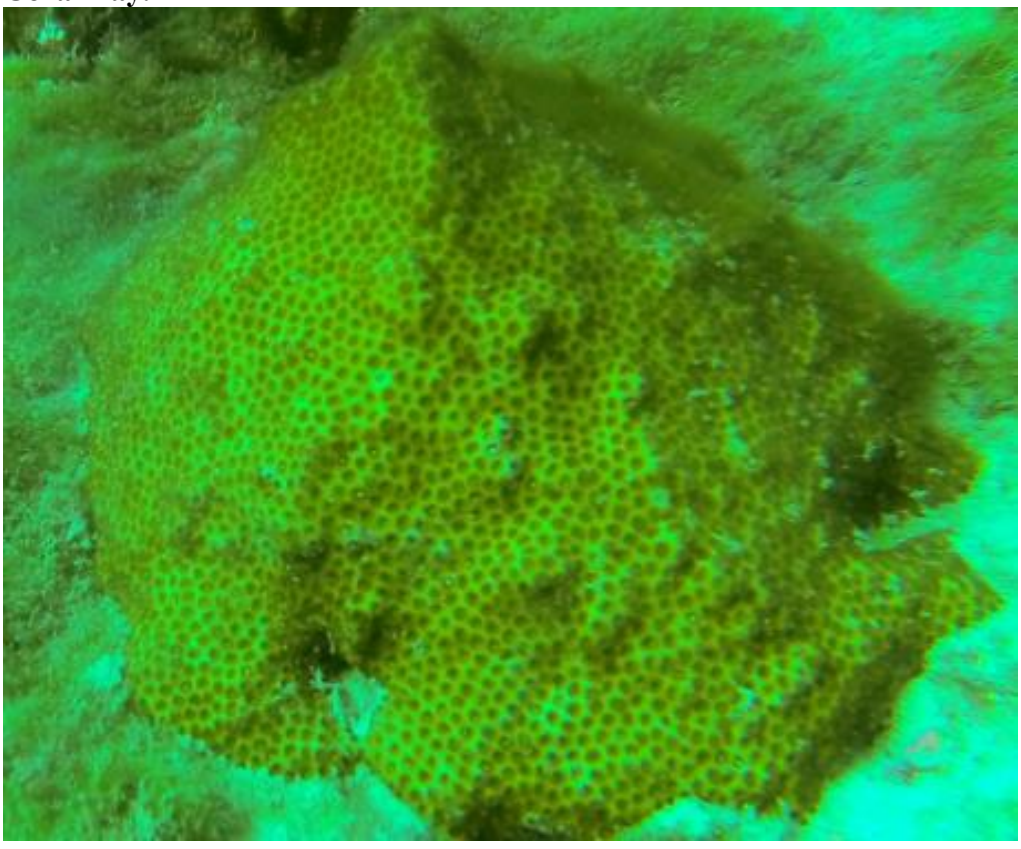


Figure 24. Colony of *Solenastrea bournoni* in southwestern portion of Coral Bay.

Figure 25. Colony of *Orbicella annularis* species complex from reef area adjacent to the western shore at the mouth of Coral Bay.

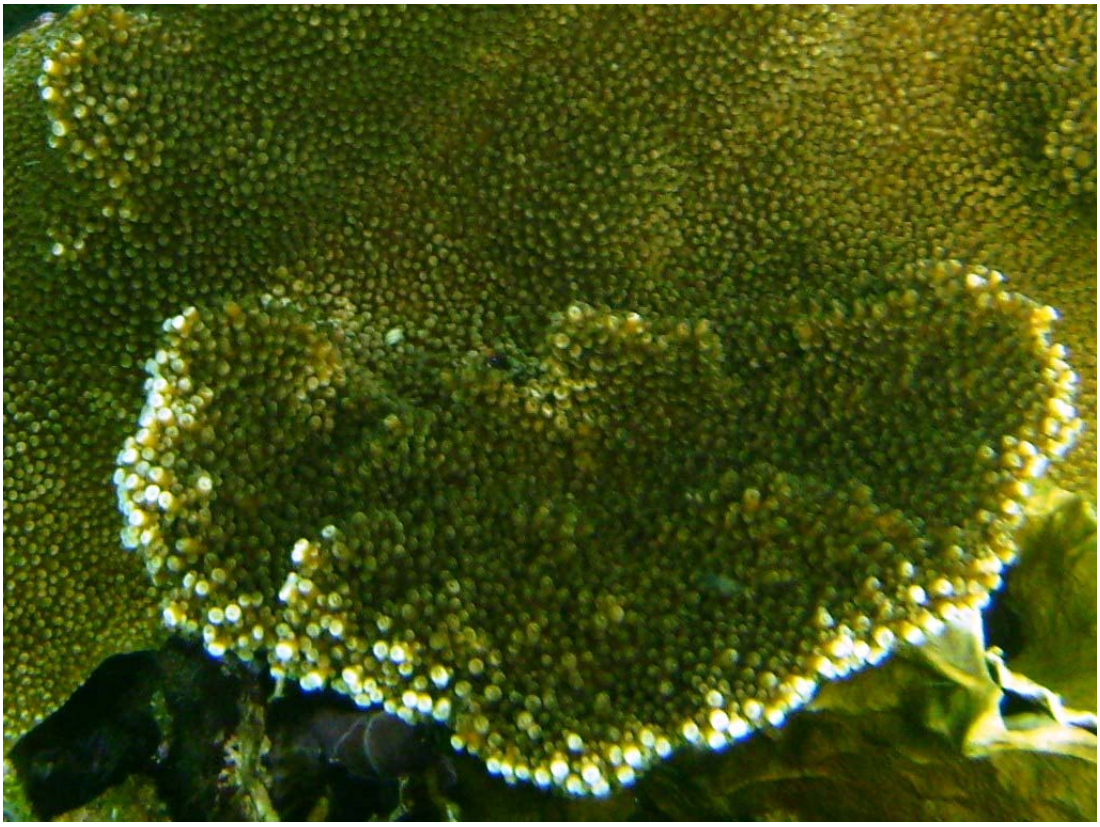


Figure 26. Colony of *Acropora palmata* at shallow-reef area adjacent to eastern shore at the mouth of Coral Bay.

6.06.3 Fish

A total of 95 individual fish were identified during the seagrass transect surveys. All fish located within two meters of the transect line (2 m wide belt) were counted. These 95 fish were divided between 11 separate species. Juvenile yellowtail snapper were the most common fishes observed in the seagrass areas on the western portion of the project. Within the seagrasses we also noted the abundant damselfish (*Stegastes* spp.), juvenile grunts (*Haemulon* spp.), numerous small juvenile parrotfishes (*Sparisoma* spp.), especially the bucktoothed parrotfish (*Sparisoma radians*). Around a few sunken derelict vessels, we noted larger snapper species (*Lutjanus apodus* and *L. griseus)*. No fish were observed in areas of barren soft-bottom habitat.

Fish observed in Coral Bay along seagrass belt transects.

Common Name	**Scientific Name**	**Total Number Observed**
Yellowtail snapper	*Ocyurus chrysurus*	24
Cocoa damselfish	*Stegastes variabilis*	16
Bucktooth parrotfish	*Sparisoma radians*	9
Juvenile parottfish	*Sparisoma* spp.	5
Beaugregory dameselfish	*Stegastes leucostitis*	5
Spotted Goatfish	*Pseudupeneus maculatus*	5
Tomtate	*Haemulon aurofrenatum*	4
White grunt	*Haemulon plumieri*	5
Schoolmaster snapper	*Lutjanus apodus*	7
Blue Tang	*Acanthurus coeruleus*	5
Mangrove snapper	*Lutjanus griseus*	6
Blue runner	*Caranx crysos*	4

6.06.4 Essential Fish Habitat (EFH)

Dial Cordy and Associates Inc. (DC&A) was contracted by T-Rex St. John, LLC to prepare an Essential Fish Habitat (EFH) Assessment for potential impacts to nearshore and hardbottom habitat associated with proposed construction of an approximate 100-wet-slip marina at Coral Bay, St. John, U.S. Virgin Islands.

Avoidance and minimization of effects associated with the project have been achieved through revised design by Moffatt & Nichol. The number of wet slips has been reduced to 92, and the slip structure has been pulled back toward the north shore in order to avoid unnecessary impacts to seagrass beds. The proposed facility will incorporate the following:

- 92 wet slips for vessels from 35 to 70 feet in length
- 30 dry storage slips for vessels under 35 feet
- Septic pump-out facilities
- Fuel facilities
- Use of wave-attenuation panels
- Flexibility to accommodate a few vessels up to 150 feet
- Accommodations for transient boaters and dinghies

- Retains marine service capability
- Public boat ramp and navigational channel to the bay
- Dock master building
- Parking

Most of the land-side facilities would be constructed on previously developed terrain, but filling a small area of wetlands would also be unavoidable in order to site the facilities in an area with the least impact while maximizing the efficiency and use of the facility and available real estate. Along the shoreline, a mangrove fringe is present, which must be filled to provide access between the various sections of the facility (buildings, docks, etc.). Other impacts to EFH include direct removal of both seagrasses and unvegetated soft-bottom habitat, and indirect effects on seagrasses due to shading due to docks and vessels. Indirect effects to the water column may include temporary increases in turbidity due to dredging the small navigational channel extending from the boat ramp to the bay. The text in below sections describes the existing conditions as well as these potential impacts in greater detail.

Introduction

St. John's habitats cannot be compartmentalized and discussed in isolation from each other in that mangroves, reefs, and SAV beds provide each other interactive protection. Reef systems disperse wave energy from sheltered areas allowing SAVs and mangrove wetlands to thrive. SAVs stabilize and bind fine sediments and nutrients that could affect turbidity and nutrient sensitive reef coral. Mangrove fringes act as depositional areas for heavier sediments washed from upland areas during rain events. Such habitats from upland fringes through quiescent SAVs and beyond the reef systems are shelter, foraging grounds, reproduction/nursery grounds for many fish species. St. John's coastal habitats are interconnected biologically, physically, and chemically (CAFMP 2005).

See Appendix E for the complete Essential Fish Habitat Assessment

6.07 Site Characteristics

Virgin Forest Restorations undertook a Terrestrial Survey for Parcels 10A, 7 and 10C. See Appendix F. However, the Sirius Marina is located on the eastern portion of Parcels 10A and this report only addresses this Marina property.

Developed Coastal Plain

This segment of the property is the least natural. It consists mostly of grazed recreational field, a derelict park, and parking lots surrounding a boatyard, and a restaurant and gift shop complex. Many of the larger trees were planted. The grandest specimen is a picturesque Rain tree *(Samanea saman),* rooted just east of the basketball court, providing shade for the bleachers at courtside. Also, some large *Ficus* trees grow in an abandoned park seaward of the Guy Benjamin School. Seaward of the park and ball field were the scrub thicket and natural shoreline communities.

Scrub Thicket

Approaching the shoreline, deeper soils give way to shallower, more saline soils. This zone is covered in "Scrub Thicket". This dry shrub land association was typified by two abundant shrubs, Yellow maran *(Croton rigidus),* and Pipe organ cactus *(Pilosocereus royenii).* A few trees were prevalent, including Nothing nut *(Cassine xylocarpa),* White frangipani *(Plumeria alba),* Mountain grape *(Coccoloba microstachya),* Wild tamarind *(Leucaena leucocephala),* Stink casha *(Acacia macracantha),* and Pink cedar *(Tabebuia heterophylla).* Other common shrubs were Century plant *(Agave missionum),* White maran *(Croton astroites),* Bread-and-cheese *(Pithecellobium unguis-cati),* Christmas bush *(Comocladia dodonaea),* Yellow sage *(Lantana camara),* Cankerberry *(Solarium racemosum),* and. Vines included Clashie malashie *(Jacquemontia pentanthos), Passiflora foetida,* and *Convolvulus nodiflorus.* Ground-layer species were Hurricane grass *(Bothriochloa pertusa),* salt grass, finger grass *(Chioris barbata),* Guinea grass *(Urochloa maxima),* and *Oplonia spinosa.*

Ball field below Emmaus Moravian Church (left center).

Scrub thicket south of Guy Benjamin School.

Mangrove communities

Mangroves of this property may be divided into two distinct sub-communities, "fringe mangroves" and "basin mangroves". Fringe mangroves consist of Red mangrove trees *(Rhizophora mangle)*mixed with occasional Black mangroves *(Avicennia germinans*) which fringe the shoreline on the west and east sections of Parcel 10A. These fringe mangrove communities exhibited occasional inclusions of vines, which were rooted landward, growing seaward. Fringe mangroves commonly front a landward berm, on which many halophytic species thrive. The mangroves on the west section of the property contain abundant White mangrove *(Laguncularia racemosa)* trees, and the salt-loving shrub, *Bontia daphnoides.*

6.08 Wetlands

Wetlands are defined by the U.S. Army Corps of Engineers (USACE) as "those areas that are periodically inundated or saturated by surface or groundwater (including seawater) at a frequency and duration sufficient to support and under normal circumstances do support, a prevalence of vegetation typically adapted (hydrophytic vegetation) for life in saturated soil conditions (hydric soils)." (USACE 1987). Biologists from Dial Cordy certified in USACE wetland delineation methods performed wetland field surveys in December 2014.

There are no terrestrial wetlands at the proposed project site as shown on the St. John NE Wetlands map.

6.08.1 Mangroves

The Red mangrove (*Rhizophora mangle*) is the most common wetland plant species colonizing the shoreline in northern Coral Bay. It has large broad leaves grow to 5 inches (12cm) and terminate with a blunt point. The leaves are waxy, dark green above and pale green below. The trunk and limbs have grey bark that covers a dark red wood. The key characteristics of the Red mangrove are the "prop roots" derived from the trunk and “drop roots” from the branches. The seedling or propagule is almost 6 inches long (l5 cm) and cigar-shaped.

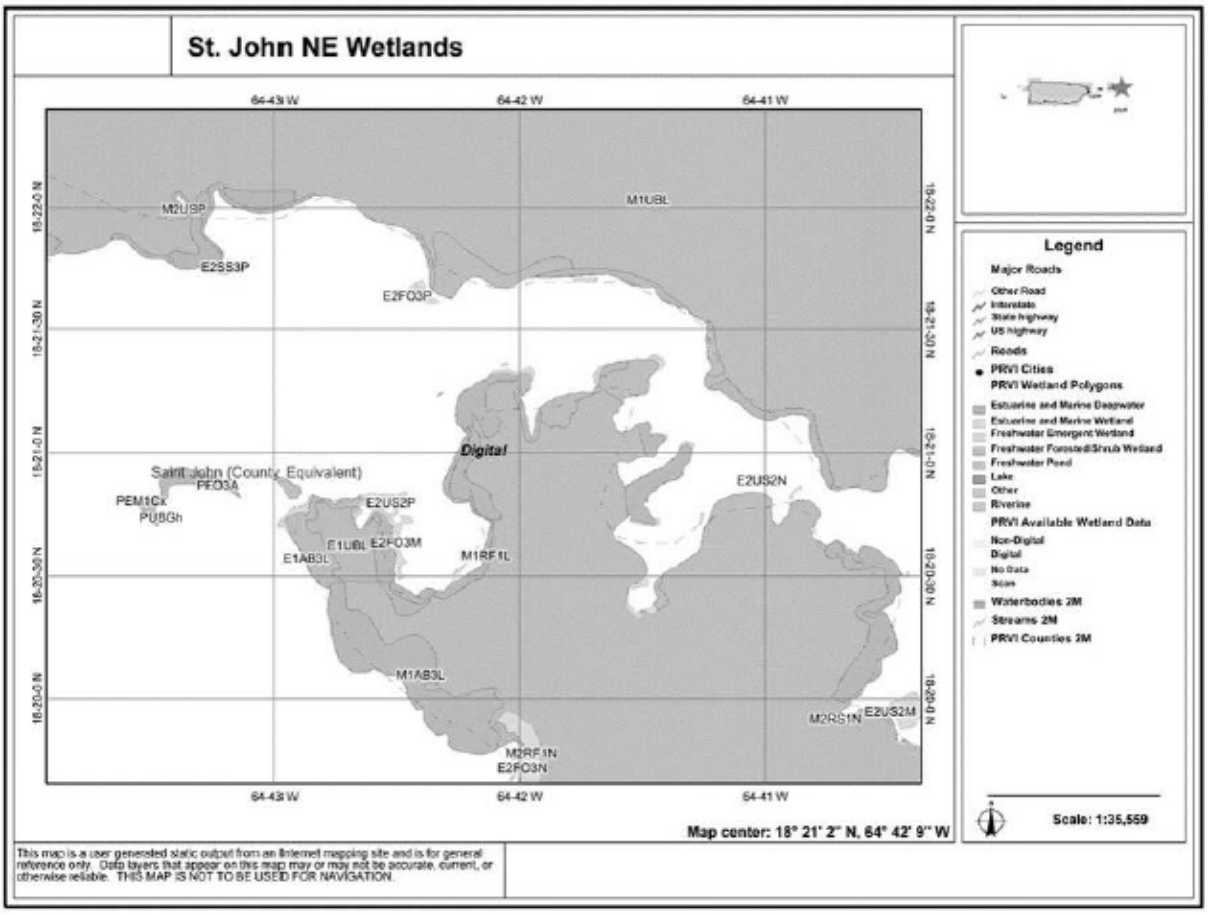


Figure 27. Wetland map of southeast St. John, USVI.

6.08.1 Mangroves

The Red mangrove (*Rhizophora mangle*) is the most common wetland plant species colonizing the shoreline in northern Coral Bay. It has large broad leaves grow to 5 inches (12cm) and terminate with a blunt point. The leaves are waxy, dark green above and pale green below. The trunk and limbs have grey bark that covers a dark red wood. The key characteristics of the Red mangrove are the "prop roots" derived from the trunk and “drop roots” from the branches. The seedling or propagule is almost 6 inches long (l5 cm) and cigar-shaped.

The second-most common species in the fringe community is the Black mangrove (*Avicennia germinans*). This tree is found in the disturbed wetland adjacent to the current dock facility in front of the “Skinny Legs” marina and restaurant. The elliptical, green leaves approach lengths of 4 inches (10cm) and are often encrusted with salt. The leaf undersurface is covered with dense hairs. The bark is dark and scaly. The key characteristics of the Black mangroves are the aerial roots known as pneumatophores born from underground horizontal cable roots. The propagules are approximately one inch (2-3cm) long and lima bean shaped.

The dense root systems of the salt-tolerant mangrove trees trap organic material, such as decaying plants, brought in by tidal flooding. The smaller creatures in a mangrove swamp, such as shrimp and small fish, feed on this decaying plant matter. And as the food chain goes, larger fish feed on the smaller animals and larger animals feed on the larger fish. Additionally,

mangrove roots prevent erosion by holding and trapping sediment in place.

The total area of delineated mangroves fronting Coral Bay along the entire property is 3.440 ac. The total area of mangroves within project boundary only is equal to 2.431 ac. Field photographs depicting the fringing mangrove shoreline wetlands are shown below. Based upon current marina plan, we anticipate approximately $10m^2$ of mangrove impacts in and around the vicinity of the current "Skinny Legs" dock structure.

Fringing mangrove wetlands delineated along the northern shoreline of Coral Bay (shaded in light blue). Note location of proposed marina (in yellow).

Oblique angle view looking towards the northwest of the mangrove shoreline fringing Coral Bay.

View of mangrove trees adjacent to present “Skinny Legs Marina” dock structure in the northeast corner of Coral Bay.

Rapid transition from red mangrove wetland (left) to rocky escarpment covered with upland plants (right).

Red mangrove wetland located in northeast corner of Coral Bay.

Borrows of the mangrove crab *Ucides cordatus* in hydric soils adjacent to red mangrove dominated mangrove in northeastern corner of Coral Bay.

Culvert at base of ghut with freshwater discharge from Coral Bay watershed that discharges directly into red mangrove wetland in the northeastern corner of Coral Bay.

6.08.2 Mangrove Mitigation Plan

To mitigate for the 10m^2 area of direct mangrove impacts we propose replanting portions of the shoreline where mangroves have been cleared for boat launches and storage. We will collect local red mangrove propagules and plant these on ½ m spacing along the shoreline. We have calculated at least 100m^2 within the project area that can be replanted and restored. In addition, there are a number of abandoned, derelict vessels that have been thrown into the mangroves in past hurricanes and tropical storms. These vessels will be removed and any injured mangroves areas be replanted as necessary.

Shoreline along northern Coral Bay that has been locally denuded of mangroves by the launching and storage of boasts. These areas will be eliminated once the marina is constructed.

6.09 Rare and Endangered Species

6.09.1 Rare and Endangered Species

Within the project area there are a number of federally listed marine species protected under the US Endangered Species Act that may be present.

NOAA FISHERIES
Southeast Region
Protected Resources Division

U.S. Virgin Island's Threatened and Endangered Species

For more information on listed species please visit:
http://www.nmfs.noaa.gov/pr/species/esa/listed.htm
http://sero.nmfs.noaa.gov/protected_resources/index.html

Marine Mammal Species	Scientific Name	Status
blue whale	*Balaenoptera musculus*	Endangered
fin whale	*Balaenoptera physalus*	Endangered
humpback whale	*Megaptera novaeangliae*	Endangered
sei whale	*Balaenoptera borealis*	Endangered
sperm whale	*Physeter macrocephalus*	Endangered
Sea Turtle Species		
green sea turtle	*Chelonia mydas*	Threatened[1]
hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
leatherback sea turtle	*Dermochelys coriacea*	Endangered
loggerhead sea turtle	*Caretta caretta*	Threatened[2]
Fish Species		
scalloped hammerhead shark	*Sphyrna lewini*	Threatened[3]
Invertebrate Species		
pillar coral	*Dendrogyra cylindrus*	Threatened
rough cactus coral	*Mycetophyllia ferox*	Threatened
lobed star coral	*Orbicella annularis*	Threatened
mountainous star coral	*Orbicella faveolata*	Threatened
boulder star coral	*Orbicella franksi*	Threatened
elkhorn coral	*Acropora palmata*	Threatened
staghorn coral	*Acropora cervicornis*	Threatened

Critical Habitat Designations

For final rules, maps, and GIS data please visit:
http://sero.nmfs.noaa.gov/maps_gis_data/protected_resources/critical_habitat/index.html

Leatherback sea turtle: Coastal waters adjacent to Sandy Point from the mean high tide line to the hundred fathom curve, St. Croix, U.S. Virgin Islands.

Elkhorn and Staghorn corals: There are four designated marine areas in Florida, Puerto Rico, and the U.S. Virgin Islands (i.e., St. John/St. Thomas, and St. Croix).

[1] Florida's breeding population is listed as endangered.
[2] Northwest Atlantic distinct population segment.
[3] Central and southwest Atlantic distinct population segment.

NOAA-NMFS list of protected marine species for the USVI (NMFS 2014).

The most common vagrant species known to occur off the waters of St. John include the leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) sea turtles. Hawksbill sea turtles have regularly been sighted in the project area. Green sea turtles are often seen foraging on seagrass in the western portions of Coral Bay. The project will impact seagrass beds (SAV) through the installation of the docks. Seagrass is considered critical foraging habitat for sea turtles. While these minor seagrass impacts are anticipated, the impacts to sea turtles should be negligible due to offsetting seagrass mitigation/restoration efforts. The project shoreline consists primarily of a narrow mangrove fringe that is not suitable nesting habitat for these turtles. Thus, the project will have no impact on nesting turtle populations. Due to boat traffic within Coral Bay there is a potential for turtle strikes from boats transiting the area.

We do not anticipate any protected cetaceans (whales) utilizing the shallow water located in the northern reaches of Coral Bay.

Presently no listed coral species exist within the project area. However, Coral Bay and surrounding areas have been designated as Critical Habitat for the elkhorn (*Acropora palmata*; NMFS 2008). Colonies of *Acropora palmata* have been identified on the far eastern margin at the mouth of Coral Harbor, more than than 1 km from the project footprint. Recently, five coral species have been added as Threatened under the Endangered Species Act by the National Marine Fisheries Service. These species include: *Dendrogyra cylindrus, Orbicella annularis, Orbicella faveolata, Orbicella franksi* and *Mycetophyllia ferox*. Corals of the *Orbicella annularis* species complex have been identified from the both the eastern and western side of the harbor mouth. The location of these species are more than 1 km from the project footprint.

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.

In order to avoid and minimize an injury or death to marine mammals and sea turtles the following NMFS measures form the Vessel Strike Avoidance Measures and Reporting for Mariners will be taken by all vessels associated with the project and fuel transfer operation:

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.

Sea turtles are known to be affected by the ensonification of the water created by pile driving activities. Sirius Marina will implement an acoustical monitoring plan during all pile driving. A 500-m safety zone shall be established around the project area for sea turtles and marine mammals. Trained observers will be used to visually monitor the safety zone for at least 30 minutes prior to beginning all noise creating in-water activities. If at any time a sea turtle or marine mammal is observed in the safety zone the operation will be shut down until the animal has left the safety zone of its own volition.

Observations for protected species will occur at least twice a day to maintain watch for animals in the area, and ensure the curtains are functioning properly. If at any time an animal is observed in the safety zone during the noise creating in-water activity, work shall cease until the animal has left the area of its own volition, or coordination with a DPNR representative has occurred, if the animal is injured.

Records will be maintained of all sea turtle and marine mammal sightings in the area, including date and time, weather conditions, species identification, approximate distance from the dredging area, direction and heading in relation to the dredging area, and behavioral observations. When animals are observed in the safety zone, additional information and corrective actions taken such as a shutdown of rock breaking/dredging equipment, duration of the shut-down, behavior of the animal, and time spent in the safety zone will be recorded. Reports will be provided to NMFS, COE, and CZM.

Pelicans (*Pelecanus occidentialis*), a federally listed endangered species, frequent the nearby shorelines and often roost on vessels in the harbor. These species will not be affected by the dredging, these birds have been seen to roost on the dredge barges during dredging.

Impact of Development

The permitting of this facility will not displace any rare, endangered, or threatened species from

its natural area or habitat. The proposed methods above will help minimize impacts to endangered species during construction and operation.

The dredging will result in resuspension of sediment during the dredging and dewatering. Turbidity barriers (type II or III) will be installed to control turbidity during all in-water activities and dewatering to minimize impacts of turbidity on the surround marine environment and the listed and nominated coral species and a water quality and environmental monitoring plan will be implemented to monitor the control devices and to assess their efficiency, if the control devices are found to be inadequate additional measures will be implemented. ESA listed species and critical habitat are within the immediate vicinity of the dredging area.

6.09.2 Acoustic Impact Minimization and Protected Species Protection

Acoustic Minimization and Mitigation Plan

Sound in water moves four times faster than in air, and attenuation and dissipation of that sound is lower in water than air. When an in-water sound is generated, a pulse is created that radiates out from the source. Geotechnical conditions (e.g. substrate density) and ocean conditions (e.g. surface condition, current strength, depth of water, salinity, suspended solids in water column) affect the propagation and the attenuation of in-water sound. Attenuation depends on both the frequency and distance travelled, in that as both increase, attenuation increases (Richardson et al. 1995). Sound typically dissipates more rapidly in shallow, turbid waters over soft substrates (the conditions presently encountered in Coral Bay).

Underwater sound in the marine environment is generated by a broad range of sources, both natural and human (anthropogenic). Open ocean ambient sound has been recorded between 74 and 100 dB off the coast of central California (Heathershaw et al. 2001). Ambient noise levels for other water bodies based on surveys generally follows in this range. Based on deep-water studies in the Northeastern Pacific, low-frequency background sound has doubled each decade for the past forty years as a result of increased commercial shipping (Andrew et al. 2002, McDonald et al. 2006) resulting in a 15 to 20 dB increase in ambient conditions compared to preindustrial levels. Table 1 identifies ambient underwater sound levels at various open water and coastal water locations.

Environment	Location	Ambient Noise Levels (dB_{PEAK} unless noted)	Source
Open ocean	Central coast, CA	74 – 100	Heathershaw et al. 2001
Open ocean	Beaufort Sea, AK	80 – 83	Roth 2012
Coastal water	Prudoe Bay, AK	80 – 87	Roth et al. 2012
Marine surf	Fort Ord Beach, CA	138	Wilson et al. 1997
Large marine bay, heavy industrial use, and boat traffic	San Francisco Bay, CA	120 – 155 or 133 dB_{RMS}	Strategic Environmental Consulting, Inc. 2004
Large marine bay, heavy commercial boat traffic	Elliot Bay, WA	147 – 156 or 132 – 143_{RMS}	Laughlin 2006
Large marine bay, nearshore, heavy commercial, recreational boat traffic	Monterey Bay, CA	113	O'Neil 1998

Table 1 - Ambient Noise Levels (RMS refers to rate-mean-square)

Based on the above it can be predicted that in Coral Bay would have a dBPEAK of somewhere below 80-87 dBpeak range based on the light commercial and recreational boat traffic observed in the project vicinity.

Potential Impacts

Pile driving has been studied for its impact on noise in the marine environment and its residents (Fish, marine mammals, etc.). Underwater noise from impact pile driving is impulsive in nature and the sounds are created by the pile and the substrate it strikes. Research has shown how to reduce noise from pile driving. Creating a physical barrier is an effective method to reduce the noise between 15-23dB (Peak). (Spence et al, 2007). One such method is the use of bubble curtains. To be effective a bubble curtain has to completely surround the pile (or area in which the noise is being created) through the entire water column.

US Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS), have developed threshold values, values that elicit some response from a target species, for making effect determinations for Endangered Species Act (ESA) listed species as follows:

- Detectability threshold (where the noise is detectable, but reactions are not observable).
- Alert and disturbance threshold (alert is where the noise has been identified by the target species, interest is shown; disturbance is where the target species shows avoidance of the noise by hiding, moving, or postponing feeding).
- Harassment/injury threshold (where the target species is actually injured).

NMFS's current thresholds for impulse noises (ex. impact pile driving) and non-impulse noises (ex. vibratory pile driving, dredging, etc.) for marine mammals are listed in the table below.

Criterion	Criterion Definition	Threshold
Level A	PTS (injury) conservatively based on TTS	190 dB_{rms} for pinnipeds 180 dB_{rms} for cetaceans
Level B	Behavioral disruption for impulsive noise (e.g., impact pile driving)	160 dB_{rms}
Level B	Behavioral disruption for non-pulse noise (e.g., vibratory pile driving, drilling)	120* dB_{rms}

All decibels referenced to 1 micro Pascal (re: 1µPa). Note all thresholds are based off root mean square (rms) levels.

* The 120 dB threshold may be slightly adjusted if background noise levels are at or above this level.

Table 2. Thresholds for Impulse & Non-Impulse Noises for Marine Mammals

Based on recommendations of the Fisheries Hydroacoustic Work Group (FHWG) in June of 2008, the current sound thresholds from impulse noises (such as pile driving) that cause injury to fish are:

- 206 dBPEAK
- 187 dB cSELfor fish > 2 grams
- 183 dB cSEL for fish < 2 grams

The in-water sound energy from pile driving occurs at lower frequencies between 100 Hz and 1 kHz. Typical sound levels from a single strike on a pile or hammer can range from 208 dBPEAK to 220 dBPEAK (Reyff 2003). The in-water sound is affected by hammer equipment and material (steel), the size of the hammer, the geotechnical conditions (e.g.driving resistances), and the water depth. This level is within the range of NOAA's predicted injury to whales and dolphins and injury to fish. Vibratory hammer activities should be below that range. The threshold for behavioral impacts for all fish is 150 dBRMS (FHWG 2008). The designation cSEL indicates the "sound exposure level in octave C".

Proposed Minimization Methods

All three federal rare and endangered sea turtle species are known to occur in the offshore waters of St. John and could be found within the project area. These include: hawksbill (*Eretmochelys imbricata*), leatherbacks (*Dermochelys coriacea*) and green turtles (*Chelonia mydas*). Abundant foraging habitat for both hawksbill and green turtles occurs both within and immediately adjacent to the proposed project area. Accordingly, the following measures will be implemented to minimize noise impacts to protected species of sea turtles and marine mammals.

It is not anticipated that the pile driving will result in direct injury to these species but it is probable that this could result in changes to their behavior if they were to come into in the area. It is also possible that these species may be stressed by the noise. In order to minimize that impact to sea turtles and all other protected species, mitigation measures will be implemented to minimize the noise that will be created during pile driving activities.

To minimize in-water noise impacts, a vibratory hammer will be used to drive piles wherever feasible. Vibratory hammers are recommended by NOAA as that they have a lower acoustic impact. Based on this information if a vibratory hammer is used the sound created during construction should be no greater than 120 dB. This is below the threshold level at which injury occurs.

Numerous methods of additional noise reduction have been reviewed and the most feasible methods will be the use of an in-water noise attenuation system (e.g. bubble curtain or similar performing system), will further reduce the in-water sounds produced by the hammer. These will be deployed in all areas of pile driving work to further attenuate underwater noise levels in the project area. It is anticipated that this barrier will result in a reduction of noise of between 15 and 23 dB.

In order to determine the impact of the project and the effectiveness of the bubble curtain, a noise baseline will be established prior to all work using an Acoustic Sensor with a 10 meter

underwater capability. Once the project begins sound measurements will be analyzed in and outside of the curtains and at distance from the pile driving activity. The distance at which the sound has sufficiently been attenuated will be determined. If the barriers are found to be effective in limiting the sound below that which results in injury to the species they will be maintained throughout the project. If the curtains are found to be ineffective additional methods will be devised to abate the noise below the level at which they result in harm to the listed species.

A baseline of existing noise will be established by taking readings at all water quality monitoring stations for one month prior to start of dredging. Readings will be taken during both periods where vessels are traversing the area as well as when there is limited activity. This data will be used to determine what the ambient noise is within the harbor.

Once the project starts and the distance at which the noise can cause potential injury to the animals is determined a knowledgeable monitor will monitor the potential impact area during all pile driving activity. In addition a 500-m safety zone shall be established around the project area for sea turtles and marine mammals. Trained observers will be used to visually monitor the safety zone for at least 30 minutes prior to beginning all noise creating in-water activities. If at any time a sea turtle or marine mammal is observed in the safety zone or the zone at which noise is known to be injurious the operation will be shut down until the animal has left the safety zone on its own accord.

Observations for protected species will occur at least twice a day to maintain watch for animals in the area, and ensure the curtains are functioning properly. If at any time an animal is observed in the safety zone during the noise creating in-water activity, work shall cease until the animal has left the area of its own volition, or coordination with a DPNR representative has occurred, if the animal is injured.

Records will be maintained of all sea turtle and marine mammal sightings in the area, including date and time, weather conditions, species identification, approximate distance from the dredging area, direction and heading in relation to the dredging area, and behavioral observations. When animals are observed in the safety zone, additional information and corrective actions taken such as a shutdown of rock breaking/dredging equipment, duration of the shut-down, behavior of the animal, and time spent in the safety zone will be recorded. Reports will be provided to NMFS, USACE, and CZM on a monthly basis.

6.10 Air Quality

This area of St. John is designated Class II by the Environmental Protection Agency in compliance with the National Ambient Air Quality Standards. In Class II Air Quality Regions the following air pollutants are regulated: open burning, visible air contaminants, particulate matter, volatile petroleum products, sulfur compounds and internal combustion engine exhausts. The site is not affected by atmospheric pollutants (other than natural marine aerosols) since it is downwind mostly of the sea.

There will be a minor increase of air pollution at the site during the dredging operation and minor increase in air pollution due to construction activities. This unavoidable minor pollution will be temporary. The project will not permanently generate any air pollutants. The on-site generator is for emergency only.

7.00 Impact of the Proposed Project on the Human Environment

7.01 Land and Water Use Plans

The upland of the proposed maintenance dredging operation is zoned W-2, Waterfront Industrial. The W-2 zoning allows for Marinas, dry docks, WWTP, marine repairs, retail, and provisioning. Surrounding land uses include: resort; residential; retail; restaurants.

Under the Coastal Zone Management Act (CZMA) of 1972, the U.S. Virgin Islands DPNR designated Coral Bay as one of 18 Areas of Particular Concern (APC) in 1979. The Coral Bay APC was approved in 1991 after the Coastal Zone Management Commission held public hearings on St. Croix, St. John, and St. Thomas.

The Coral Bay APC Management Plan was developed as a planning document to better understand the resources and concerns in the area. Sirius Marina has been developed to meet the objectives of the APC.

7.02 Visual Impacts

The visual impacts of the marina dock itself will not be any more than presently existing as much of that area right now has boats mooring in it. The docks themselves will be approximately 36-44 inches above sea level and, as such, will not visually impact the surrounding areas. The area where the parking will be located will take advantage of the natural grade from Route 10, down to the shore, such that it will not be visible from Route 10. The land-based buildings themselves consist of a Dry-Stack Storage Building that is approximately 35 feet in height, and a Single-Story Marina Building. These buildings will be clad with similar exterior finishes that will be utilized for the future resort nearby. While the dry-stack building will be primarily a pre-engineered structure, it will be clad with an exterior sheathing similar to a "Hardie" board to simulate the shiplap siding that will be used throughout the development. The marina building will have similar cladding. This approach to sheathing the building will bring these structures into scale with other vernacular-type buildings in Coral Bay and other St. John areas. Examples of how these structures are shown below in Figures 7.02(a), 7.02(b).

Figure 7.02(a)/Dry-Stack Storage Building

Figure 7.02(b)/Single-Story Marina Building

7.03 Impacts on Public Services

7.03.1 Potable Water

Parcel 10C is at the bottom of a major watershed and it is proposed that wells be drilled and the water used for processing thru an R/O system to produce the potable water needs for the Marina operation. A total of 4,000 gal/day is required for the Marina operation. In addition to the normal restroom requirements for employees and customers, there will be a restroom with lockers and toilets for boat owners and crew.

		Units	Gals/unit/day	Gals/day
Marina				
Slips	boats	92	20	1,840
Dry Stack	boats	30	5	150
Retail	per toilet room	2	400	800
Employees	number	15	15	225
				3,015

The water from the wells will be processed thru a brackish R/O and stored on Parcel 10A in a cistern and trucked to the Marina as needed. There will be a 18,000 gal cistern at the Marina. Potable water will be available at all slips.

7.03.2 Sewage Treatment & Disposal

The sewage from the boats pump-out and the land-side facilities will be will be approximately 75% of the potable water demand and will be treated in a tertiary 2,500 gal/day Wastewater Treatment Plant and the effluent will be used for landscape irrigation. Boat pumpout will be available at the Fuel Dock. There will be a potable pumpout cart at the dock for boats at the slips.

Based on an average rate of 2,500 g/d with an irrigation rate of 1" per week, the irrigation area needed for the WWTP effluent will be 27,500 sf.

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7.03.3 Solid Waste

Solid waste generation will be approximately:

• Provisioning	3#/100 sq.ft	2,000 sq.ft.	60 lbs/day
• Retail	2.5#/1,000 sq.ft.	1,000 sq.ft.	2.5 lbs/day
• Employees	1.25#/day	15	18 lbs/day
• Boats Slips	2.5#/day	92	230 lbs/day
			310 lbs/day

CalRecycle has estimated that over 60% of commercial and retail waste can be easily recycled which is defined as:

> **Easily Divertible Materials (recyclable):**Cardboard; Paper; Newsprint; Magazines & catalogs; Glass; Tin/Steel Cans; Major Appliances; Aluminum Cans; Other Ferrous and non-Ferrous metals; Electronics; Plastics; Organics; Landscape Trimmings; Used Oils; Lumber; and Tires.

For the Marina it can be assumed that at least 30% of the solid waste generated (cardboard, newspaper, magazines, cans, metals, etc.) can be recycled leaving about 220 #/day that will be hauled to the St. Thomas Landfill.

Solid waste generated will be contained in dumpsters and hauled at a regular schedule the St. Thomas Landfill.

7.03.4 Traffic

Access into the Marina will be off of Route 10 and is estimated to be less than 100 vehicles per day. Route 10 has a design capacity of 100+ vehicles per hour.

7.03.5 Electricity

Primary power source will be supplied by WAPA. Power requirement is estimated to be 800 kwh. Solar PV panels will be installed on the roof of the Marina Building. Three phase power will be available at all slips. There will be a 300 kwh emergency generator for all facilities except the boats at the dock..

7.03.6 Schools

The proposed Marina will not have any impact on schools as it will not be providing housing and its employees are expected to be residents of St. John.

7.03.7 Public Safety

Emergency fire and police protection will be provided by normal governmental services, with the Coral bay Fire Service Station adjacent to the property. The nearest Police Station is in Cruz Bay. In addition, the marina will have its own security and will meet all Customs and Border Protection requirements.

The Marina will meet all I.B.C. and National Fire Protection Agency Codes. All final plans will be reviewed by the Fire Marshall.

Impacts on health facilities should be limited to emergency services only.

7.03.8 Landscaping

Most of the landscaping throughout the site will be installed during the construction of the future resort. This will be to avoid potential damage to the plants as construction will continue on the site after the marina is completed. The Landscaping Design will include native species that are salt tolerant. The palm trees utilized shall be a combination of the Puerto Rican Native Royal Palms and Phoenix Palms. Shade trees utilized shall include the Pitch Apple/Autograph Tree or Sea Grape. Shrubs will include Beach Ficus, Silver Buttonwoods and Sea Grape.

7.04 Social Impacts

In addition to providing numerous employment opportunities to the local community during construction and post-construction operations in all areas of their project, T-Rex St. John LLC, as an integral part of its dedication to community support and involvement, intends to assist in providing available training programs and educational opportunities in areas of marina operations, hotel and hospitality management, and related tourism service industries. They embrace the sentiment and efforts of the Moravian Church to elevate well-being within the community.

By providing and assisting others in making available such training and educational programs, T-Rex hopes the local V.I. population will avail themselves to these opportunities and develop the skills and experience needed to advance to higher levels in the work force and gain greater economic growth and stability in the industries indigenous to the Virgin Islands and elsewhere. They also hope to then hire those who have become qualified through such training to fill management positions in all aspects of our marina condo-hotel resort.

T-Rex/Sirius further promotes, supports and hopes to participate in establishing learning opportunities for the community youth to enable them to acquire and develop the skills and experience to elevate the quality of their lives and afford them increased access to better positions in the work force as they mature, KATS (Kids and the Sea) being an example of one such program.

In an effort in these regards, T-Rex hopes to work hand in hand with the neighbors in the community and, also, to liaison with V.I. existing educational institutions, and local businesses and industry to establish such learning opportunities for the members of the local community and our children.

The addition of the Marina, dry-stack building, new boat ramp and dingy docks and small provisioning/grocery store will provide additional services to the residents and boaters within Coral Bay.

The sizing of the Marina was based on a Coral Bay Marina Market Analysis. The Analysis arrived at the following Slip Demand Summary;

Underserved Existing Population With 6-Pax Modified 6-Pax	 20 – 30 130 – 150
Population Growth	5 - 10
Demographic Shift (by 2025)	400 - 500
Tourism	60 – 110
Boat Yard	10 – 20
Mega-yacht	Seasonal – use flex slips
Total	495 - 790

The largest contributor to slip demand is projected demand due to demographic shifts. Removing this factor results in projected slip demand ranging from 95 to 290 slips.

As some of the demand is future projection and some is site specific, the following table breaks down the projection based on present demand and demand in 10 years as well as demand with and without the project hotel and associated services. For complete Report, see Appendix I

7.05 Economic Impact

Construction of the Sirius Marina will create short term employment which will benefit the VI Government thru gross receipt and withholding taxes. The total cost for the Marina and Land-side Facilities is estimated to be
:

- Pre-construction and soft costs: $ 1,050,000
- Site Development $ 1,750,000
- Construction $ 13,000,000

$ 15,800,000

Post-construction operation of the Marina will generate VI Government revenue thru: gross receipt taxes; withholding taxes and property taxes. Post-construction employment is estimated to be:

Marina Operations

Dockmaster	1
Asst. Dockmaster	1
Clerical	4
Dock Hands	5
Total	**11**

Services / Tenant Employees	
Service Yard	4
Yacht Maintenance	2
Dive Shop	4
Sail Charter	6
Boat Rental	3
Jet Ski Rental	3
Fishing Charter	6
Island Tours	4
Provisioning	12
Total	**44**

There will also be additional employment and tax revenue from off-property services that will support the Marina, such as taxi and restaurants.

7.06 Impacts on Historical and Archaeological Resources

Soltec International undertook a Phase I Archaeological Survey for Lease areas A and B Area B was a portion of land north of Route 10 that is no longer a part of the development. Lease area A includs the W-2 property that is the land-based portion of the Marina. The investigation utilized shovel testing and trenches and were designed and implemented to identify the presence or absence of submerged historic and pre-historic remains. The Phase I Archaeological Survey performed for Lease Areas A indicates that no potentially significant archaeological contexts are present within the surveyed areas. See Appendix F for the complete Report.

Maritime archaeologists from Panamerican conducted an intensive remote-sensing survey of a proposed marina development on St. John, U.S. Virgin Islands. The remote-sensing survey consisted of a magnetometer survey to determine the presence or absence of submerged anomalies or targets within the project area that might represent the remains of historic shipwrecks. However, results of the magnetometer survey revealed an absence of potentially significant magnetic anomalies within the project area.

Results of the current remote-sensing survey recorded several small magnetic anomalies. However, because of visual confirmation of the anomaly sources (i.e., vessels, moorings), as well as the overall intensive modern use-history of the area, the anomalies are not considered to be representative of potentially significant submerged cultural resources. Therefore, it was the opinion of the Principal Investigator that no potentially significant submerged cultural resources will be impacted by proposed project activities, and that the project area should be given clearance relative to submerged cultural resources permit issues. See Appendix G for complete Report

7.07 Recreational Use

During construction and during the dredging there will be some interruption to the public that use the existing boat ramp and dingy dock. Where possible, an alternate dingy dock will be constructed for public use. Upon construction, the proposed Marina will continue to provide

public access to a boat ramp and dinghy docks. Parking will be available for residents and boaters. Other than the displacement of a few legal and illegal boat moorings, recreational use of the upland and Coral Bay will remain as is.

7.08 Waste Disposal

No hazardous wastes are anticipated to be generated during the construction of the Marina. Demolition and construction waste will be stored on site in dumpsters and hauled to the St. Thomas landfill.

7.09 Accidental Spills

A crucial element of the operation of any marina is the ability to control accidental spills. A Spill Prevention Control and Countermeasure Plan (SPCC) will be developed. Prior to operation of the Marina, the plan submitted to DEP, DPNR for approval. In addition, marina personal will completed an OSHA 8-hour course for hazardous waste operators of marinas. The marina manager will completed a 40-hour course for Hazardous Waste Operations for Marina Operators.

It is proposed that the two 10,00 doubled walled fuel tanks be buried under the concrete apron. Prior to installation, a Facility Operators Permit would be applied for and approved by the Division of Environmental Protection, DPNR. These tanks will meet all local and federal requirements such as doubled wall, automatic detection sensors, etc.

A Spill Prevention, Control and Countermeasure (SPCC) Plan will be prepared and submitted to DPNR and US Coast Guard for review and approval pior to operation of the Marina.

7.10 Potential Adverse Effects Which Cannot Be Avoided

Marina:

The dredging will result in the loss of 3,170 sq. meters (34,100 sq. ft.) of associated macro algal and sparsely scattered sponges.

The area of dredging is proposed for an entrance channel to the marina and is located over barren soft-bottom habitat. The total bottom area to be dredged is 34,100 sq. ft and its dredging will not directly impact any seagrasses or submerged aquatic vegetation.

In addition, the project will also impact approximately 218 m^2 of seagrass due to the emplacement of approximately 420 piles ranging from 14 - 18" in diameter. To minimize the direct impact of pilings, seagrasses within the piling footprints will be removed prior to emplacement of the piles and transplanted as part of the seagrass mitigation measures.

The boats utilizing the slips along the dock structures will shade another XX acres of seagrass. We have used maximum occupancy as a most conservative estimate for secondary shading impacts.

The material to be dredged ranges is primarily silty sand with some clay and stringent

turbidity controls will be required in order to minimize impact to the surrounding benthic communities.

There are sparsely scattered sponges within the project area which will be lost as a part of the project.

Water quality impacts have the potential for impacting the benthic habitat within the area. It will be imperative to maintain existing water quality to the greatest extent possible. Once the Marina is complete there should be an improvement in Coral Bay as there will be pumpout capability at the Marina.

Land-based Facilities:

The Marina building, parking, dry-stack building and boat ramp area is currently being used for boat storage and small boat repairs and is primarily dry scrubs, sparse ground cover and Guinea grass. Some wetlands will be removed and mitigated.

8.00 Mitigation Plans

Several aspects of the Project are expected to mitigate the environmental impacts. These are:

1. Use of best available management practices for the control of turbidity.
2. Use best available management practices for erosion and sedimentation control.
3. Provide employment opportunities for residents of St. John for construction and Marina operation and associated businesses. Provide non-traditional jobs for residents in the marine industry.
4. Maintain and provide additional tax revenue to the V.I. Government.
5. A Water Quality Monitoring and Submerged Aquatic Vegetation Mitigation Plans have been developed, see Sections 6.05.3 and 6.06.1.3
6. Create and provide a central point for local and tourist activities, which is projected to have a positive and far-reaching impact on the image and economy of St. John and Coral Bay.

9.00 Alternatives to Proposed Action

In reviewing available land for a Marina, zoning is a major obstacle. A portion of Parcel 10A is zoned W-2 Waterfront Industrial and is the only area in Coral Bay to allow for Boat storage and repairs. Other than VI Government lands, there are no other parcels on St. John zoned W-2.

With over two-thirds of St. John designated as a National park, there is very little land suitable for a Marina that affords the protection that the Sirius Marina has.

Leaving the property in its present condition is not a viable alternative. The decrepit and environmentally unsound present operation is not viable. There are un-permitted docks on the property and no control of activities.

Within Coral Bay, the proposed location is the best area as it is well protected from waves and wind. A larger Marina would interfere with the proposed St. John marina and disturbe more marine bottom.

Throughout the many studies and analyses that have been done in developing this plan, a common theme has been the interdependency of the elements. The land-side and marina each supports the other and would not be feasible otherwise.

A smaller Marina and support facilities would not be financially feasible.

A larger marina that would allow for mega-yachts would have a greater impact on the Coral Bay Infrastructure and possibly require extensive dredging and greater impact on the marine environment.

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

The proposed development is consistent with the goals and policies of the Virgin Islands CZM Act and with the stated policies of the Government of the Virgin Islands and will be revenue-producing over the long term.

The area is an active boating area and the construction of the Marina would improve the Coral Bay environment and provide much needed services to the local community.

The Project is not expected to have any long term negative impacts on the marine environment. It may have limited short-term impacts.

This proposed project is economically feasible and checks and balances will be in place to ensure the successful completion and operation of the dredging.

11.00 References

Organizations and Persons Consulted

Principle Preparers:

William F McComb, PE – Environmental Consultant, Principal Writer

Jaredian Design Group - John Woods

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Moffatt & Nichol – Mark Pirrello

Dial Cordy & Associates – William Precht

Moravian Church, VI Conference – Samuel Rymer

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